Tripod Data Systems, Inc.

Cirronet Radio Module installed in the Ranger X Series Handheld Computer

EMC Test Report

May 23, 2005

Report No. TRPO0007.2

Report Prepared By

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

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Issue Date: May 23, 2005
Tripod Data Systems, Inc.
Cirronet Radio Module installed in the Ranger X Series Handheld Computer

Emissions			
Specification	**Test Method**	**Pass**	**Fail**
FCC 15.207 AC Powerline Conducted Emissions:2005-04	ANSI C63.4:2003	☒	☐
FCC 15.247(d) Spurious Radiated Emissions:2005-04	ANSI C63.4:2003	☒	☐

Modifications made to the product
See the Modifications section of this report

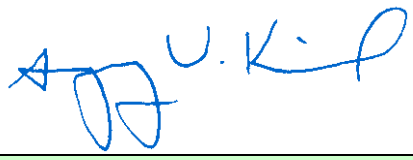
Test Facility

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		

Accreditations and Authorizations

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

NVLAP: Northwest EMC, Inc. is recognized 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.

200629-0
200630-0
200676-0

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

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

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

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.

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 and R-1025, Irvine: C-2094 and R-1943, Newberg: C-1877 and R-1760, Sultan: R-871, C-1784 and R-1761).*

BSMI: Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) 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

Explanation of Northwest EMC Performance Criteria

How important is it to understand performance criteria?

It is the responsibility of the test laboratory to observe the results of the tests that are performed and to accurately report those results. As the responsible party (manufacturer, importer, etc) it is your responsibility to take those results, compare them against the specifications and standards, then, if appropriate make a declaration of conformity. As the responsible party it makes sense that you are fully aware of the requirements, how your device performs when tested to those requirements, and what information is being used to declare conformity.

To better assist you in making those conformity decisions, Northwest EMC has adopted a very simple, yet very clear performance assessment procedure. The following criteria is used when performing immunity or susceptibility tests:

Performance Criteria 1:

- The EUT exhibited no change in performance when operating as specified by the manufacturer. In this case no changes were observed during the test.
- In most cases this would be equivalent to Performance Criteria A. When operating the equipment in the modes or configurations specified by the responsible party, monitoring the parameters specified, no changes were observed. Basically nothing happened.

Performance Criteria 2:

- The EUT exhibited a change in performance when operating as specified by the manufacturer. In this case the equipment recovered without any operator intervention, once the test signal was removed. The data sheets will detail the exact phenomena observed.
- In most cases this would be equivalent to Performance Criteria B. When operating the equipment in the modes or configurations specified by the responsible party, monitoring the parameters specified, changes were observed. The EUT was able to recover from those changes without any operator intervention, once the test signal was removed.

Performance Criteria 3:

- The EUT exhibited a change in performance when operating as specified by the manufacturer. In this case the equipment required some operator intervention in order to recover. This intervention may be in the form of changing EUT settings, or even resetting the system. The data sheets will detail the exact phenomena observed.
- In most cases this would be equivalent to Performance Criteria C. When operating the equipment in the modes or configurations specified by the responsible party, monitoring the parameters specified, changes were observed. The EUT required some sort of operator intervention to recover. There was no permanent damage and the EUT appeared to function normally after completion of test.

Performance Criteria 4:

- The EUT exhibited a change in performance when operating as specified by the manufacturer. In this case the equipment was damaged and would not recover. The data sheets will detail the exact phenomena observed.
- In most cases there is no specific criterion to compare this to; it typically ends the test. When operating the equipment in the modes or configurations specified by the responsible party, monitoring the parameters specified, changes were observed. There was no recovery; the equipment would no longer function as intended.

Each of the standards and specifications have unique performance criteria. In order to make an accurate assessment, one must compare the test results provided with the specific performance criteria. **To ensure that a responsible party is compliant with the specifications, one must read and understand those specifications. Provided below is a sample performance criteria, taken from EN 61000-6-1.**

EN 61000-6-1 Performance Criteria

Performance Criteria A: *The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.*

Performance Criteria B: *The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test degradation of performance is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.*

Performance Criteria C: *Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of controls.*

How should a device perform in order for a declaration of conformity to be made?

As already stated, it is the responsible party that must interpret and understand the results in such a way that a declaration of conformity is made. Having said that, we are often asked to render our opinion as to how a device should perform. Our recommendation simply follows the standards, as can be referenced below. Most of the standards and specifications offer the same performance criterion shown below as their requirements.

Test	Performance Criteria typically specified by the Standard	Equivalent Northwest EMC Performance Criteria
ESD	Performance Criteria B	Performance Criteria 1 or 2
Radiated RF	Performance Criteria A	Performance Criteria 1
EFT/Burst	Performance Criteria B	Performance Criteria 1 or 2
Surge	Performance Criteria B	Performance Criteria 1 or 2
Conducted RF	Performance Criteria A	Performance Criteria 1
Magnetic Field	Performance Criteria A	Performance Criteria 1
Voltage Dips and Variations	Performance Criteria B & C	Performance Criteria 1, 2, or 3

What is measurement uncertainty?

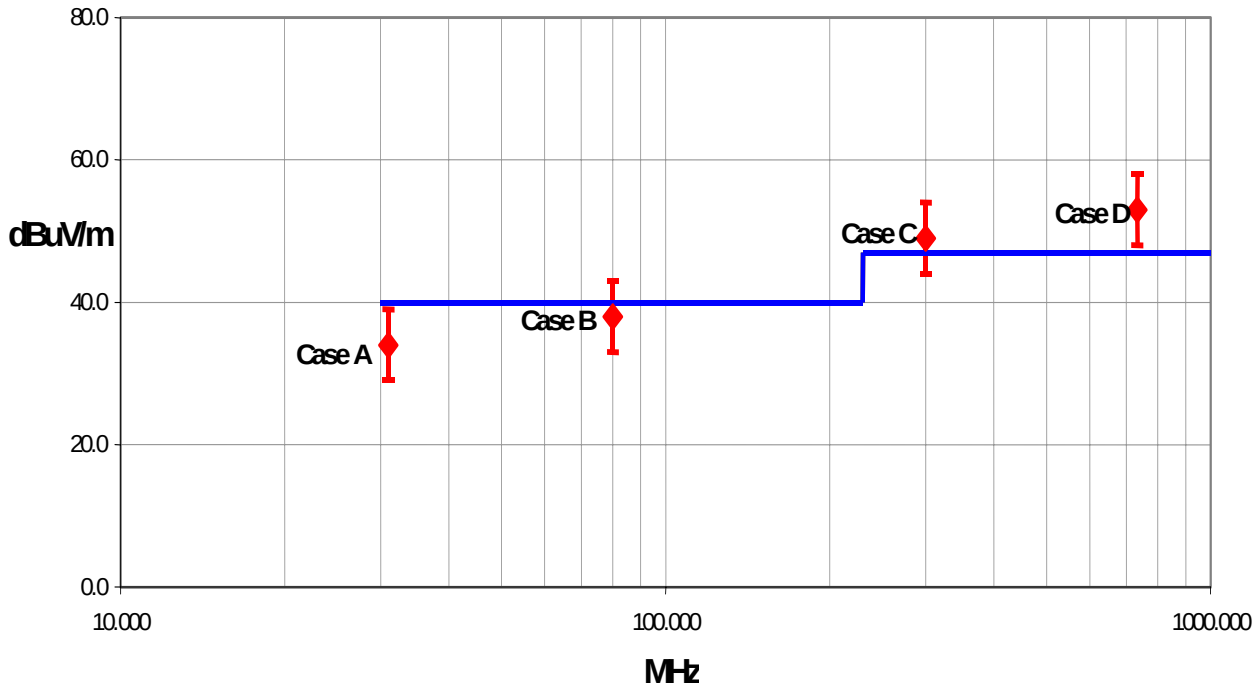
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. The following 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)					
	Probability Distribution	Biconical Antenna		Log Periodic Antenna		Dipole Antenna	
Test Distance		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)		
	Probability Distribution	Without High Pass Filter	With High Pass Filter
Combined standard uncertainty $u_c(y)$	normal	+ 1.29 - 1.25	+ 1.38 - 1.35
Expanded uncertainty ***U*** (level of confidence ≈ 95%)	normal (k=2)	+ 2.57 - 2.51	+ 2.76 - -2.70

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

Radiated Immunity		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty ***uc(y)***	normal	1.05
Expanded uncertainty ***U*** (level of confidence ≈ 95 %)	normal (k = 2)	2.11

Conducted Immunity		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty ***uc(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, uc(y) yields a confidence level of only 68%.

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Sultan, WA 98294
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FAX (360) 793-2536

Party Requesting the Test	
Company Name:	Tripod Data Systems, Inc.
Address:	345 SW Avery Ave
City, State, Zip:	Corvallis, OR 97333
Test Requested By:	Dennis York
Model:	Cirronet Radio Module installed in the Ranger X Series Handheld Computer
First Date of Test:	4/26/2005
Last Date of Test:	5/11/2005
Receipt Date of Samples:	4/26/2005
Equipment Design Stage:	Pre-Production
Equipment Condition:	No visual damage.

Information Provided by the Party Requesting the Test

Clocks/Oscillators:	Not provided.
I/O Ports:	Not provided.

Functional Description of the EUT (Equipment Under Test):

The EUT is Tripod's Cirronet radio module, FCC ID: S9E-RNGR2410. It is a frequency hopping spread spectrum radio operating in the 2.4 GHz band. The radio module is installed in Tripod's Ranger X Series handheld computer.

Tripod's Ranger X handheld computer will also contain a second radio module (USI) , FCC ID: S9E-RNGR80BT. It is an 802.11b / Bluetooth combo radio.

All radios in the Ranger X can transmit simultaneously – each radio through its own antenna.

The Cirronet radio utilizes a single integral antenna.

Client Justification for EUT Selection:

The product is a representative production sample.

Client Justification for Test Selection:

The Cirronet radio was previously certified under FCC ID: HSW-2410M. All the antenna direct connect test data from the previous certification continues to be representative, and will be used in support of the application of certification for the Cirronet radio in the Tripod's Ranger X handheld computer. New radiated spurious emissions data and AC powerline conducted emissions data was taken for Tripod's Ranger X configuration and is documented in this test report.

Equipment modifications					
Item	Test	Date	Modification	Note	Disposition of EUT
1	Spurious Radiated Emissions	04/26/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
2	AC Power Line Conducted Emissions for Intentional Radiator	05/11/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT was returned to the client.

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:
No Hop

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
120 VAC/60 Hz.

Other Settings Investigated:
All radios transmitting simultaneously

Frequency Range Investigated			
Start Frequency	30 MHz	**Stop Frequency**	25 GHz

Software\Firmware Applied During Test			
Operating system	Windows CE	**Version**	2003 Ozone Update
Exercise software	RTS 802.11	**Version**	1.0
Exercise software	BlueEMI	**Version**	1.0
Exercise software	Cirrochat	**Version**	1.0
Description			
Program written by Tripod Data Systems to exercise hardware for test purposes. Running Cirrochat v1.0 to continuously Transmit PSBS, running RTS 802.11 v1.0 to continuously Transmit PSBS, running BlueEMI v1.0 to continuously Transmit PSBS.			

