

# WirelessWERX, Inc.

## TrakLITE C4-B

March 29, 2005

Report No. 7LAY0030.1

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: March 29, 2005**  
**WirelessWERX, Inc.**  
**Model: TrakLITE C4-B**

Specification	Emissions	Test Method	Pass	Fail
Effective Radiated Power: FCC 24.232(b): 2004	TIA/EIA-603:2001	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
FCC 22H & 24E Frequency Stability:2004	TIA/EIA-603:2001	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
FCC 22H & 24E Occupied Bandwidth:2004	TIA/EIA-603:2001	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
FCC 2.1046 Output Power:2004	TIA/EIA-603:2001	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
FCC 22H & 24E Spurious Conducted Emissions:2004	TIA/EIA-603:2001	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
FCC 22H & 24E Spurious Radiated Emissions:2004	TIA/EIA-603:2001	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
FCC 15.109 Radiated Emissions (Receive Mode):2004	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:**



Dean Ghizzone, President

*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 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 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).



**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>

### What is measurement uncertainty?

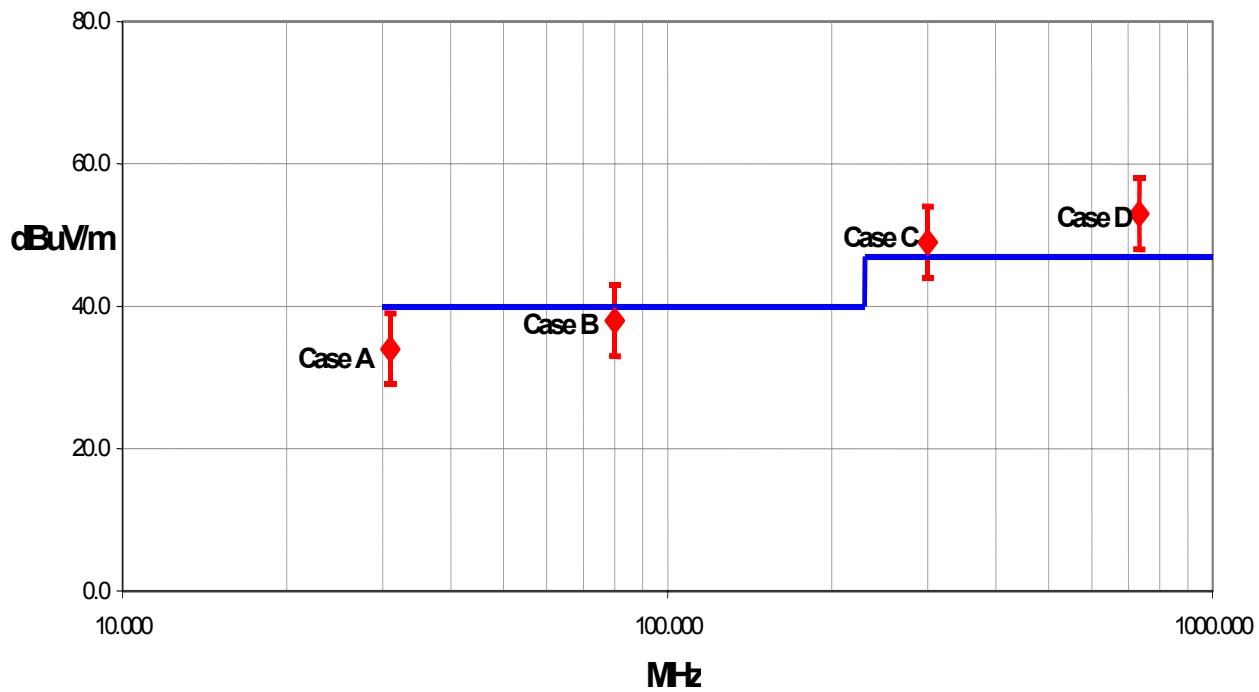
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. The following 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 $\leq 1$ GHz		Value (dB)							
Test Distance	Probability Distribution	Biconical Antenna		Log Periodic Antenna		Dipole Antenna		3m	10m
		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 $\approx 95\%$ )	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	
		3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.29 - 1.25		+ 1.38 - 1.35	
Expanded uncertainty $U$ (level of confidence $\approx 95\%$ )	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 $\approx 95\%$ )	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 $\approx 95\%$ )	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 $\approx 95\%$ )	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%.		

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

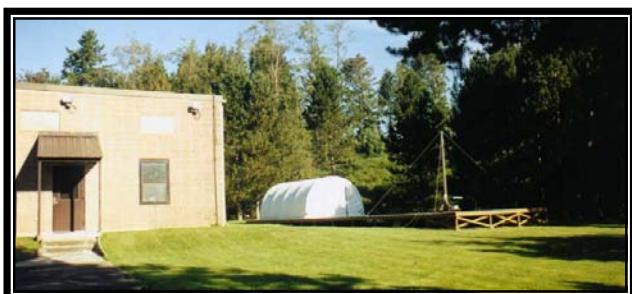
41 Tesla Ave.  
Irvine, CA 92618  
(888) 364-2378  
FAX (503) 844-3826

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

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

**Oregon****Trails End Facility****Labs TE01 – TE03**

30475 NE Trails End Lane  
Newberg, OR 97132  
(503) 844-4066  
FAX (503) 537-0735

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

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

**Party Requesting the Test**

<b>Company Name:</b>	WirelessWERX, Inc.
<b>Address:</b>	9361 Irvine Blvd
<b>City, State, Zip:</b>	Irvine, CA 92618
<b>Test Requested By:</b>	Dave Couchman
<b>Model:</b>	TrakLITE C4-B
<b>First Date of Test:</b>	03-19-2005
<b>Last Date of Test:</b>	03-25-2005
<b>Receipt Date of Samples:</b>	03-19-2005
<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, JTAG (factory use only), GSM Modem, GPS, Bluetooth, Vehicle Cable Harness

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

Vehicle mounted radio with GSM modem, Bluetooth, and GPS capability

The TrakLITE is primarily intended for mounting on a mobile vehicle or cargo, and provides the means for remote positioning and communications on a global scale. The TrakLITE, when requested, can issue commands to a local system or cargo, receive and respond to requests for position and status, issue pre-programmed commands and status messages and log a combination of 4,500 position, velocity, and status records for subsequent download to a Control Center.

**Client Justification for EUT Selection:**

The product is a representative production sample.

**Client Justification for Test Selection:**

These tests satisfy the requirements of FCC Parts 22H and 24E for the GSM modem.

**EUT Photo**

Equipment modifications					
Item	Test	Date	Modification	Note	Disposition of EUT
1	Effective Radiated Power	03/20/2005	No EMI suppression devices were added or modified during this test.	Same configuration as delivered.	EUT remained at Northwest EMC.
2	Spurious Radiated Emissions	03/21/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
3	Receive Mode Radiated Emissions	03/21/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
4	Spurious Conducted Emissions	03/24/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
5	Frequency Stability	03/24/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
6	Output Power	03/25/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
7	Occupied Bandwidth	03/25/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.