EUT and Peripherals			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT – 2.4 GHz FHSS Radio Module installed in Ranger X Series	Cirronet	Cirronet	Unknown
802.11b/Bluetooth Radio Module installed in Ranger X Series	USI	USI	Unknown
Host Device – Handheld Computer	Tripod Data Systems, Inc.	Ranger X Series	C24
GPS receiver	Tripod Data Systems, Inc.	Pocket Pathfinder	Unknown
Compact Flash GPS Receiver	Holux	Unknown	Unknown
DC Power Supply	Cincon	TR30R	N/A

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB	Yes	1.0	Yes	Host Device – Handheld Computer	Unterminated
USB	Yes	1.8	No	Host Device – Handheld Computer	Unterminated
DC Leads	No	1.8	Yes	Host Device – Handheld Computer	AC Power
Serial	Yes	1.7	Yes	Host Device – Handheld Computer	GPS receiver

Measurement Equipment					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Cal**	**Interval**
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	12/02/2004	13 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	12/02/2004	13 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	03/01/2005	13 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APJ	01/05/2004	16 mo
Antenna, Biconilog	EMCO	3141	AXE	12/03/2003	24 mo
Antenna, Horn	EMCO	3115	AHC	09/07/2004	12 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APC	02/17/2005	13 mo
Antenna, Horn	EMCO	3160-08	AHK	NCR	NA
Antenna, Horn	EMCO	3160-09	AHG	NCR	NA
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	02/15/2005	13 mo
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo
Attenuator	Coaxicom	66702 5910-20	RBJ	02/25/2005	13 mo
High Pass Filter	Micro-Tronics	HPM50111	HFO	03/09/2005	13 mo

Test Description

Requirement: The field strength of any spurious emissions or modulation products that fall in a restricted band, as defined in 47 CFR 15.205, is measured. The peak level must comply with the limits specified in 47 CFR 15.35(b). The average level (taken with a 10Hz VBW) must comply with the limits specified in 15.209.

Configuration: The antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

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

Completed by:

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

ACQ 2005.1.4
EMI 2005.4.13

EUT:	Cirronet Radio Module installed in the Ranger X Series Handheld Computer	Work Order:	TRPO0007
Serial Number:		Date:	04/26/05
Customer:	Tripod Data Systems, Inc.	Temperature:	21
Attendees:	Dennis York	Humidity:	46%
Cust. Ref. No.:		Barometric Pressure	30.09
Tested by:	Dan Haas	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS

Specification:	FCC 15.247(d) Spurious Radiated Emissions:2004	Method:	ANSI C63.4:2003

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

Maximum data rate. Ranger X Series Handheld contains USI & Cirronet radio modules.

EUT OPERATING MODES

Tx Low Channel on all radios.

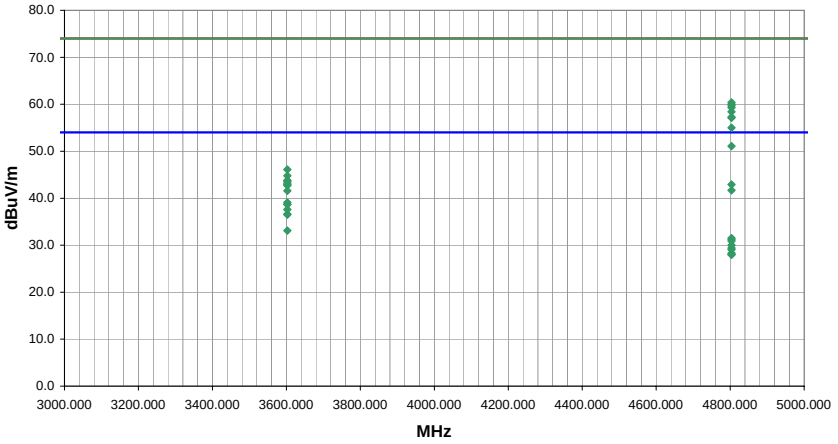
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Run #
Pass	1

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction (dB)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4803.378	47.8	3.3	238.0	1.3	0.0	0.0	H-Horn	AV	0.0	51.1	54.0	-2.9	EUT on side, 802.11 data rate=11Mbps.
3602.530	42.3	0.7	112.0	1.1	0.0	0.0	H-Horn	AV	0.0	43.0	54.0	-11.0	EUT Vertical, 802.11 data rate=11Mbps.
4803.378	57.1	3.3	285.0	1.3	0.0	0.0	V-Horn	PK	0.0	60.4	74.0	-13.6	EUT Horizontal, 802.11 data rate=11Mbps.
4803.378	56.7	3.3	130.0	1.1	0.0	0.0	H-Horn	PK	0.0	60.0	74.0	-14.0	EUT Vertical, 802.11 data rate=11Mbps.
4803.378	56.4	3.3	140.0	1.2	0.0	0.0	H-Horn	PK	0.0	59.7	74.0	-14.3	EUT Horizontal, 802.11 data rate=11Mbps.
4803.378	56.0	3.3	261.0	1.2	0.0	0.0	V-Horn	PK	0.0	59.3	74.0	-14.7	EUT Horizontal, 802.11 data rate=1Mbps.
3602.530	38.4	0.7	248.0	1.3	0.0	0.0	H-Horn	AV	0.0	39.1	54.0	-14.9	EUT Horizontal, 802.11 data rate=1Mbps.
3602.530	38.0	0.7	249.0	1.2	0.0	0.0	H-Horn	AV	0.0	38.7	54.0	-15.3	EUT Horizontal, 802.11 data rate=11Mbps.
3602.530	38.0	0.7	358.0	1.2	0.0	0.0	H-Horn	AV	0.0	38.7	54.0	-15.3	EUT on side, 802.11 data rate=11Mbps.
4803.378	55.1	3.3	133.0	1.3	0.0	0.0	H-Horn	PK	0.0	58.4	74.0	-15.6	EUT Horizontal, 802.11 data rate=1Mbps.
3602.530	36.9	0.7	98.0	1.3	0.0	0.0	V-Horn	AV	0.0	37.6	54.0	-16.4	EUT Horizontal, 802.11 data rate=1Mbps.
4803.378	54.0	3.3	213.0	1.1	0.0	0.0	V-Horn	PK	0.0	57.3	74.0	-16.7	EUT Vertical, 802.11 data rate=11Mbps.
4803.378	53.8	3.3	122.0	1.1	0.0	0.0	V-Horn	PK	0.0	57.1	74.0	-16.9	EUT on side, 802.11 data rate=11Mbps.
3602.530	35.9	0.7	96.0	1.2	0.0	0.0	V-Horn	AV	0.0	36.6	54.0	-17.4	EUT Horizontal, 802.11 data rate=11Mbps.
3602.530	35.8	0.7	146.0	1.2	0.0	0.0	V-Horn	AV	0.0	36.5	54.0	-17.5	EUT Vertical, 802.11 data rate=11Mbps.
4803.378	51.7	3.3	238.0	1.3	0.0	0.0	H-Horn	PK	0.0	55.0	74.0	-19.0	EUT on side, 802.11 data rate=11Mbps.
3602.530	32.4	0.7	87.0	1.2	0.0	0.0	V-Horn	AV	0.0	33.1	54.0	-20.9	EUT on side, 802.11 data rate=11Mbps.
4803.378	54.5	3.3	285.0	1.3	26.3	0.0	V-Horn	AV	0.0	31.5	54.0	-22.5	EUT Horizontal, 802.11 data rate=11Mbps.
4803.378	54.2	3.3	130.0	1.1	26.3	0.0	H-Horn	AV	0.0	31.2	54.0	-22.8	EUT Vertical, 802.11 data rate=11Mbps.
4803.378	53.9	3.3	140.0	1.2	26.3	0.0	H-Horn	AV	0.0	30.9	54.0	-23.1	EUT Horizontal, 802.11 data rate=11Mbps.

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

ACQ 2005.1.4
EMI 2005.4.13

EUT:	Cirronet Radio Module installed in the Ranger X Series Handheld Computer			Work Order:	TRPO0007
Serial Number:				Date:	04/26/05
Customer:	Tripod Data Systems, Inc.			Temperature:	21
Attendees:	Dennis York			Humidity:	46%
Cust. Ref. No.:				Barometric Pressure	30.09
Tested by:	Dan Haas	Power:	120VAC/60Hz	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC 15.247(d) Spurious Radiated Emissions:2004	Method:	ANSI C63.4:2003

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

Maximum data rate. Ranger X Series Handheld contains USI & Cirronet radio modules.

EUT OPERATING MODES

Tx Low Channel on all radios.

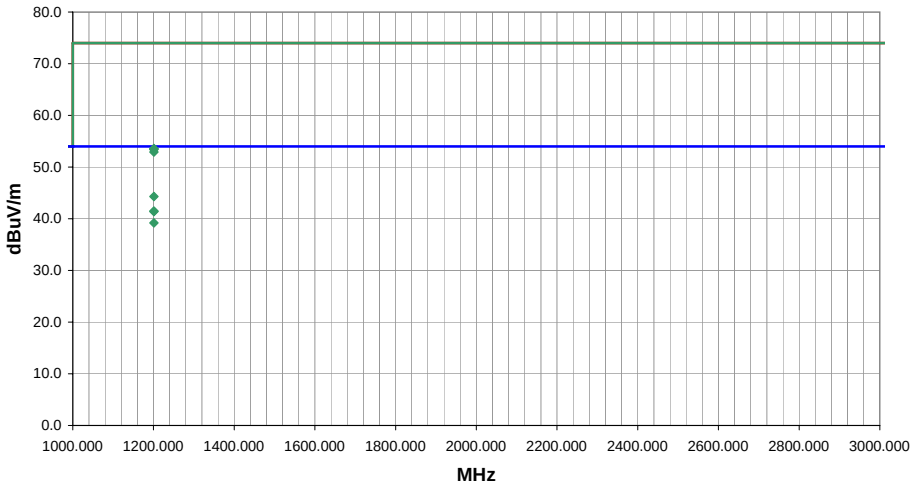
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Run #
Pass	2

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction (dB)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
1200.865	32.5	-8.2	286.0	1.1	0.0	20.0	H-Horn	AV	0.0	44.3	54.0	-9.7	EUT Horizontal, 802.11 data rate=1Mbps.
1200.865	29.7	-8.2	326.0	1.2	0.0	20.0	V-Horn	AV	0.0	41.5	54.0	-12.5	EUT Horizontal, 802.11 data rate=1Mbps.
1200.865	29.6	-8.2	14.0	1.3	0.0	20.0	H-Horn	AV	0.0	41.4	54.0	-12.6	EUT Horizontal, 802.11 data rate=11Mbps.
1200.865	27.4	-8.2	55.0	1.2	0.0	20.0	V-Horn	AV	0.0	39.2	54.0	-14.8	EUT Horizontal, 802.11 data rate=11Mbps.
1200.865	41.8	-8.2	326.0	1.2	0.0	20.0	V-Horn	PK	0.0	53.6	74.0	-20.4	EUT Horizontal, 802.11 data rate=1Mbps.
1200.865	41.7	-8.2	14.0	1.3	0.0	20.0	H-Horn	PK	0.0	53.5	74.0	-20.5	EUT Horizontal, 802.11 data rate=11Mbps.
1200.865	41.6	-8.2	286.0	1.1	0.0	20.0	H-Horn	PK	0.0	53.4	74.0	-20.6	EUT Horizontal, 802.11 data rate=1Mbps.
1200.865	41.1	-8.2	55.0	1.2	0.0	20.0	V-Horn	PK	0.0	52.9	74.0	-21.1	EUT Horizontal, 802.11 data rate=11Mbps.

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

ACQ 2005.1.4
EMI 2005.4.13

EUT:	Cirronet Radio Module installed in the Ranger X Series Handheld Computer			Work Order:	TRPO0007
Serial Number:				Date:	04/26/05
Customer:	Tripod Data Systems, Inc.			Temperature:	21
Attendees:	Dennis York			Humidity:	46%
Cust. Ref. No.:				Barometric Pressure	30.09
Tested by:	Dan Haas	Power:	120VAC/60Hz	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC 15.247(d) Spurious Radiated Emissions:2004	Method:	ANSI C63.4:2003

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

Maximum data rate. Ranger X Series Handheld contains USI & Cirronet radio modules.

EUT OPERATING MODES

Tx Mid Channel on all radios.

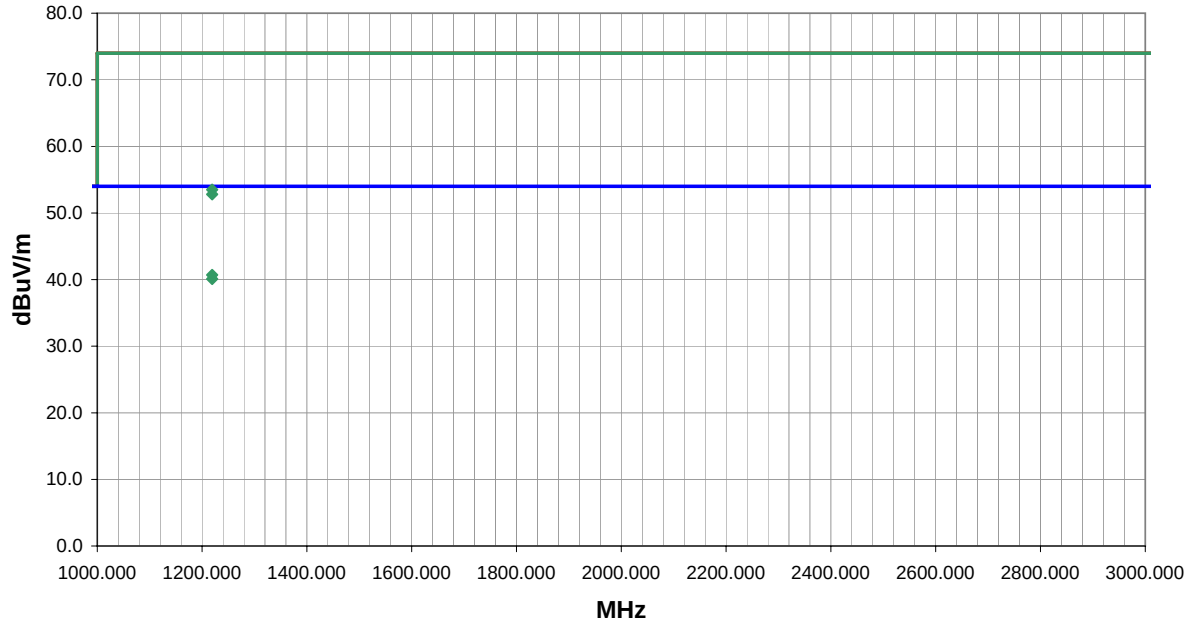
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Run #
Pass	3

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction (dB)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
1219.253	28.9	-8.2	38.0	1.3	0.0	20.0	H-Horn	AV	0.0	40.7	54.0	-13.3
1219.253	28.3	-8.2	245.0	1.2	0.0	20.0	V-Horn	AV	0.0	40.1	54.0	-13.9
1219.253	41.7	-8.2	38.0	1.3	0.0	20.0	H-Horn	PK	0.0	53.5	74.0	-20.5
1219.253	41.0	-8.2	245.0	1.2	0.0	20.0	V-Horn	PK	0.0	52.8	74.0	-21.2

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

ACQ 2005.1.4
EMI 2005.4.13

EUT:	Cirronet Radio Module installed in the Ranger X Series Handheld Computer	Work Order:	TRPO0007
Serial Number:		Date:	04/26/05
Customer:	Tripod Data Systems, Inc.	Temperature:	21
Attendees:	Dennis York	Humidity:	46%
Cust. Ref. No.:		Barometric Pressure	30.09
Tested by:	Dan Haas	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS

Specification:	FCC 15.247(d) Spurious Radiated Emissions:2004	Method:	ANSI C63.4:2003

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

Maximum data rate. Ranger X Series Handheld contains USI & Cirronet radio modules.

EUT OPERATING MODES

Tx Mid Channel on all radios.

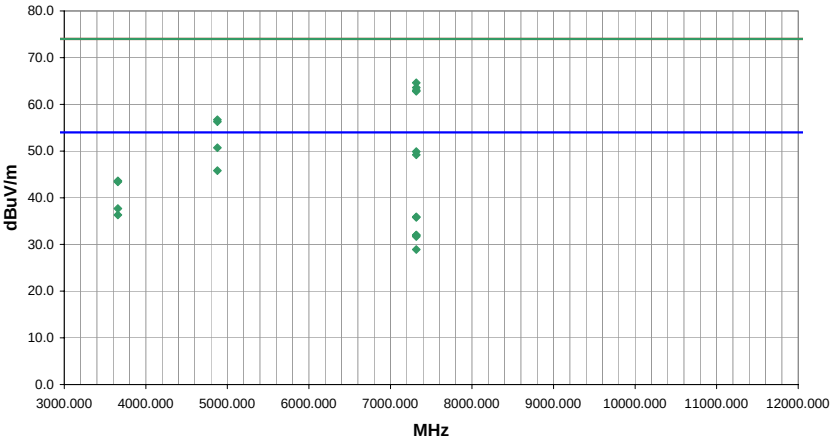
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Run #
Pass	4

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction (dB)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4877.127	47.2	3.5	263.0	1.2	0.0	0.0	V-Horn	AV	0.0	50.7	54.0	-3.3	EUT Horizontal, 802.11 data rate=11Mbps.
4877.127	42.3	3.5	223.0	1.3	0.0	0.0	H-Horn	AV	0.0	45.8	54.0	-8.2	EUT Horizontal, 802.11 data rate=11Mbps.
7315.652	54.1	10.5	164.0	1.2	0.0	0.0	V-Horn	PK	0.0	64.6	74.0	-9.4	EUT Horizontal, 802.11 data rate=11Mbps.
7315.652	53.1	10.5	157.0	1.2	0.0	0.0	V-Horn	PK	0.0	63.6	74.0	-10.4	EUT Horizontal, 802.11 data rate=1Mbps.
7315.652	52.5	10.5	211.0	1.3	0.0	0.0	H-Horn	PK	0.0	63.0	74.0	-11.0	EUT Horizontal, 802.11 data rate=11Mbps.
7315.652	52.3	10.5	212.0	1.3	0.0	0.0	H-Horn	PK	0.0	62.8	74.0	-11.2	EUT Horizontal, 802.11 data rate=1Mbps.
3657.830	36.7	1.0	99.0	1.3	0.0	0.0	V-Horn	AV	0.0	37.7	54.0	-16.3	EUT Horizontal, 802.11 data rate=11Mbps.
4877.127	53.2	3.5	263.0	1.2	0.0	0.0	V-Horn	PK	0.0	56.7	74.0	-17.3	EUT Horizontal, 802.11 data rate=11Mbps.
3657.830	35.3	1.0	255.0	1.3	0.0	0.0	H-Horn	AV	0.0	36.3	54.0	-17.7	EUT Horizontal, 802.11 data rate=11Mbps.
4877.127	52.8	3.5	223.0	1.3	0.0	0.0	H-Horn	PK	0.0	56.3	74.0	-17.7	EUT Horizontal, 802.11 data rate=11Mbps.
7315.652	25.4	10.5	298.0	1.2	0.0	0.0	V-Horn	AV	0.0	35.9	54.0	-18.1	EUT Horizontal, 802.11 data rate=1Mbps. Cirronet radio off.
7315.652	25.3	10.5	150.0	1.7	0.0	0.0	H-Horn	AV	0.0	35.8	54.0	-18.2	EUT Horizontal, 802.11 data rate=1Mbps. Cirronet radio off.
7315.652	47.8	10.5	212.0	1.3	26.3	0.0	H-Horn	AV	0.0	32.0	54.0	-22.0	EUT Horizontal, 802.11 data rate=1Mbps.
7315.652	47.8	10.5	157.0	1.2	26.3	0.0	V-Horn	AV	0.0	32.0	54.0	-22.0	EUT Horizontal, 802.11 data rate=1Mbps.
7315.652	47.5	10.5	164.0	1.2	26.3	0.0	V-Horn	AV	0.0	31.7	54.0	-22.3	EUT Horizontal, 802.11 data rate=11Mbps.
7315.652	39.4	10.5	150.0	1.7	0.0	0.0	H-Horn	PK	0.0	49.9	74.0	-24.1	EUT Horizontal, 802.11 data rate=1Mbps. Cirronet radio off.
7315.652	38.7	10.5	298.0	1.2	0.0	0.0	V-Horn	PK	0.0	49.2	74.0	-24.8	EUT Horizontal, 802.11 data rate=1Mbps. Cirronet radio off.
7315.652	44.7	10.5	211.0	1.3	26.3	0.0	H-Horn	AV	0.0	28.9	54.0	-25.1	EUT Horizontal, 802.11 data rate=11Mbps.
3657.830	42.6	1.0	99.0	1.3	0.0	0.0	V-Horn	PK	0.0	43.6	74.0	-30.4	EUT Horizontal, 802.11 data rate=11Mbps.
3657.830	42.4	1.0	255.0	1.3	0.0	0.0	H-Horn	PK	0.0	43.4	74.0	-30.6	EUT Horizontal, 802.11 data rate=11Mbps.

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

ACQ 2005.1.4
EMI 2005.4.13

EUT:	Cirronet Radio Module installed in the Ranger X Series Handheld Computer	Work Order:	TRPO0007
Serial Number:		Date:	04/26/05
Customer:	Tripod Data Systems, Inc.	Temperature:	21
Attendees:	Dennis York	Humidity:	46%
Cust. Ref. No.:		Barometric Pressure	30.09
Tested by:	Dan Haas	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS

Specification:	FCC 15.247(d) Spurious Radiated Emissions:2004	Method:	ANSI C63.4:2003

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

Maximum data rate. Ranger X Series Handheld contains USI & Cirronet radio modules.

EUT OPERATING MODES

Tx High Channel on all radios.