**Justification**

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

**Channels in Specified Band Investigated:**

Cellular Low Channel, 824.2MHz

Cellular Mid Channel, 836.4MHz

Cellular High Channel, 848.8MHz

PCS Low Channel, 1850.2MHz

PCS Mid Channel, 1880MHz

PCS High Channel, 1909.8MHz

**Operating Modes Investigated:**

Typical

**Data Rates Investigated:**

Maximum

**Power Input Settings Investigated:**

12VDC

**Software\Firmware Applied During Test**

Exercise software	Hyperterminal	Version	1999
Description			
The system was tested using hyperterminal software on a remote pc to access the EUT during the testing. A call was originated by the wireless communications test set and answered via hyperterminal on the EUT.			

**EUT and Peripherals**

Description	Manufacturer	Model/Part Number	Serial Number
EUT	Wireless Werx	TrakLITE C4-B	100074
DC Power Supply	Topward Electric Instruments, Co. Ltd.	TPS-2000	Unknown
Cellular Antenna	Radiall/Larsen	MMC/P3ESMA	Unknown
GPS Antenna	Laipac Tech	GLP1	334083
Bluetooth Antenna	Radiall/Larsen	MS3E2400SMA	Unknown

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Wireless Communications Test Set	Agilent	8960 Series 10 E5515C	0844051960
Remote laptop	IBM	Thinkpad	78-HKYY6 10/00
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	6	No	EUT	Remote laptop
Wire harness (16)	No	1.0	No	EUT	Unterminated
Wire harness (3)	No	1.0	No	EUT	DC Power Supply
Bluetooth	Yes	2.0	No	EUT	Bluetooth Antenna
Cellular	Yes	3.0	No	EUT	Cellular Antenna
GPS	Yes	3.0	No	EUT	GPS Antenna
AC Power	No	2.0	No	DC Power Supply	AC Mains

Measurement Equipment						
Description	Manufacturer	Model	Identifier	Last Cal	Interval	
Antenna, Biconilog	EMCO	3141	AXE	12/03/2003	24 mo	
Antenna, Horn	EMCO	3115	AHC	09/07/2004	12 mo	
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	12/02/2004	13 mo	
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	12/02/2004	13 mo	
Spectrum Analyzer Display	Hewlett Packard	85662A	AALD	12/02/2004	13 mo	
Attenuator	Coaxicom	66702 5910-20	RBJ	02/25/2005	13 mo	
Antenna, Horn	EMCO	3115	AHF	03/18/2004	24 mo	
Signal Generator	Hewlett Packard	8341B	TGN	02/07/2005	13 mo	
Antenna, Dipole (ADAA included)	Roberts	Roberts	ADA	01/06/2005	24 mo	

### Test Description

**Requirement:** The EIRP of the GSM Cellular and PCS radio's fundamental frequencies shall meet the requirements specified in FCC 22.913 and FCC 24.232, respectively.

**Configuration:** The fundamental emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height (1-4 meters) and polarization. The amplitude of the emissions were noted. The EUT was then replaced with a  $\frac{1}{2}$  wave dipole that was successively tuned to each of the highest spurious emissions. A signal generator was connected to the dipole, and its output was adjusted to match the level previously noted for each frequency. The output of the signal generator was recorded, and by factoring in the cable loss to the dipole antenna and its gain (dBi); the effective radiated power for each radiated emission was determined.

Completed by:

NORTHWEST  
EMC

## Apparent Power Data Sheet

ACQ 2005.1.3  
EMI 2005.1.3

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/19/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Holly Ashkannejhad	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 22.913(a): 2004	Method: TIA/EIA-603:2001
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## 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

10dB internal attenuation, no preamp

## EUT OPERATING MODES

Transmitting GSM Cellular Low Channel

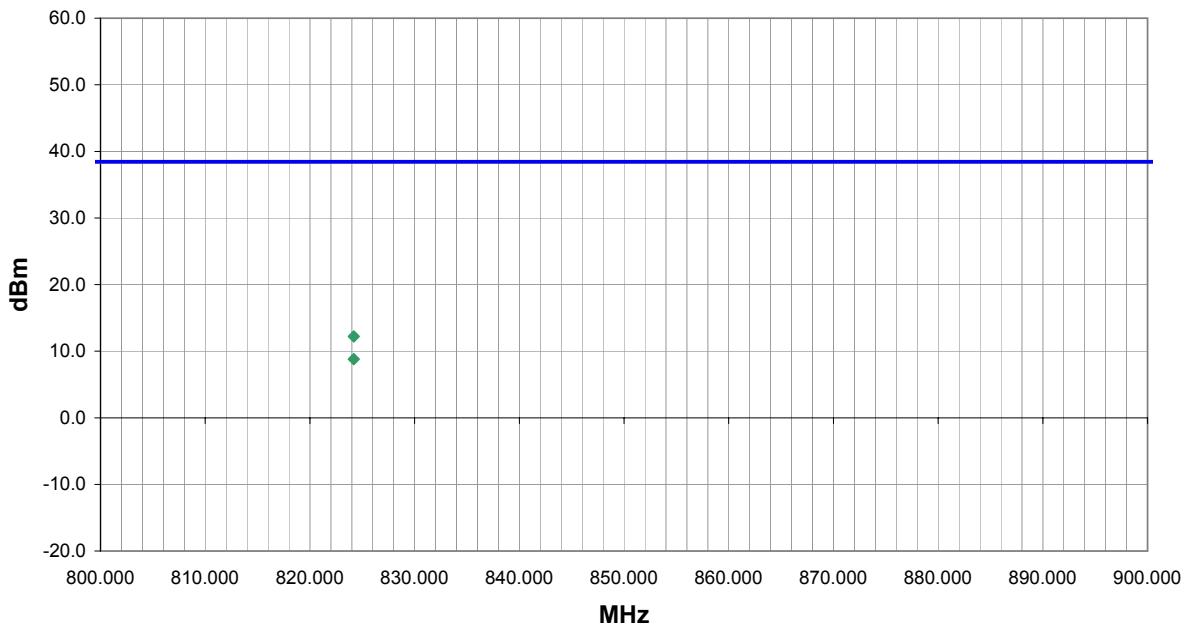
## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Pass	Run #
	1

Other	
	Tested By: _____



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
824.197			29.0	1.2			V-Bilog	PK	0.0167	12.2	38.5	-26.2
824.197			331.0	1.0			H-Bilog	PK	0.0076	8.8	38.5	-29.6

NORTHWEST  
EMC

## Apparent Power Data Sheet

ACQ 2005.1.3  
EMI 2005.1.3

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/19/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Holly Ashkannejhad	Power: 12VDC
	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 22.913(a): 2004	Method: TIA/EIA-603:2001
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## 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

10dB internal attenuation, no preamp.