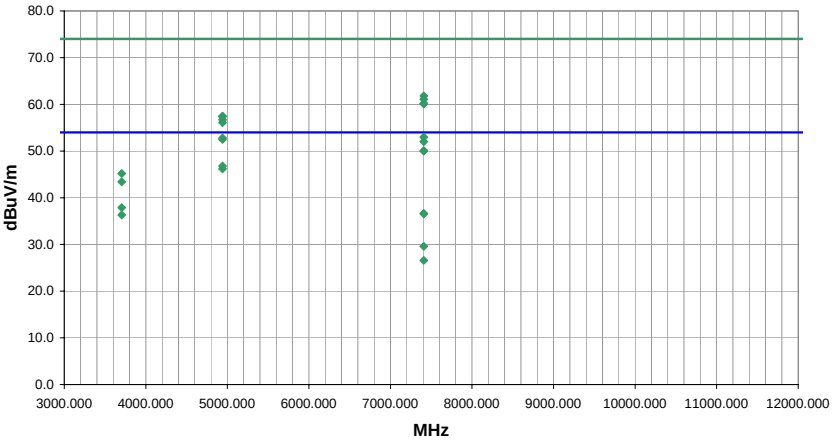
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Run #
Pass	5

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction (dB)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
7409.666	41.9	11.1	319.0	1.2	0.0	0.0	V-Horn	AV	0.0	53.0	54.0	-1.0	EUT Horizontal, 802.11 data rate=11Mbps.
4939.778	49.2	3.6	282.0	1.2	0.0	0.0	V-Horn	AV	0.0	52.8	54.0	-1.2	EUT Horizontal, 802.11 data rate=1Mbps.
4939.778	48.9	3.6	281.0	1.2	0.0	0.0	V-Horn	AV	0.0	52.5	54.0	-1.5	EUT Horizontal, 802.11 data rate=11Mbps.
7409.666	40.9	11.1	300.0	1.3	0.0	0.0	H-Horn	AV	0.0	52.0	54.0	-2.0	EUT Horizontal, 802.11 data rate=11Mbps.
4939.778	43.2	3.6	229.0	1.3	0.0	0.0	H-Horn	AV	0.0	46.8	54.0	-7.2	EUT Horizontal, 802.11 data rate=1Mbps.
4939.778	42.6	3.6	228.0	1.3	0.0	0.0	H-Horn	AV	0.0	46.2	54.0	-7.8	EUT Horizontal, 802.11 data rate=11Mbps.
7409.666	50.7	11.1	305.0	1.6	0.0	0.0	H-Horn	PK	0.0	61.8	74.0	-12.2	EUT Horizontal, 802.11 data rate=1Mbps.
7409.666	50.0	11.1	271.0	1.6	0.0	0.0	V-Horn	PK	0.0	61.1	74.0	-12.9	EUT Horizontal, 802.11 data rate=1Mbps.
7409.666	49.1	11.1	319.0	1.2	0.0	0.0	V-Horn	PK	0.0	60.2	74.0	-13.8	EUT Horizontal, 802.11 data rate=11Mbps.
7409.666	49.0	11.1	300.0	1.3	0.0	0.0	H-Horn	PK	0.0	60.1	74.0	-13.9	EUT Horizontal, 802.11 data rate=11Mbps.
3704.838	36.8	1.1	265.0	1.3	0.0	0.0	H-Horn	AV	0.0	37.9	54.0	-16.1	EUT Horizontal, 802.11 data rate=11Mbps.
4939.778	53.9	3.6	229.0	1.3	0.0	0.0	H-Horn	PK	0.0	57.5	74.0	-16.5	EUT Horizontal, 802.11 data rate=1Mbps.
4939.778	53.8	3.6	228.0	1.3	0.0	0.0	H-Horn	PK	0.0	57.4	74.0	-16.6	EUT Horizontal, 802.11 data rate=11Mbps.
4939.778	53.1	3.6	282.0	1.2	0.0	0.0	V-Horn	PK	0.0	56.7	74.0	-17.3	EUT Horizontal, 802.11 data rate=1Mbps.
7409.666	25.5	11.1	290.0	3.5	0.0	0.0	V-Horn	AV	0.0	36.6	54.0	-17.4	EUT Horizontal, 802.11 data rate=1Mbps. Cirronet radio off.
7409.666	25.5	11.1	249.0	1.3	0.0	0.0	H-Horn	AV	0.0	36.6	54.0	-17.4	EUT Horizontal, 802.11 data rate=1Mbps. Cirronet radio off.
3704.838	35.2	1.1	261.0	1.2	0.0	0.0	V-Horn	AV	0.0	36.3	54.0	-17.7	EUT Horizontal, 802.11 data rate=11Mbps.
4939.778	52.5	3.6	281.0	1.2	0.0	0.0	V-Horn	PK	0.0	56.1	74.0	-17.9	EUT Horizontal, 802.11 data rate=11Mbps.
7409.666	39.0	11.1	290.0	3.5	0.0	0.0	V-Horn	PK	0.0	50.1	74.0	-23.9	EUT Horizontal, 802.11 data rate=1Mbps. Cirronet radio off.
7409.666	38.9	11.1	249.0	1.3	0.0	0.0	H-Horn	PK	0.0	50.0	74.0	-24.0	EUT Horizontal, 802.11 data rate=1Mbps. Cirronet radio off.

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

ACQ 2005.1.4
EMI 2005.4.13

EUT:	Cirronet Radio Module installed in the Ranger X Series Handheld Computer	Work Order:	TRPO0007
Serial Number:		Date:	04/26/05
Customer:	Tripod Data Systems, Inc.	Temperature:	21
Attendees:	Dennis York	Humidity:	46%
Cust. Ref. No.:		Barometric Pressure	30.09
Tested by:	Dan Haas	Job Site:	EV01
Power:	120VAC/60Hz		

TEST SPECIFICATIONS

Specification:	FCC 15.247(d) Spurious Radiated Emissions:2004	Method:	ANSI C63.4:2003

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

Maximum data rate. Ranger X Series Handheld contains USI & Cirronet radio modules.

EUT OPERATING MODES

Tx High Channel on all radios.

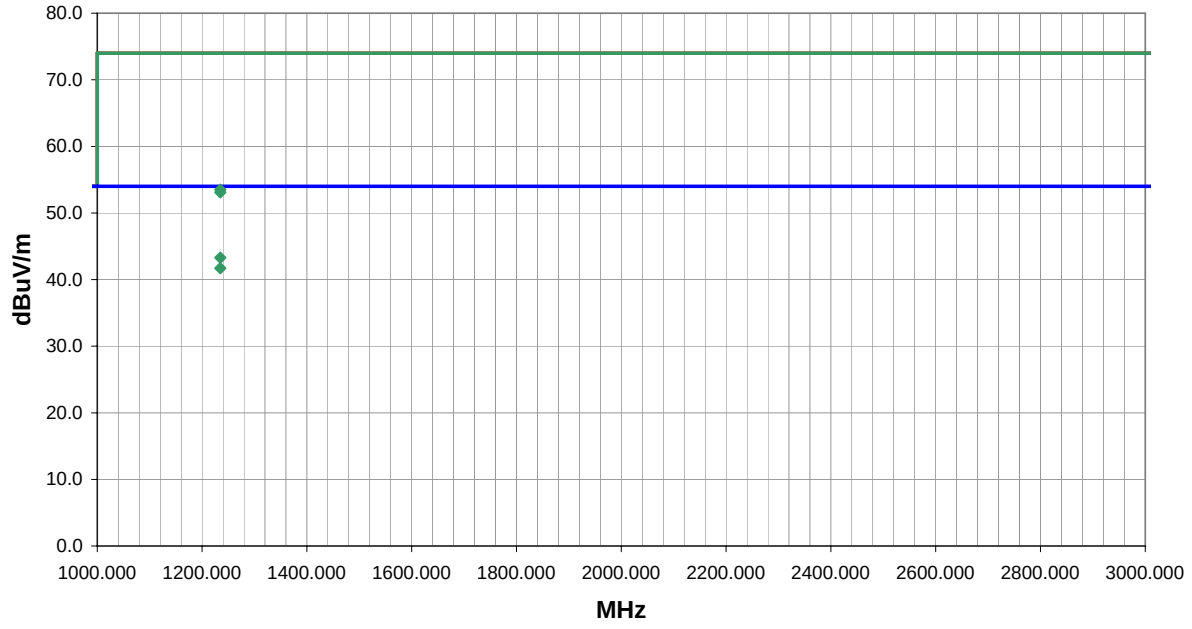
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Run #
Pass	6

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction (dB)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
1234.938	31.4	-8.1	19.0	1.3	3.0	20.0	H-Horn	AV	0.0	43.3	54.0	-10.7
1234.938	29.8	-8.1	281.0	1.2	3.0	20.0	V-Horn	AV	0.0	41.7	54.0	-12.3
1234.938	41.6	-8.1	19.0	1.3	3.0	20.0	H-Horn	PK	0.0	53.5	74.0	-20.5
1234.938	41.2	-8.1	281.0	1.2	3.0	20.0	V-Horn	PK	0.0	53.1	74.0	-20.9

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

ACQ 2005.1.4
EMI 2005.4.13

EUT:	Cirronet Radio Module installed in the Ranger X Series Handheld Computer	Work Order:	TRPO0007
Serial Number:		Date:	04/26/05
Customer:	Tripod Data Systems, Inc.	Temperature:	21
Attendees:	Dennis York	Humidity:	46%
Cust. Ref. No.:		Barometric Pressure	30.09
Tested by:	Dan Haas	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS

Specification:	FCC 15.247(d) Spurious Radiated Emissions:2004	Method:	ANSI C63.4:2003

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

Maximum data rate. Ranger X Series Handheld contains USI & Cirronet radio modules.

EUT OPERATING MODES

Tx High Channel on all radios.

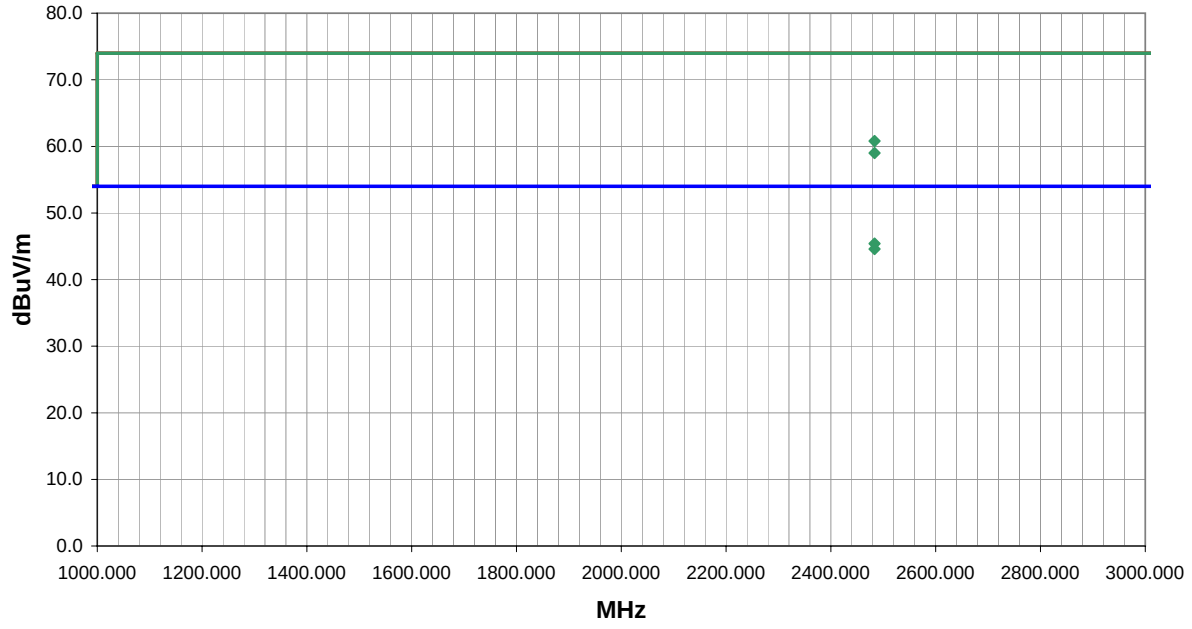
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Run #
Pass	7

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction (dB)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
2483.500	27.6	-2.2	265.0	1.2	3.0	20.0	H-Horn	AV	0.0	45.4	54.0	-8.6
2483.500	26.8	-2.2	155.0	1.2	3.0	20.0	V-Horn	AV	0.0	44.6	54.0	-9.4
2483.500	43.0	-2.2	265.0	1.2	3.0	20.0	H-Horn	PK	0.0	60.8	74.0	-13.2
2483.500	41.2	-2.2	155.0	1.2	3.0	20.0	V-Horn	PK	0.0	59.0	74.0	-15.0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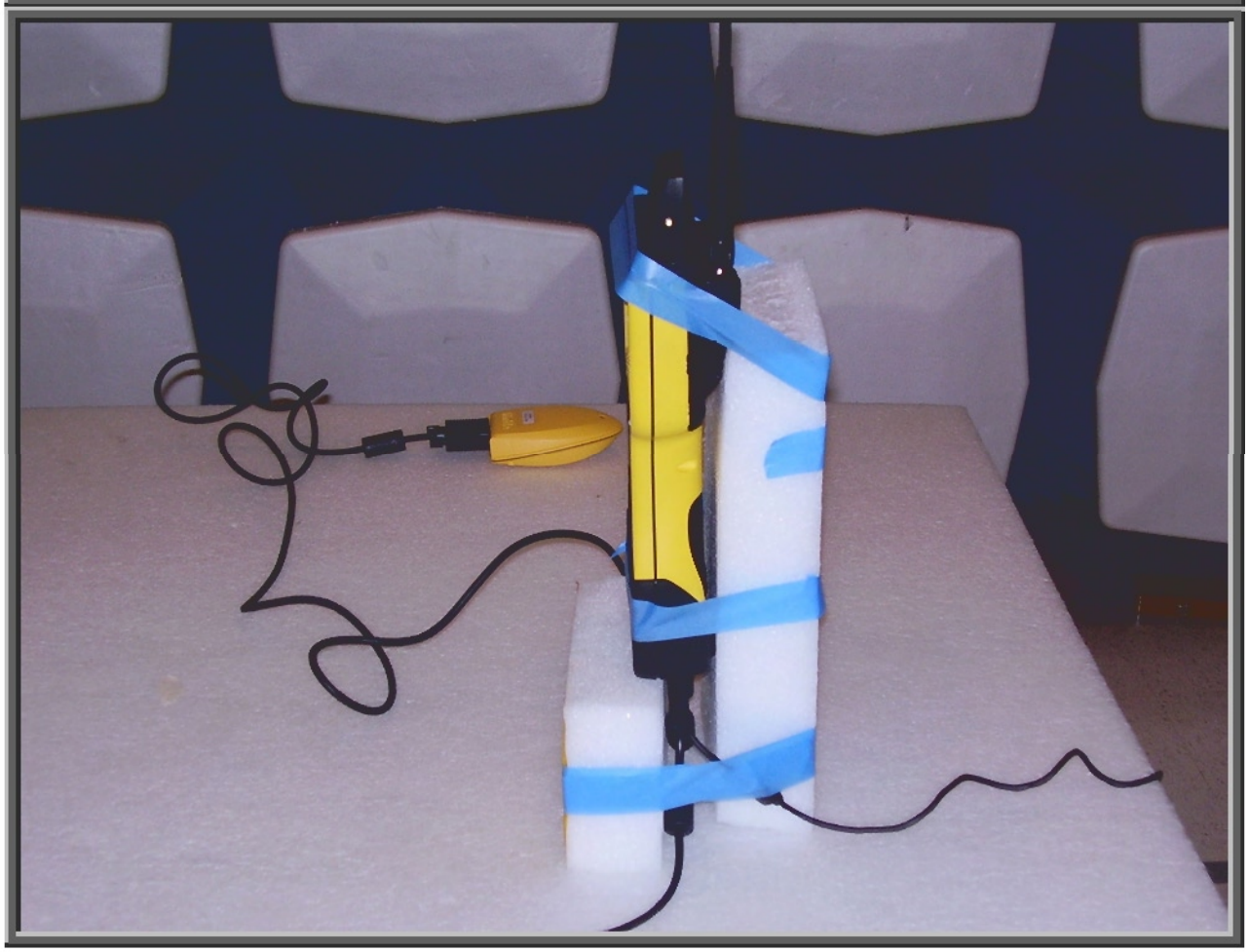


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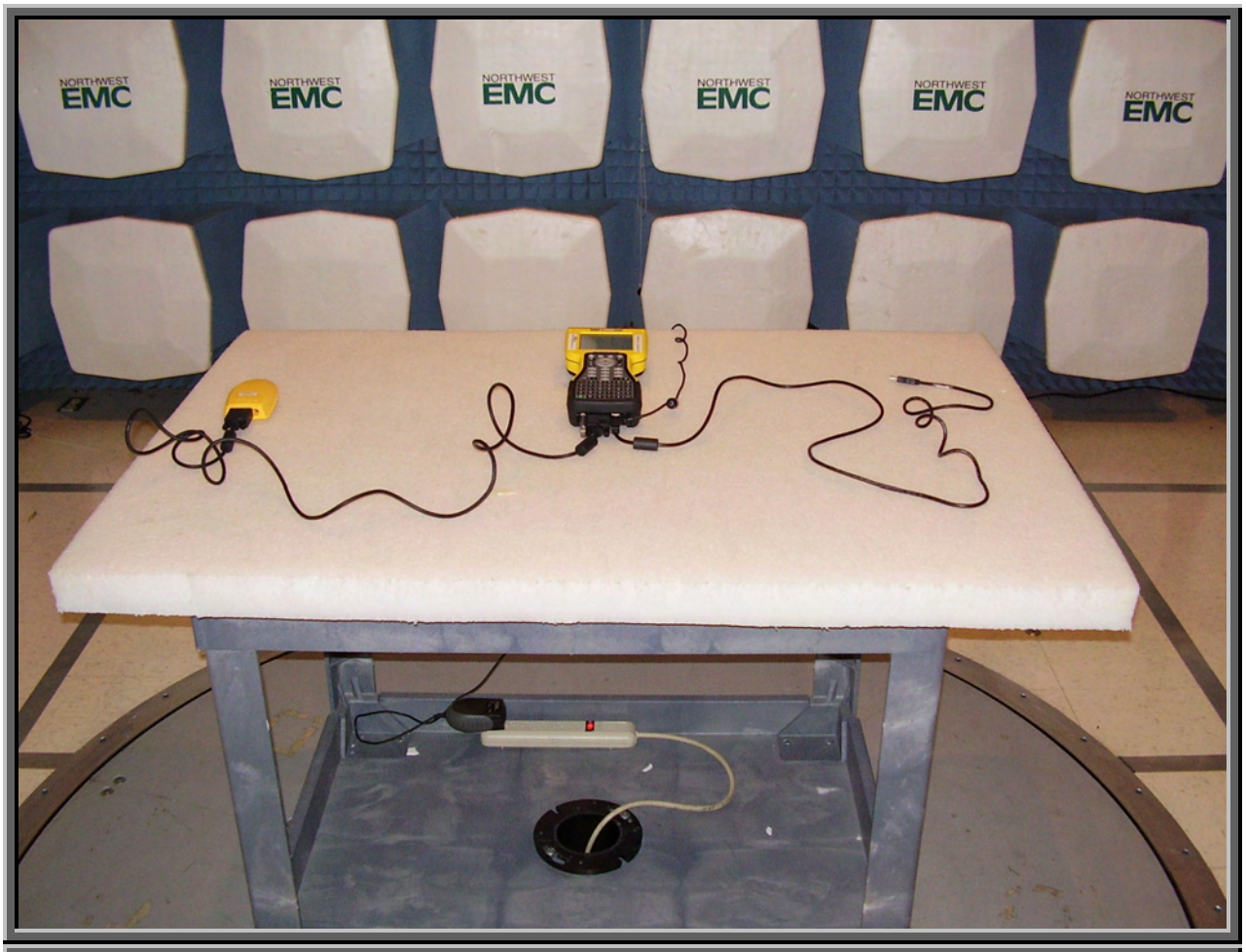
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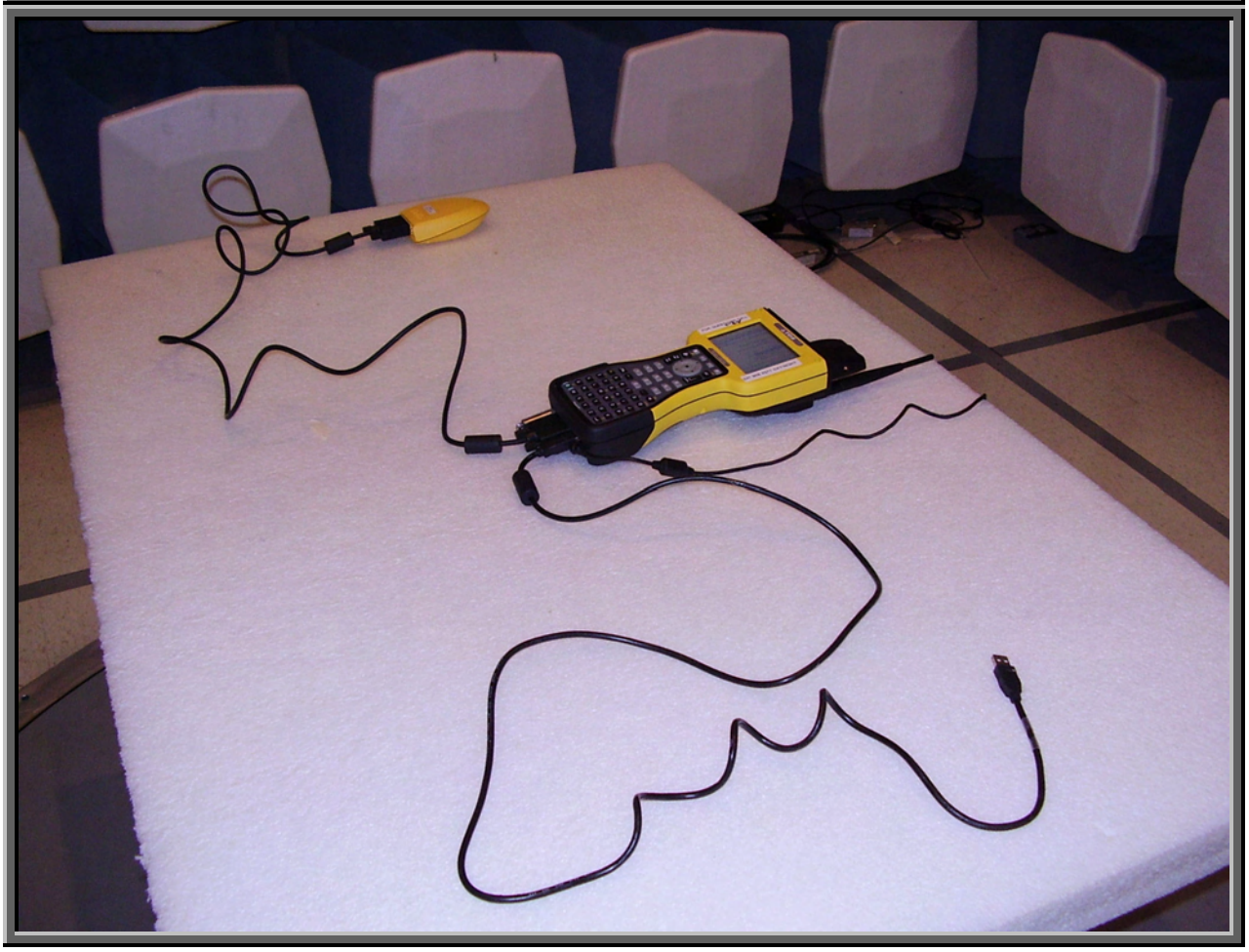


Justification

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

Channels in Specified Band Investigated:
Low
Mid
High

Operating Modes Investigated:
No Hop

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
120 VAC/60 Hz.

Other Settings Investigated:
All radios transmitting simultaneously

Software\Firmware Applied During Test			
Operating system	Windows CE	**Version**	2003 Ozone Update
Exercise software	RTS 802.11	**Version**	1.0
Exercise software	BlueEMI	**Version**	1.0
Exercise software	Cirrochat	**Version**	1.0
Description			
Program written by Tripod Data Systems to exercise hardware for test purposes. Running Cirrochat v1.0 to continuously Transmit PSBS, running RTS 802.11 v1.0 to continuously Transmit PSBS, running BlueEMI v1.0 to continuously Transmit PSBS.			