## EUT OPERATING MODES

Transmitting GSM Cellular Mid Channel

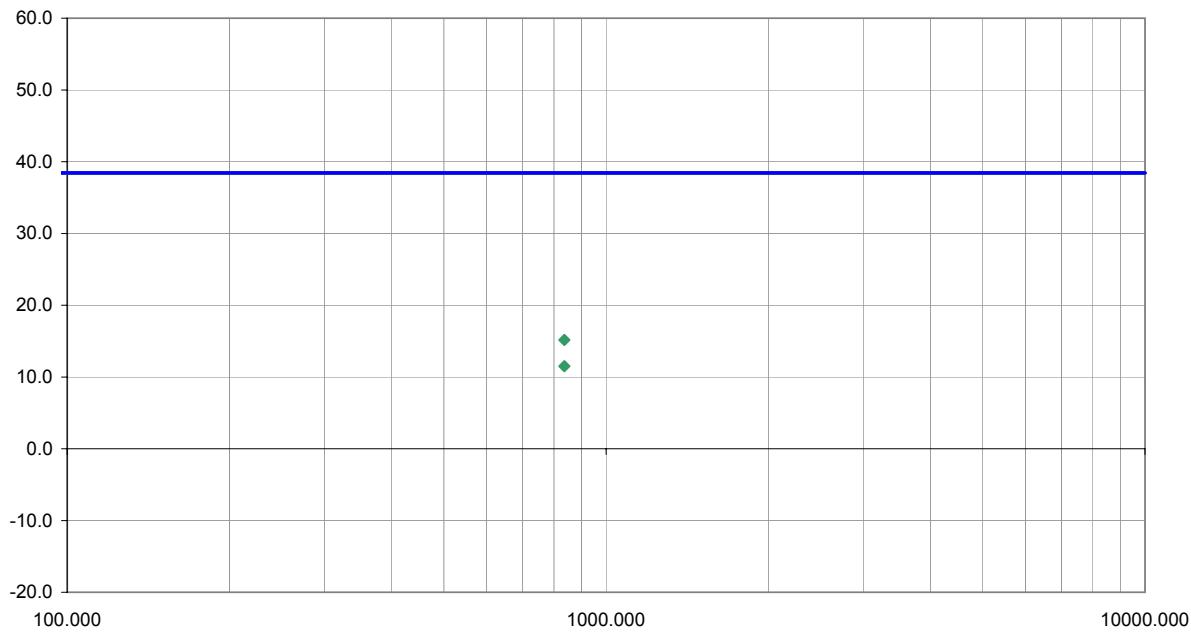
## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Pass	Run #
	2

Other	<i>Holly Ashkannejhad</i>
	Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
836.400			30.0	1.3			V-Bilog	PK	0.0329	15.2	38.5	-23.4
836.400			331.0	1.0			H-Bilog	PK	0.0141	11.5	38.5	-27.0

NORTHWEST  
EMC

## Apparent Power Data Sheet

ACQ 2005.1.3  
EMI 2005.1.3

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/19/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure: 29.67
Tested by: Holly Ashkannejhad	Power: 12VDC
	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 22.913(a): 2004	Method: TIA/EIA-603:2001
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## 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

10dB internal attenuation, no preamp.

## EUT OPERATING MODES

Transmitting GSM Cellular High Channel

## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Pass

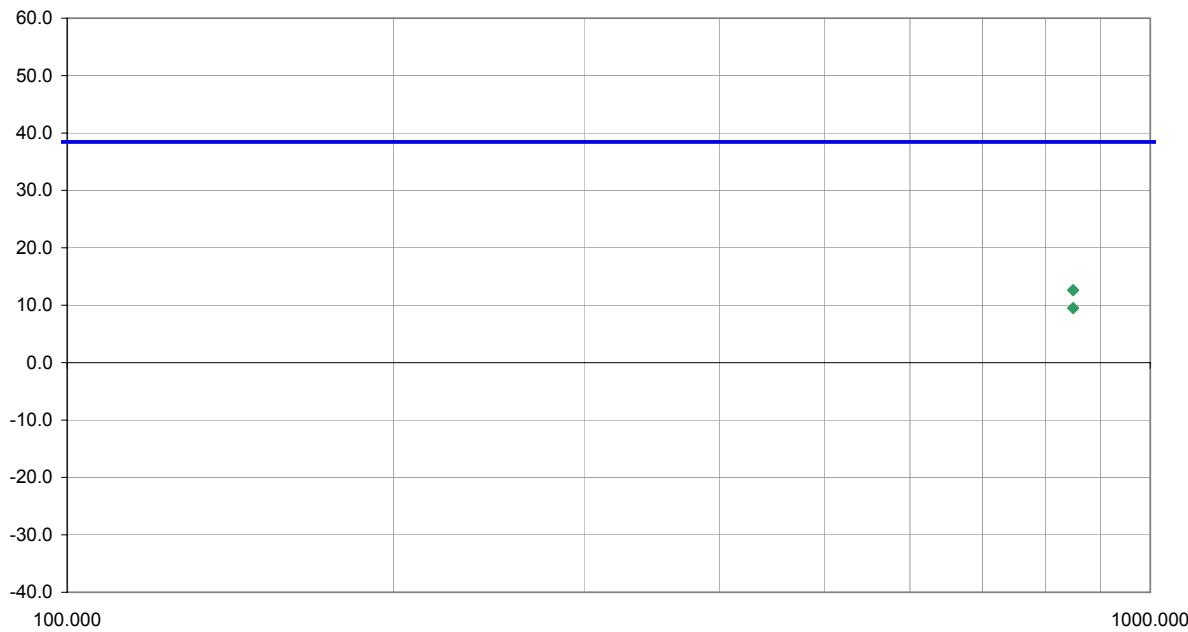
Run #

3

Other

*Holly Ashkannejhad*

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	ERP (Watts)	ERP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
848.800			23.0	1.3			V-Bilog	PK	0.0183	12.6	38.5	-25.8
848.800			360.0	1.0			H-Bilog	PK	0.0089	9.5	38.5	-29.0

## Apparent Power Data Sheet

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/19/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Holly Ashkannejhad	Power: 12VDC
	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 24.232(b) :2004 Method: TIA/EIA-603:2001