EUT and Peripherals			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
EUT – 2.4 GHz FHSS Radio Module installed in Ranger X Series	Cirronet	Cirronet	Unknown
802.11b/Bluetooth Radio Module installed in Ranger X Series	USI	USI	Unknown
Host Device – Handheld Computer	Tripod Data Systems, Inc.	Ranger X Series	C24
GPS receiver	Tripod Data Systems, Inc.	Pocket Pathfinder	Unknown
Compact Flash GPS Receiver	Holux	Unknown	Unknown
DC Power Supply	Cincon	TR30R	N/A

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
USB	Yes	1.0	Yes	Host Device – Handheld Computer	Unterminated
USB	Yes	1.8	No	Host Device – Handheld Computer	Unterminated
DC Leads	No	1.8	Yes	Host Device – Handheld Computer	AC Power
Serial	Yes	1.7	Yes	Host Device – Handheld Computer	GPS receiver

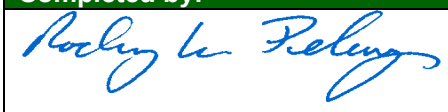
Measurement Equipment					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Cal**	**Interval**
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	12/02/2004	13 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	12/02/2004	13 mo
High Pass Filter	TTE	H97-100k-50-720B	HFC	12/29/2004	13 mo
LISN	Solar	9252-50-R-24-BNC	LIN	12/29/2004	13 mo

Test Description

Requirement: Per 47 15.207(c), in addition to devices which are powered directly from the AC power line, conducted emissions measurements shall also be made on battery operated devices that can transmit while charging, as well as on devices that are powered from AC adaptors, or devices that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines. All of these devices shall be tested to demonstrate compliance with the conducted limits of 15.207.

Configuration: The EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT. The AC power line conducted emissions were measured with the EUT operating at the lowest, the highest, and a middle channel in the operational band. The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.4-2003.

Completed by:



NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

ACQ 2005.1.4
EMI 2005.4.13

EUT:	Cirronet Radio Module installed in the Ranger X Series Handheld Computer	Work Order:	TRPO0007
Serial Number:		Date:	05/11/05
Customer:	Tripod Data Systems, Inc.	Temperature:	21
Attendees:	None	Humidity:	46%
Cust. Ref. No.:		Barometric Pressure	30.09
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS

Specification:	FCC 15.207 AC Powerline Conducted Emissions:2004	Method:	ANSI C63.4:2003

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

Maximum data rate. Ranger X Series Handheld contains USI & Cirronet radio modules.

EUT OPERATING MODES

Tx low Channel on all radios.

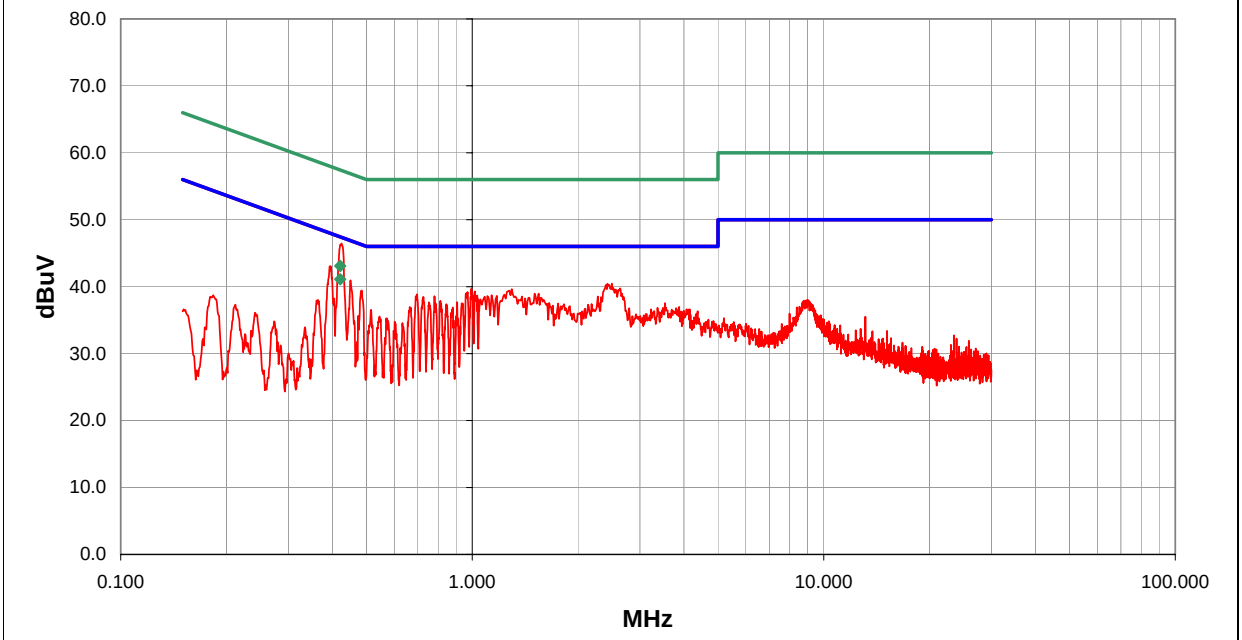
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Line	Run #
Pass	L1	1

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.421	21.1			0.0	0.0	20.0		AV		41.1	47.4	-6.3
0.421	23.1			0.0	0.0	20.0		QP		43.1	57.4	-14.3
0.425	26.2			0.0	0.2	20.0				46.4	47.3	-0.9
0.396	22.8			0.0	0.2	20.0				43.0	47.9	-4.9
2.496	20.0			0.0	0.4	20.0				40.4	46.0	-5.6
0.451	20.7			0.0	0.2	20.0				40.9	46.9	-5.9
0.995	19.4			0.0	0.3	20.0				39.7	46.0	-6.3
1.295	19.3			0.0	0.3	20.0				39.6	46.0	-6.4
1.018	19.0			0.0	0.3	20.0				39.3	46.0	-6.7
0.970	18.9			0.0	0.3	20.0				39.2	46.0	-6.8
0.485	19.2			0.0	0.2	20.0				39.4	46.3	-6.8
1.545	18.6			0.0	0.4	20.0				39.0	46.0	-7.0
0.696	18.6			0.0	0.3	20.0				38.9	46.0	-7.1
1.135	18.4			0.0	0.3	20.0				38.7	46.0	-7.3
1.175	18.3			0.0	0.3	20.0				38.6	46.0	-7.4
1.105	18.3			0.0	0.3	20.0				38.6	46.0	-7.4
0.781	18.3			0.0	0.3	20.0				38.6	46.0	-7.4
2.276	18.1			0.0	0.4	20.0				38.5	46.0	-7.5
0.726	18.2			0.0	0.3	20.0				38.5	46.0	-7.5

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

ACQ 2005.1.4
EMI 2005.4.13

EUT:	Cirronet Radio Module installed in the Ranger X Series Handheld Computer	Work Order:	TRPO0007
Serial Number:		Date:	05/11/05
Customer:	Tripod Data Systems, Inc.	Temperature:	21
Attendees:	None	Humidity:	46%
Cust. Ref. No.:		Barometric Pressure	30.09
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS

Specification:	FCC 15.207 AC Powerline Conducted Emissions:2004	Method:	ANSI C63.4:2003

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

Maximum data rate. Ranger X Series Handheld contains USI & Cirronet radio modules.

EUT OPERATING MODES

Tx low Channel on all radios.

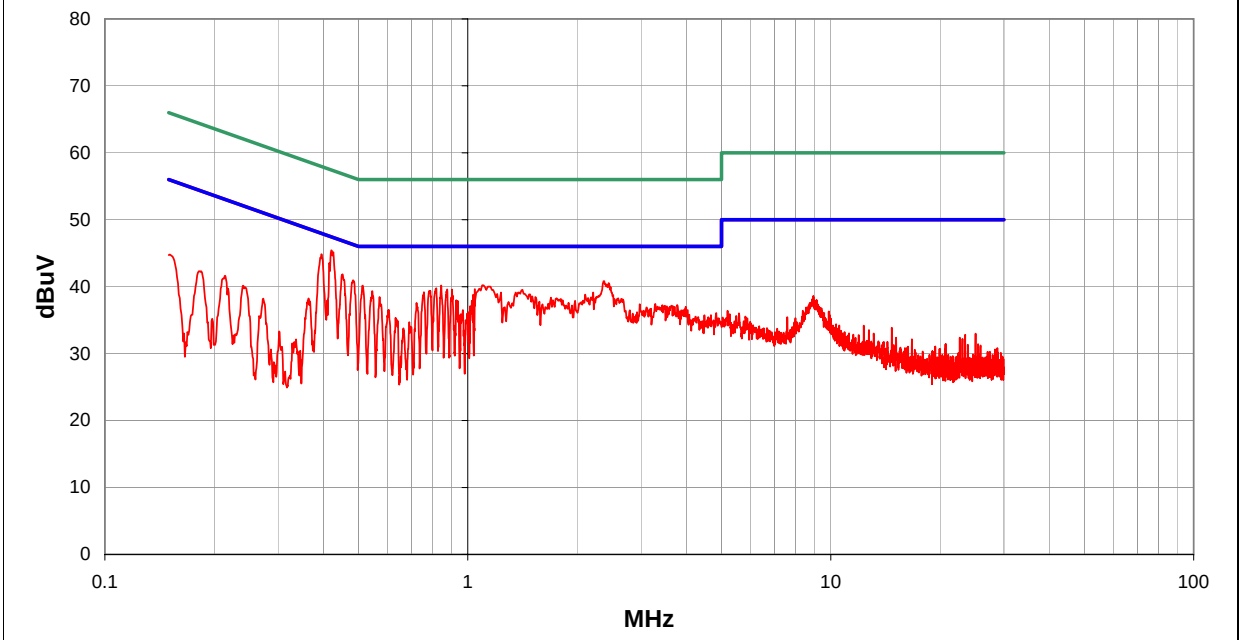
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Line	Run #
Pass	N	2

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.421	25.2			0.0	0.2	20.0				45.4	47.4	-2.0
0.396	24.6			0.0	0.2	20.0				44.8	47.9	-3.1
0.452	21.6			0.0	0.2	20.0				41.8	46.8	-5.0
2.376	20.4			0.0	0.4	20.0				40.8	46.0	-5.2
0.484	20.7			0.0	0.2	20.0				40.9	46.3	-5.3
1.105	19.9			0.0	0.3	20.0				40.2	46.0	-5.8
0.845	19.9			0.0	0.3	20.0				40.2	46.0	-5.8
0.514	19.9			0.0	0.2	20.0				40.1	46.0	-5.9
0.819	19.5			0.0	0.3	20.0				39.8	46.0	-6.2
1.045	19.3			0.0	0.3	20.0				39.6	46.0	-6.4
0.904	19.3			0.0	0.3	20.0				39.6	46.0	-6.4
0.878	19.3			0.0	0.3	20.0				39.6	46.0	-6.4
1.415	19.2			0.0	0.3	20.0				39.5	46.0	-6.5
0.788	19.1			0.0	0.3	20.0				39.4	46.0	-6.6
0.545	19.1			0.0	0.3	20.0				39.4	46.0	-6.6
0.757	18.9			0.0	0.3	20.0				39.2	46.0	-6.8
2.216	18.7			0.0	0.4	20.0				39.1	46.0	-6.9
1.035	18.5			0.0	0.3	20.0				38.8	46.0	-7.2
0.571	18.2			0.0	0.3	20.0				38.5	46.0	-7.5

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

ACQ 2005.1.4
EMI 2005.4.13

EUT:	Cirronet Radio Module installed in the Ranger X Series Handheld Computer	Work Order:	TRPO0007
Serial Number:		Date:	05/11/05
Customer:	Tripod Data Systems, Inc.	Temperature:	21
Attendees:	None	Humidity:	46%
Cust. Ref. No.:		Barometric Pressure	30.09
Tested by:	Rod Peloquin Power: 120VAC/60Hz	Job Site:	EV01

TEST SPECIFICATIONS

Specification:	FCC 15.207 AC Powerline Conducted Emissions:2004	Method:	ANSI C63.4:2003

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

Maximum data rate. Ranger X Series Handheld contains USI & Cirronet radio modules.

EUT OPERATING MODES

Tx mid channel on all radios.

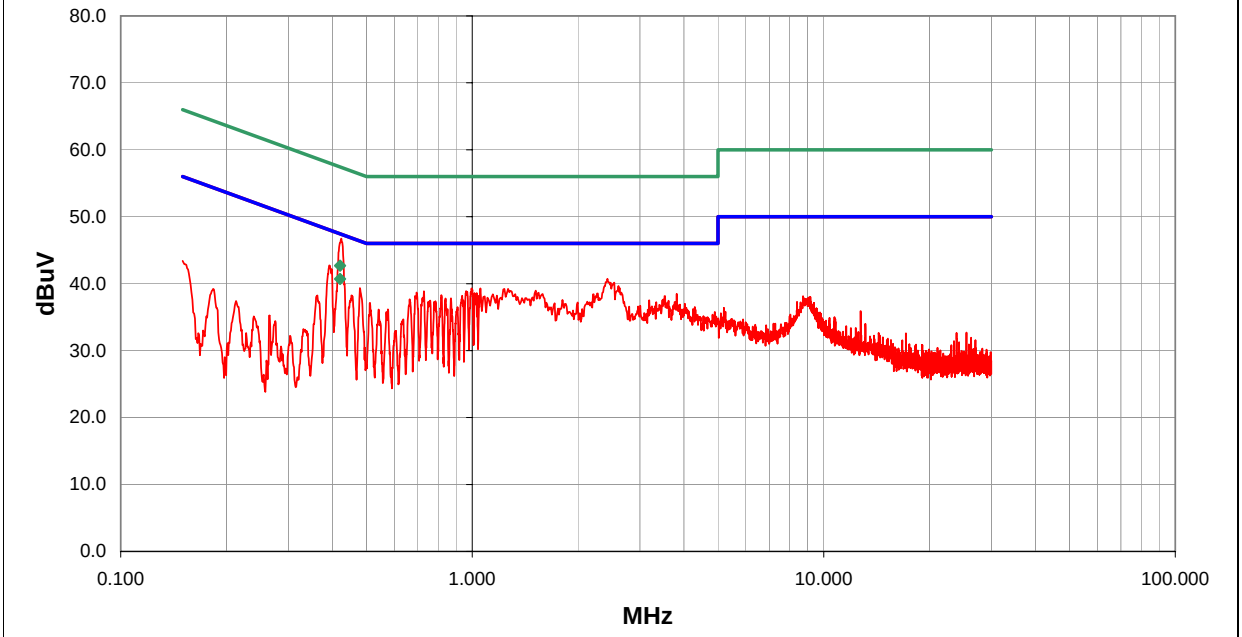
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Line	Run #
Pass	L1	3

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.421	20.7			0.0	0.0	20.0		AV		40.7	47.4	-6.7
0.421	22.7			0.0	0.0	20.0		QP		42.7	57.4	-14.7
0.425	26.5			0.0	0.2	20.0				46.7	47.4	-0.6
2.426	20.3			0.0	0.4	20.0				40.7	46.0	-5.3
0.392	22.5			0.0	0.2	20.0				42.7	48.0	-5.3
2.606	19.2			0.0	0.5	20.0				39.7	46.0	-6.3
1.055	19.0			0.0	0.3	20.0				39.3	46.0	-6.7
0.996	19.0			0.0	0.3	20.0				39.3	46.0	-6.7
1.265	18.9			0.0	0.3	20.0				39.2	46.0	-6.8
0.479	19.1			0.0	0.2	20.0				39.3	46.3	-7.0
1.515	18.6			0.0	0.3	20.0				38.9	46.0	-7.1
0.961	18.6			0.0	0.3	20.0				38.9	46.0	-7.1
0.729	18.6			0.0	0.3	20.0				38.9	46.0	-7.1
0.695	18.4			0.0	0.3	20.0				38.7	46.0	-7.3
1.029	18.3			0.0	0.3	20.0				38.6	46.0	-7.4
3.816	17.9			0.0	0.6	20.0				38.5	46.0	-7.5
1.145	18.1			0.0	0.3	20.0				38.4	46.0	-7.6
1.005	18.1			0.0	0.3	20.0				38.4	46.0	-7.6
0.817	18.0			0.0	0.3	20.0				38.3	46.0	-7.7

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

ACQ 2005.1.4
EMI 2005.4.13

EUT:	Cirronet Radio Module installed in the Ranger X Series Handheld Computer	Work Order:	TRPO0007
Serial Number:		Date:	05/11/05
Customer:	Tripod Data Systems, Inc.	Temperature:	21
Attendees:	None	Humidity:	46%
Cust. Ref. No.:		Barometric Pressure	30.09
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS

Specification:	FCC 15.207 AC Powerline Conducted Emissions:2004	Method:	ANSI C63.4:2003

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

Maximum data rate. Ranger X Series Handheld contains USI & Cirronet radio modules.

EUT OPERATING MODES

Tx mid channel on all radios.

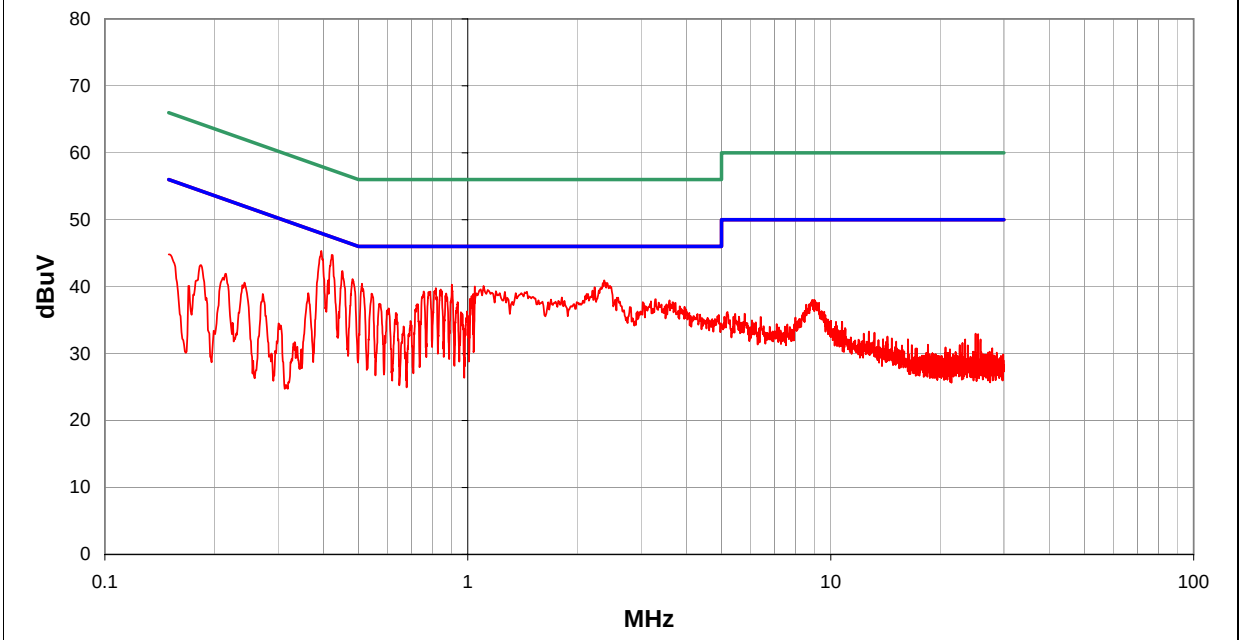
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Line	Run #
Pass	N	4

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.395	25.1			0.0	0.2	20.0				45.3	48.0	-2.6
0.424	24.5			0.0	0.2	20.0				44.7	47.4	-2.6
0.452	22.1			0.0	0.2	20.0				42.3	46.8	-4.5
2.376	20.5			0.0	0.4	20.0				40.9	46.0	-5.1
0.481	20.9			0.0	0.2	20.0				41.1	46.3	-5.2
0.511	20.2			0.0	0.2	20.0				40.4	46.0	-5.6
0.904	20.0			0.0	0.3	20.0				40.3	46.0	-5.7
1.105	19.8			0.0	0.3	20.0				40.1	46.0	-5.9
1.045	19.7			0.0	0.3	20.0				40.0	46.0	-6.0
2.236	19.5			0.0	0.4	20.0				39.9	46.0	-6.1
0.817	19.5			0.0	0.3	20.0				39.8	46.0	-6.2
0.842	19.3			0.0	0.3	20.0				39.6	46.0	-6.4
0.788	19.0			0.0	0.3	20.0				39.3	46.0	-6.7
0.757	19.0			0.0	0.3	20.0				39.3	46.0	-6.7
1.455	18.9			0.0	0.3	20.0				39.2	46.0	-6.8
0.872	18.7			0.0	0.3	20.0				39.0	46.0	-7.0
0.543	18.7			0.0	0.3	20.0				39.0	46.0	-7.0
1.035	18.6			0.0	0.3	20.0				38.9	46.0	-7.1
1.024	18.3			0.0	0.3	20.0				38.6	46.0	-7.4

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

ACQ 2005.1.4
EMI 2005.4.13

EUT:	Cirronet Radio Module installed in the Ranger X Series Handheld Computer	Work Order:	TRPO0007
Serial Number:		Date:	05/11/05
Customer:	Tripod Data Systems, Inc.	Temperature:	21
Attendees:	None	Humidity:	46%
Cust. Ref. No.:		Barometric Pressure	30.09
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS

Specification:	FCC 15.207 AC Powerline Conducted Emissions:2004	Method:	ANSI C63.4:2003

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

Maximum data rate. Ranger X Series Handheld contains USI & Cirronet radio modules.

EUT OPERATING MODES

Tx high channel on all radios.