## 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

20dB external attenuation, 10dB internal attenuation

## EUT OPERATING MODES

Transmitting GSM PCS Low Channel

## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Pass

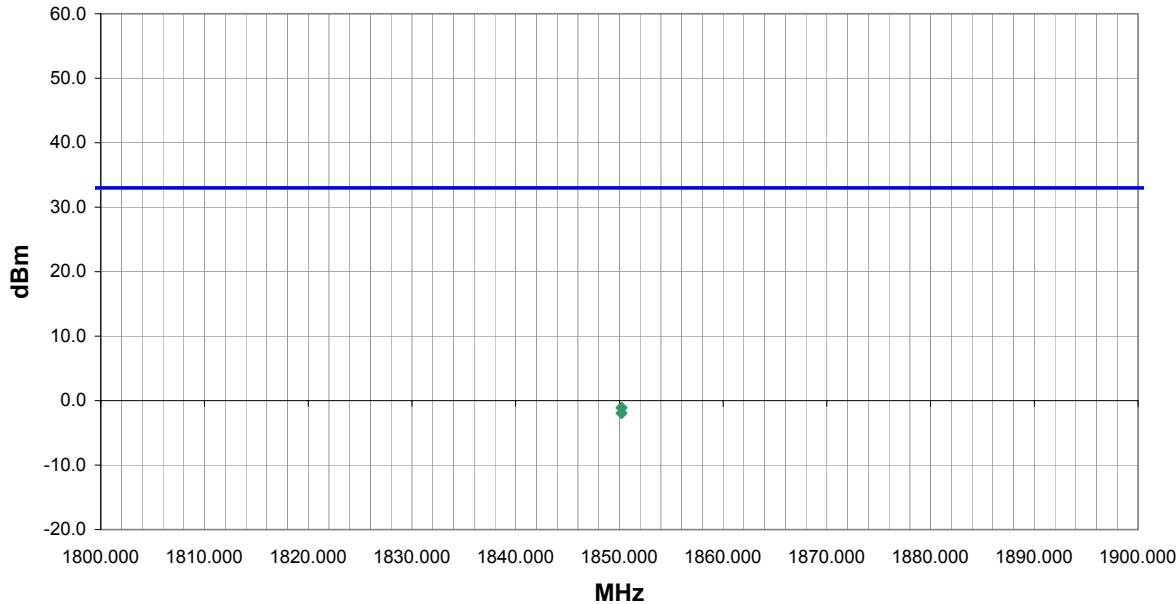
Run #

4

Other

*Holly Ashkannejhad*

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
1850.209			247.0	1.2			V-Horn	PK	6.3878E-04	-1.1	33.0	-34.1
1850.209			210.0	1.7			H-Horn	PK	7.7726E-04	-1.9	33.0	-34.9

NORTHWEST  
EMC

## Apparent Power Data Sheet

ACQ 2005.1.3  
EMI 2005.1.3

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/20/05
Customer: WirelessWERX, Inc.	Temperature: 23
Attendees: none	Humidity: 32%
Cust. Ref. No.:	Barometric Pressure 29.5
Tested by: Holly Ashkannejhad	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 24.232(b):2004	Method: TIA/EIA-603:2001
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## 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

20dB external attenuation, 10dB internal attenuation.

## EUT OPERATING MODES

Transmitting GSM PCS Mid Channel

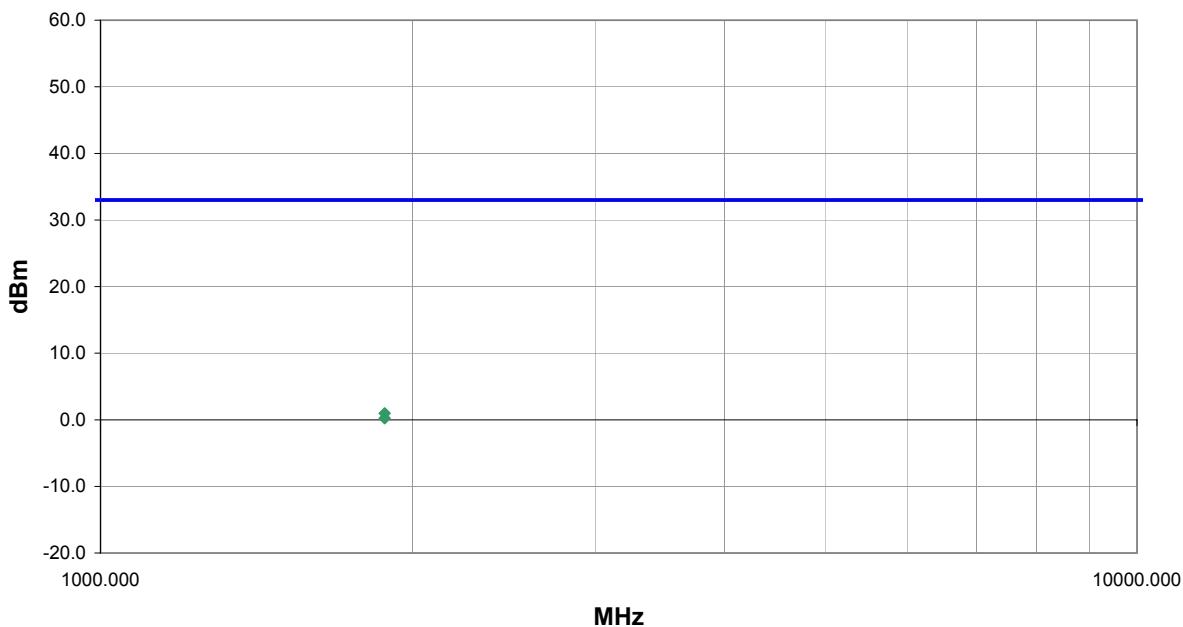
## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Pass	Run #
6	

Other	<i>Holly Ashkannejhad</i>
	Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
1880.000			188.0	1.2			V-Horn	AV	0.0011	1.0	33.0	-32.0
1880.000			208.0	1.3			H-Horn	PK	0.0012	0.2	33.0	-32.8

NORTHWEST  
EMC

## Apparent Power Data Sheet

ACQ 2005.1.3  
EMI 2005.1.3

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/20/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure: 29.67
Tested by: Holly Ashkannejhad	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 24.232(b):2004	Method: TIA/EIA-603:2001
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## 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

20dB external attenuation, 10dB internal attenuation.

## EUT OPERATING MODES

Transmitting GSM PCS High Channel

## DEVIATIONS FROM TEST STANDARD

No deviations.