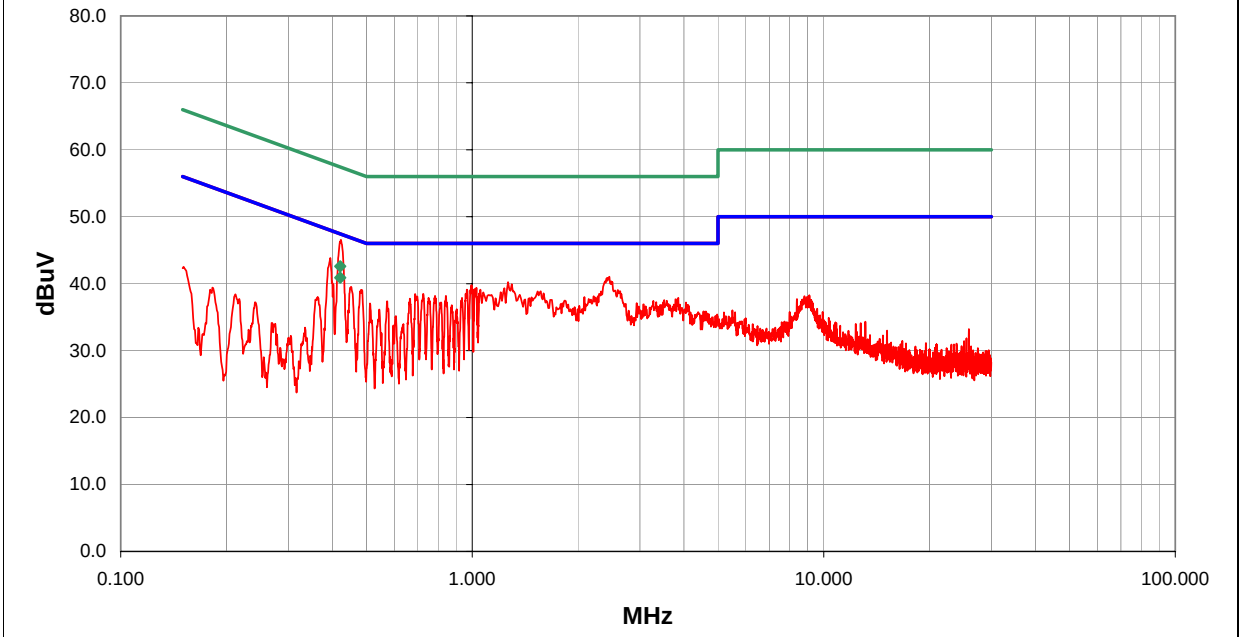
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Line	Run #
Pass	L1	5

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.421	20.9			0.0	0.0	20.0		AV		40.9	47.4	-6.5
0.421	22.6			0.0	0.0	20.0		QP		42.6	57.4	-14.8
0.424	26.3			0.0	0.2	20.0				46.5	47.4	-0.8
0.395	23.6			0.0	0.2	20.0				43.8	48.0	-4.1
2.456	20.6			0.0	0.4	20.0				41.0	46.0	-5.0
1.265	19.9			0.0	0.3	20.0				40.2	46.0	-5.8
0.995	19.5			0.0	0.3	20.0				39.8	46.0	-6.2
1.027	19.1			0.0	0.3	20.0				39.4	46.0	-6.6
1.235	19.0			0.0	0.3	20.0				39.3	46.0	-6.7
1.055	18.8			0.0	0.3	20.0				39.1	46.0	-6.9
0.966	18.8			0.0	0.3	20.0				39.1	46.0	-6.9
1.005	18.7			0.0	0.3	20.0				39.0	46.0	-7.0
1.565	18.5			0.0	0.4	20.0				38.9	46.0	-7.1
0.486	18.8			0.0	0.2	20.0				39.0	46.2	-7.2
0.452	19.3			0.0	0.2	20.0				39.5	46.8	-7.3
0.726	18.2			0.0	0.3	20.0				38.5	46.0	-7.5
0.688	18.2			0.0	0.3	20.0				38.5	46.0	-7.5
0.842	17.9			0.0	0.3	20.0				38.2	46.0	-7.8
0.784	17.9			0.0	0.3	20.0				38.2	46.0	-7.8

NORTHWEST EMC

CONDUCTED EMISSIONS DATA SHEET

ACQ 2005.1.4
EMI 2005.4.13

EUT:	Cirronet Radio Module installed in the Ranger X Series Handheld Computer	Work Order:	TRPO0007
Serial Number:		Date:	05/11/05
Customer:	Tripod Data Systems, Inc.	Temperature:	21
Attendees:	None	Humidity:	46%
Cust. Ref. No.:		Barometric Pressure	30.09
Tested by:	Rod Peloquin	Power: 120VAC/60Hz	Job Site: EV01

TEST SPECIFICATIONS

Specification:	FCC 15.207 AC Powerline Conducted Emissions:2004	Method:	ANSI C63.4:2003

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

Maximum data rate. Ranger X Series Handheld contains USI & Cirronet radio modules.

EUT OPERATING MODES

Tx high channel on all radios.

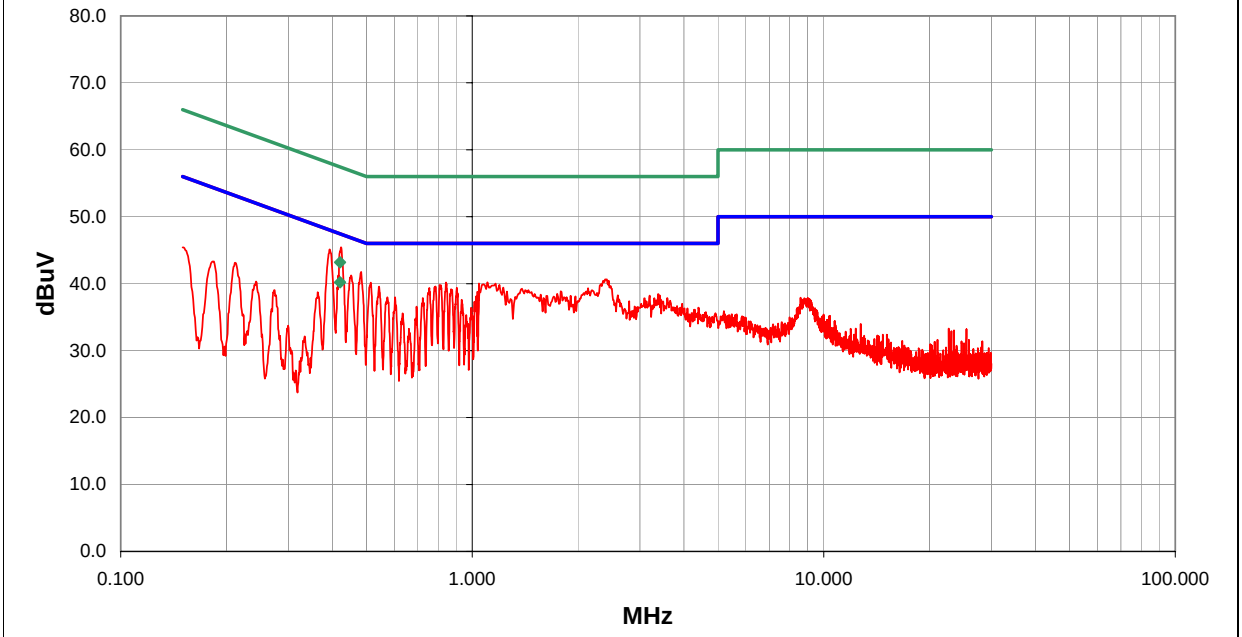
DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS	Line	Run #
Pass	N	6

Other

Tested By:



Freq (MHz)	Amplitude (dBuV)			Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.421	20.2			0.0	0.0	20.0		AV		40.2	47.4	-7.2
0.421	23.2			0.0	0.0	20.0		QP		43.2	57.4	-14.2
0.424	25.2			0.0	0.2	20.0				45.4	47.4	-1.9
0.393	24.9			0.0	0.2	20.0				45.1	48.0	-2.9
0.483	21.5			0.0	0.2	20.0				41.7	46.3	-4.5
2.416	20.2			0.0	0.4	20.0				40.6	46.0	-5.4
0.452	21.0			0.0	0.2	20.0				41.2	46.8	-5.6
1.105	19.9			0.0	0.3	20.0				40.2	46.0	-5.8
0.842	19.9			0.0	0.3	20.0				40.2	46.0	-5.8
0.514	19.9			0.0	0.2	20.0				40.1	46.0	-5.9
1.045	19.7			0.0	0.3	20.0				40.0	46.0	-6.0
0.814	19.5			0.0	0.3	20.0				39.8	46.0	-6.2
0.785	19.3			0.0	0.3	20.0				39.6	46.0	-6.4
0.543	19.3			0.0	0.3	20.0				39.6	46.0	-6.4
0.904	19.1			0.0	0.3	20.0				39.4	46.0	-6.6
0.755	19.1			0.0	0.3	20.0				39.4	46.0	-6.6
1.385	18.9			0.0	0.3	20.0				39.2	46.0	-6.8
0.871	18.9			0.0	0.3	20.0				39.2	46.0	-6.8
1.785	18.5			0.0	0.4	20.0				38.9	46.0	-7.1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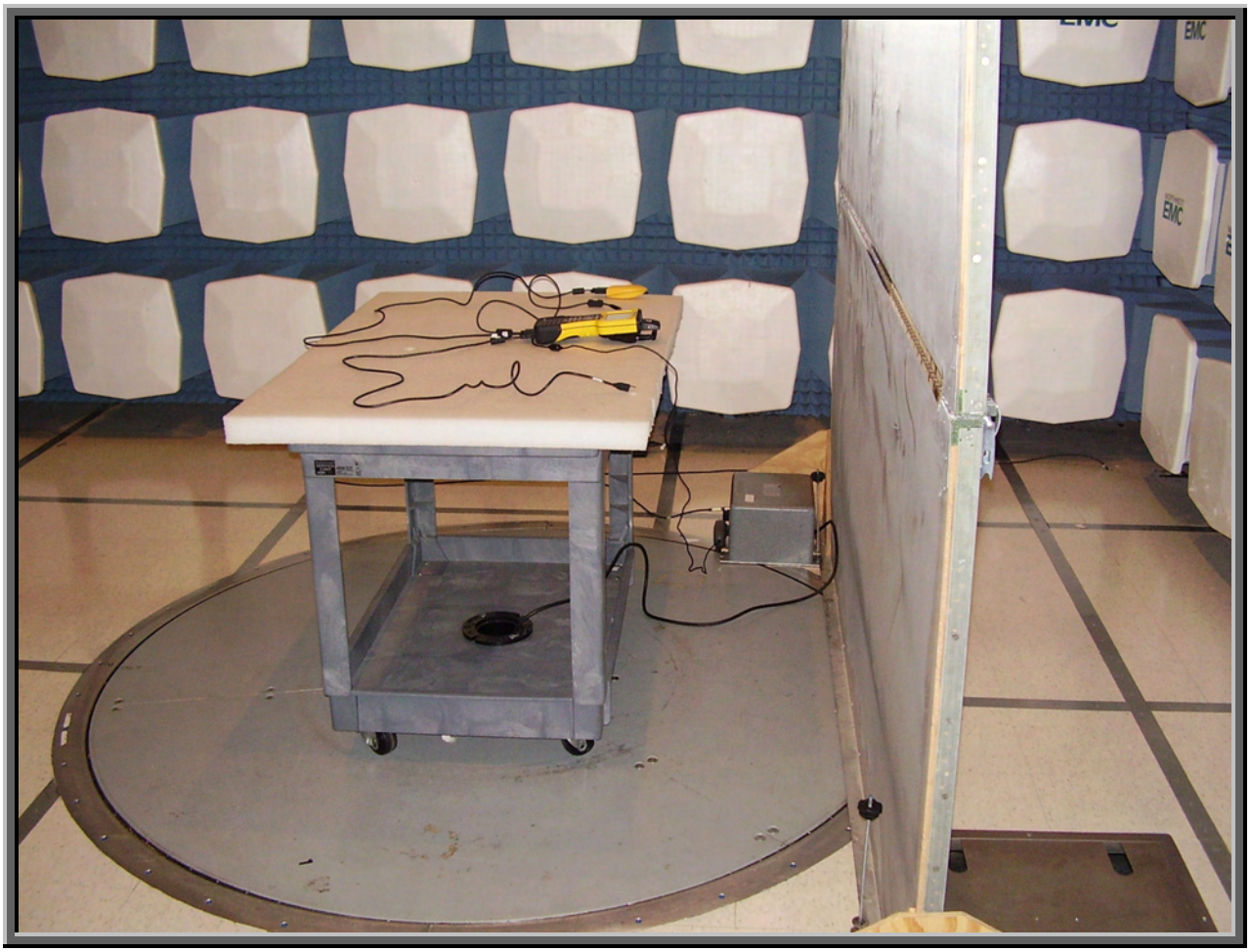
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