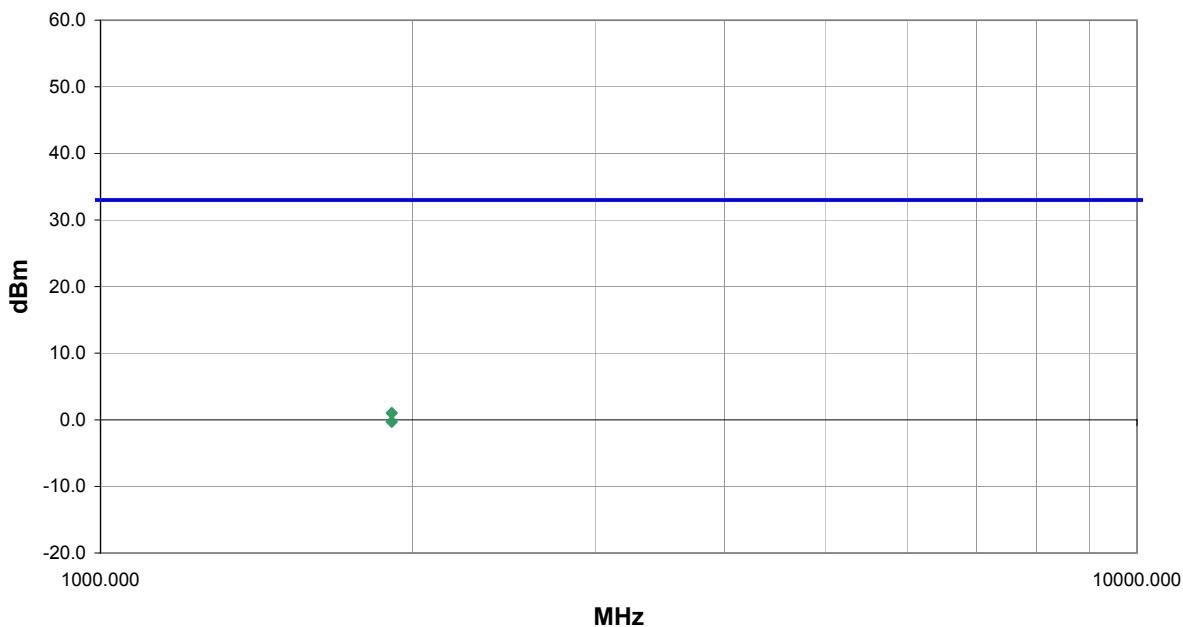
## RESULTS

Pass	Run #
7	

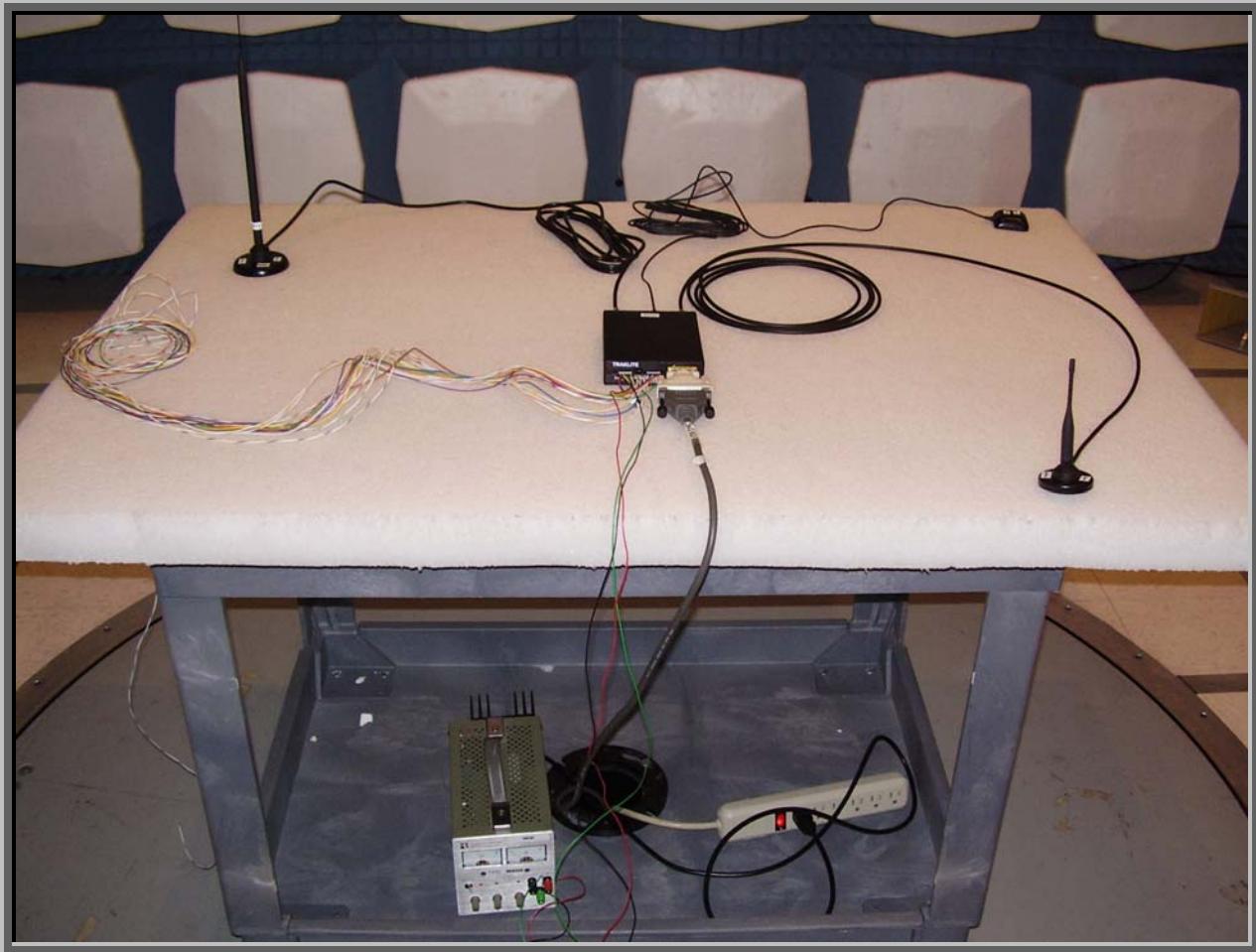
Other

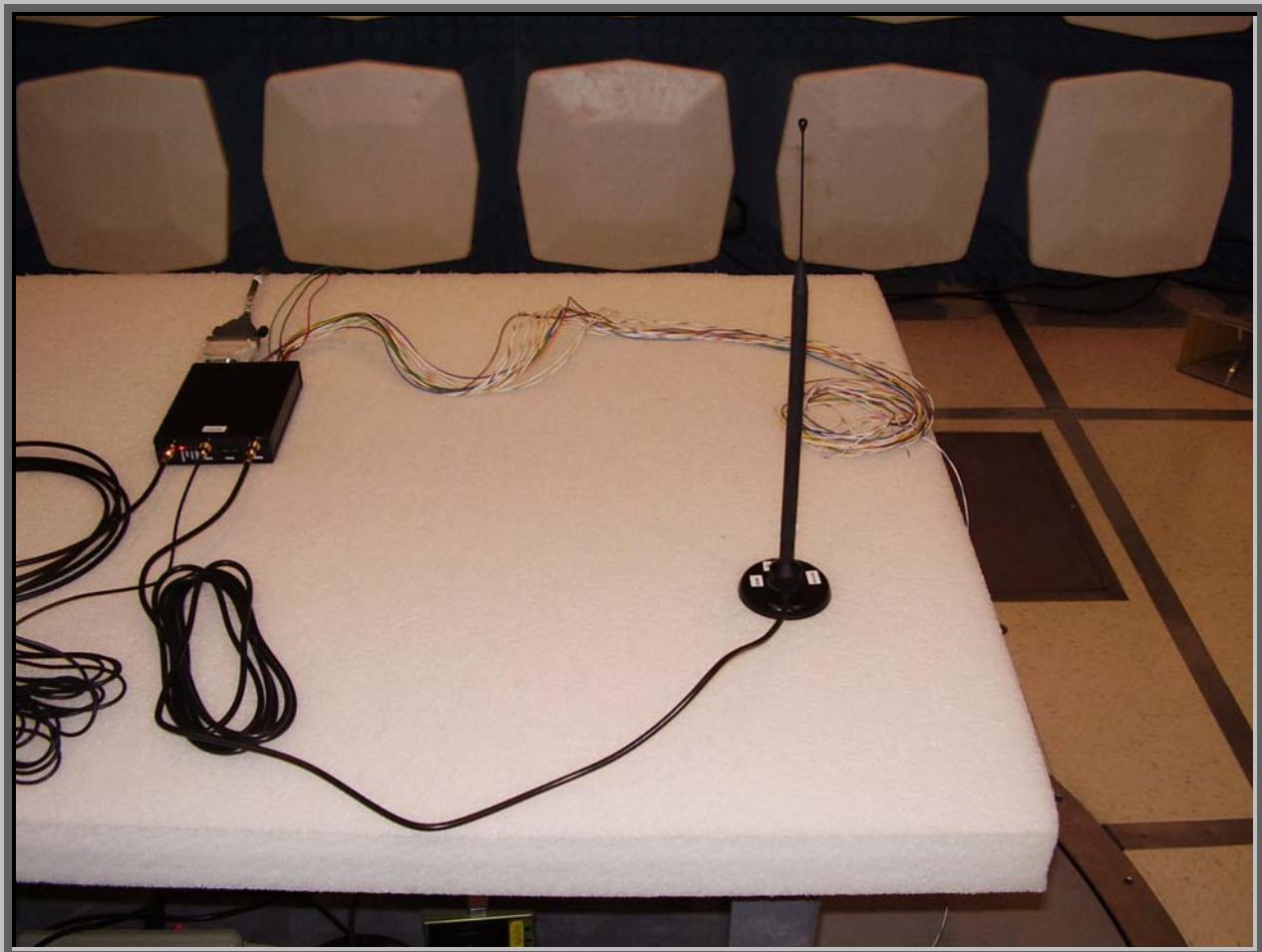
*Holly Ashkannejhad*

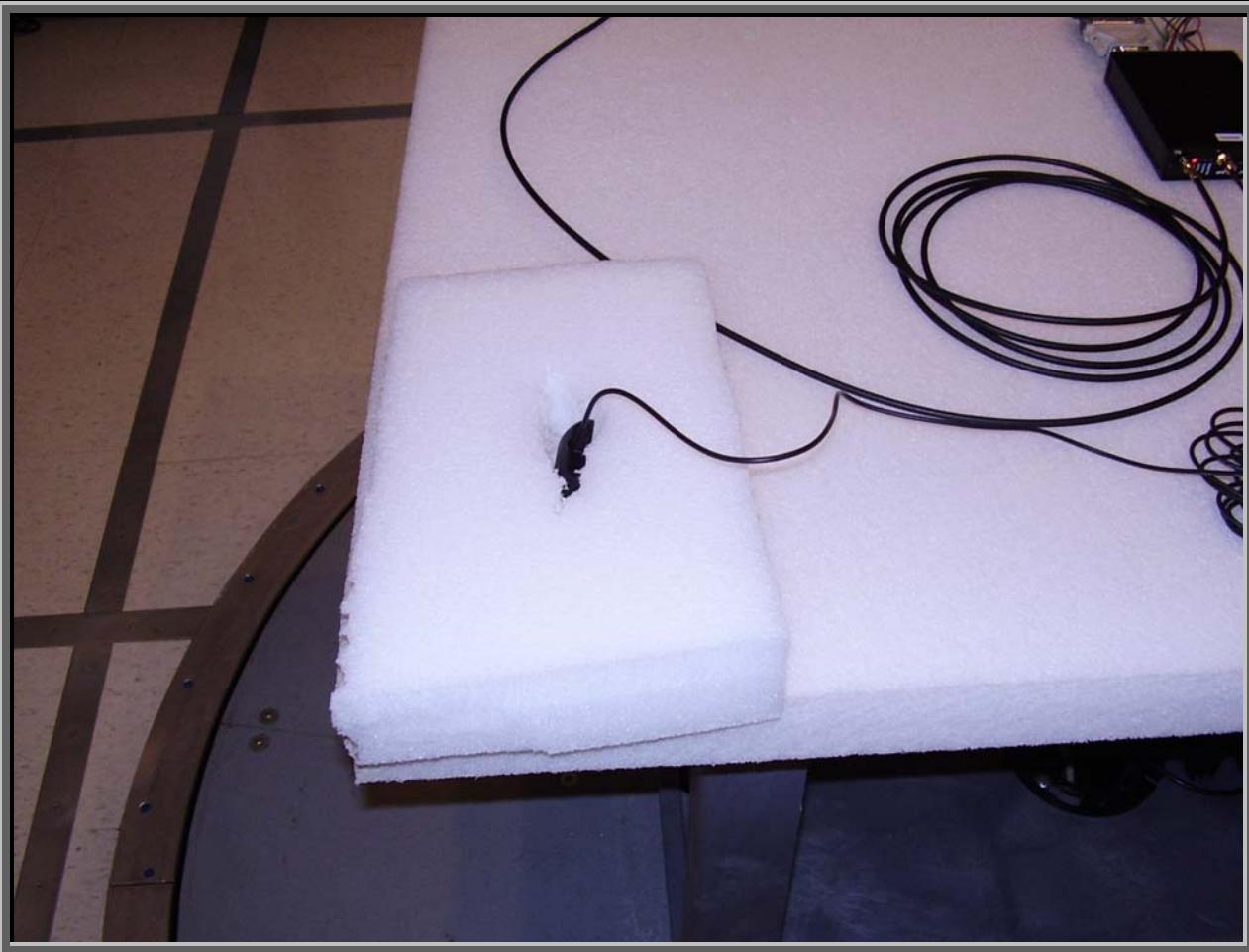
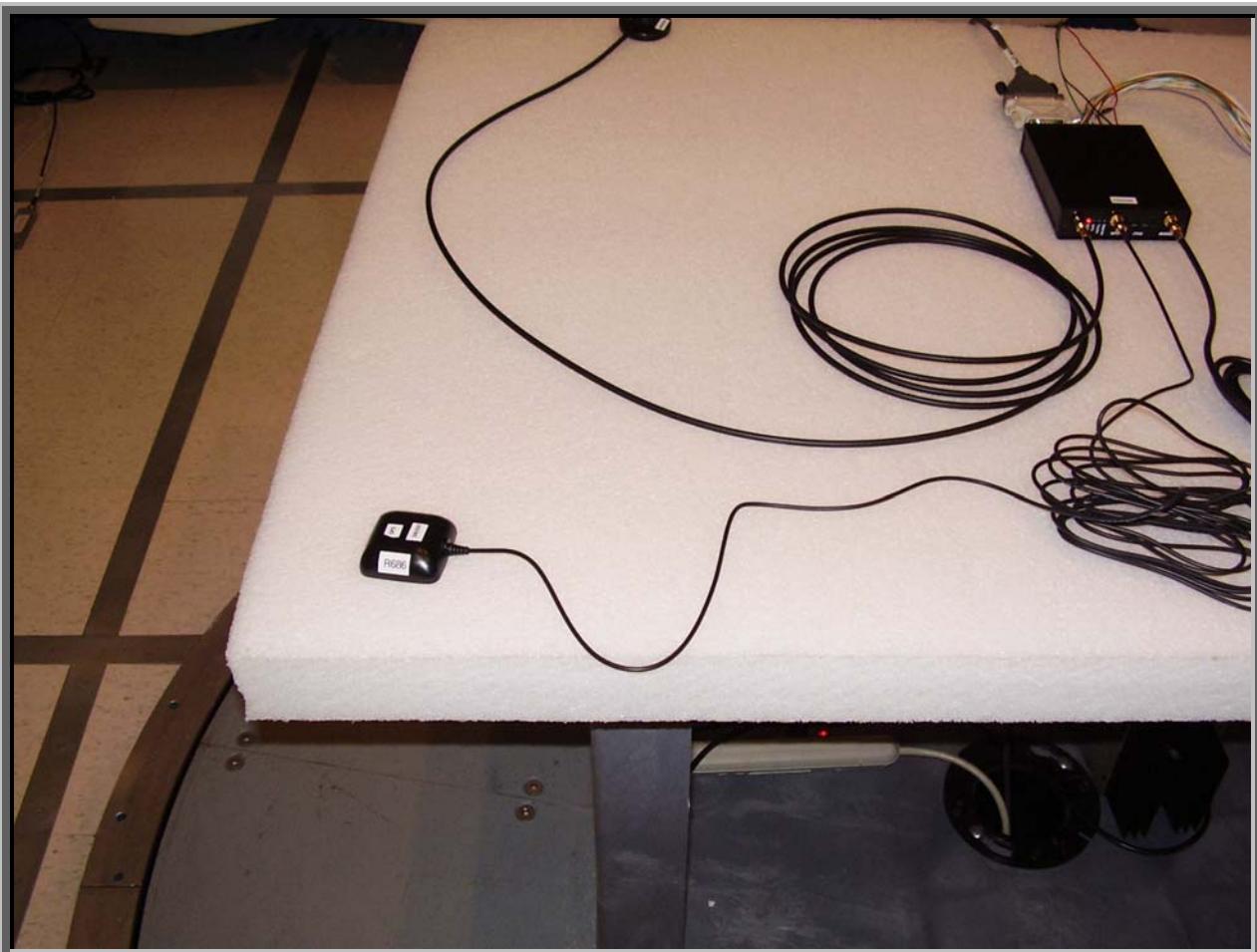
Tested By:

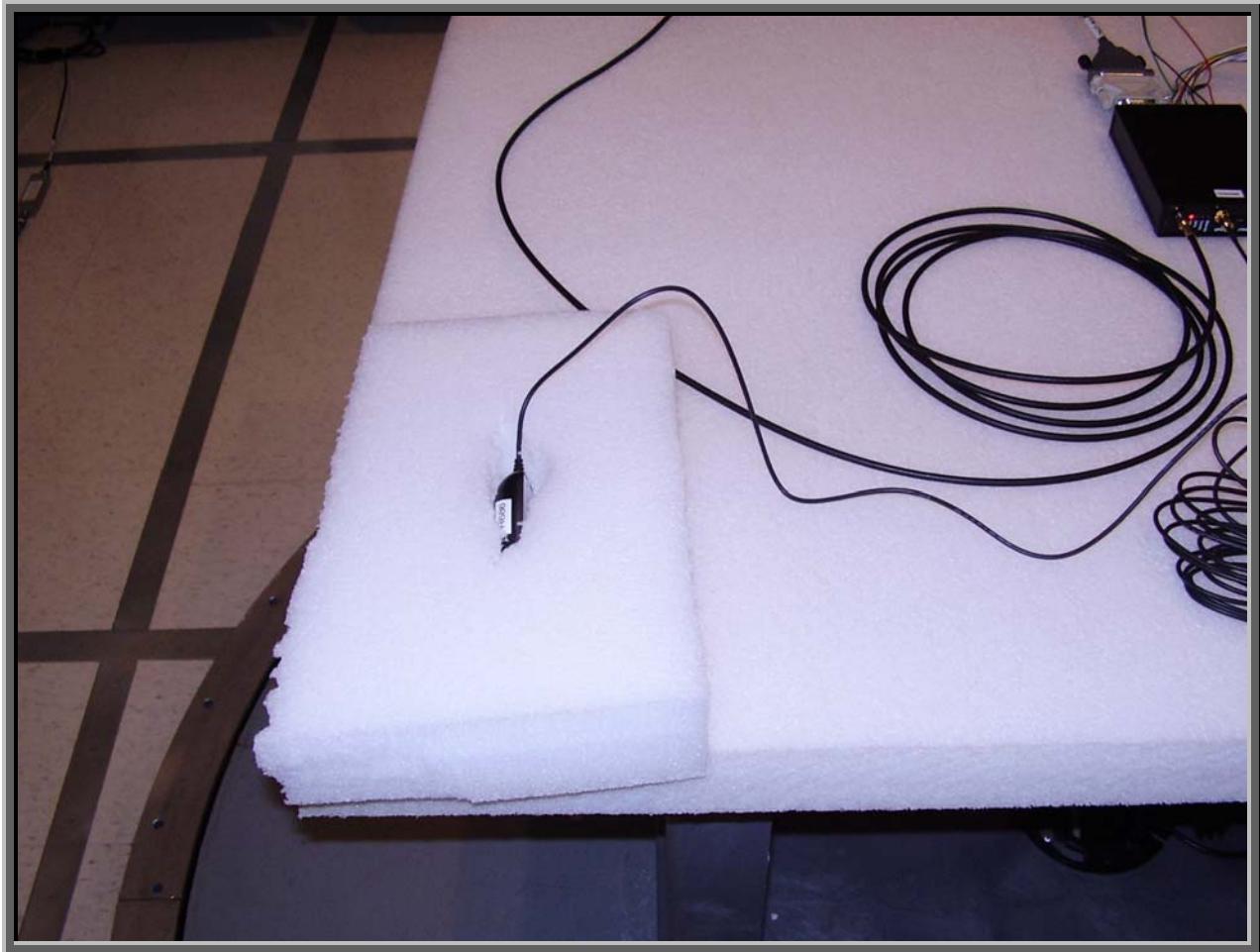


Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
1909.800			52.0	1.7			V-Horn	PK	0.0009	1.0	33.0	-32.0
1909.800			211.0	1.3			H-Horn	PK	0.0013	-0.3	33.0	-33.3









**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:**

Cellular Mid Channel, 836.4MHz

PCS Mid Channel, 1880MHz

**Operating Modes Investigated:**

Typical

**Data Rates Investigated:**

Maximum

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

Maximum

**Power Input Settings Investigated:**

12 VDC (nominal)

**Software\Firmware Applied During Test**

Exercise software	Hyperterminal	Version	1999
Description			
The system was tested using hyperterminal software on a remote pc to access the EUT during the testing. A call was originated by the wireless communications test set and answered via hyperterminal on the EUT.			

**EUT and Peripherals**

Description	Manufacturer	Model/Part Number	Serial Number
EUT	Wireless Werx	TrakLITE C4-B	100074
DC Power Supply	Tektronix, Inc	PS280	TW60580

**Remote Equipment Outside of Test Setup Boundary**

Description	Manufacturer	Model/Part Number	Serial Number
Wireless Communications Test Set	Agilent	8960 Series 10 E5515C	0844051960
Remote laptop	IBM	Thinkpad	78-HKYY6 10/00
Near Field Probe	EMCO	7405-901	3337
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	6	No	EUT	Remote laptop
Wire harness (16)	No	1.0	No	EUT	Unterminated
Wire harness (3)	No	1.0	No	EUT	DC Power Supply
AC Power	No	2.0	No	DC Power Supply	AC Mains

Measurement Equipment						
Description	Manufacturer	Model	Identifier	Last Cal	Interval	
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo	
Multimeter	Tektronix	DMM912	MMH	12/02/2004	13 mo	
Chamber, Temp./Humidity Chamber	Cincinnati Sub Zero (CSZ)	ZH-32-2-2-H/AC	TBA	09/07/2004	12 mo	

### Test Description

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

#### Configuration:

##### Variation of AC Mains Supply Voltage

The EUT is operated in motorized vehicles. There is no provision for connection to the AC mains.

##### Variation of Battery Supply Voltage

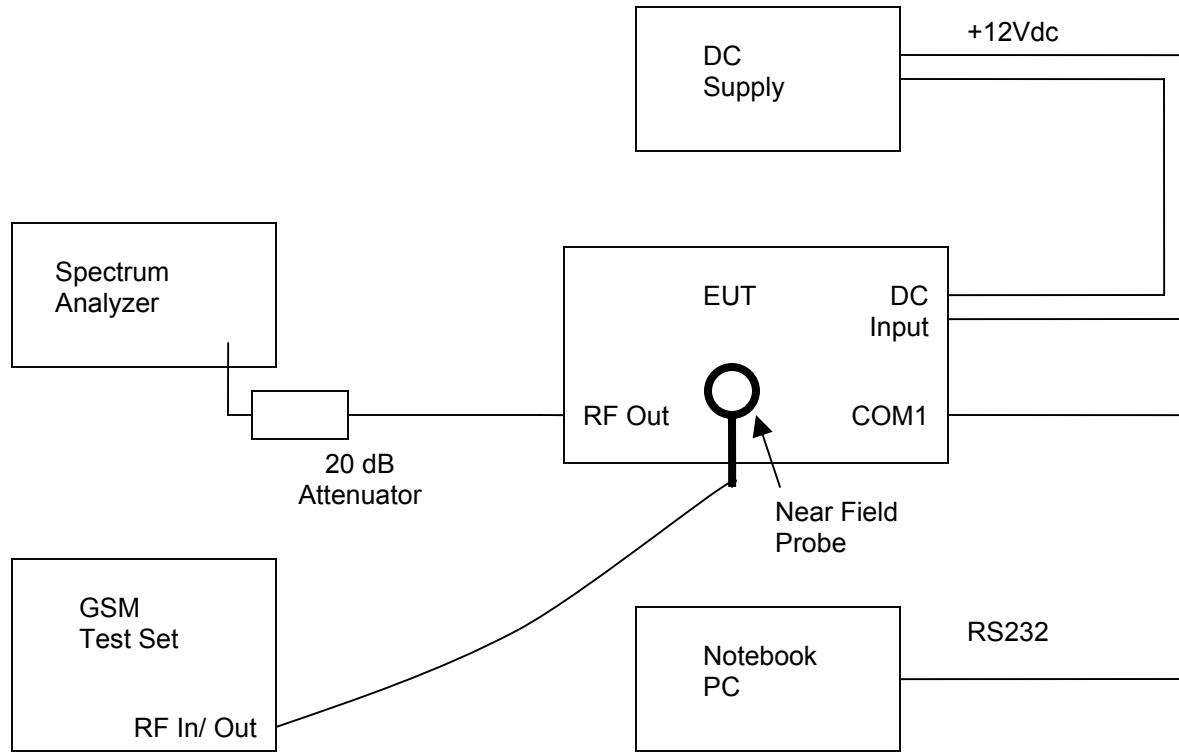
The EUT is designed to operate from either 12 Vdc or 24 Vdc vehicle power. A DC lab supply was used to vary the supply voltage from 24 Vdc down to the EUT's voltage end point.

##### Variation of Ambient Temperature

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

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

## Test Setup Diagram



Completed by:

A handwritten signature in blue ink, appearing to read "U. Kip".

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT: TrakLITE C4-B	Work Order: 7LAY0037	
Serial Number: 100074	Date: 03/24/05	
Customer: WirelessWERX, Inc.	Temperature: see below	
Attendees: none	Humidity: 42%	
Customer Ref. No.: N/A	Power: see below	
TEST SPECIFICATIONS		Job Site: EV06, EV09
Specification: 47 CFR 2.1055	Year: Most Current	Method: TIA/EIA - 603
SAMPLE CALCULATIONS		
COMMENTS		
EUT OPERATING MODES		
Transmitting mid band		
DEVIATIONS FROM TEST STANDARD		
None		
REQUIREMENTS		
Minimum frequency stability of 2.5 parts per million (ppm) for variations of temperature and supply voltage.		
RESULTS		MINIMUM FREQUENCY STABILITY
Pass	0.20 ppm	
SIGNATURE		
 Tested By: _____		
DESCRIPTION OF TEST		
Frequency Stability		

## Frequency Stability with Variation of Ambient Temperature (Primary Supply = 12 Vdc)

Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
-30	836.40000	836.399900	0.12	2.5
-20	836.40000	836.399925	0.09	2.5
-10	836.40000	836.399930	0.08	2.5
0	836.40000	836.399895	0.13	2.5
10	836.40000	836.399940	0.07	2.5
20	836.40000	836.399865	0.16	2.5
30	836.40000	836.399860	0.17	2.5
40	836.40000	836.399830	0.20	2.5
50	836.40000	836.399880	0.14	2.5
60	836.40000	836.399865	0.16	2.5

## Frequency Stability with Variation of Primary Supply Voltage (Ambient Temperature = 22°C)

12 Vdc or 24 Vdc = Nominal Battery Supply Voltage

Voltage (Vdc)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
24 (100%)	836.40000	836.399950	0.06	2.5
12 (100%)	836.40000	836.399885	0.14	2.5
11.4 (95%)	836.40000	836.399895	0.13	2.5
10.8 (90%)	836.40000	836.399925	0.09	2.5
10.2 (85%)	836.40000	836.399890	0.13	2.5
8.0 (end point)	836.40000	836.399830	0.20	2.5

EUT: TrakLITE C4-B		Work Order: 7LAY0037	
Serial Number: 100074		Date: 03/24/05	
Customer: WirelessWERX, Inc.		Temperature: see below	
Attendees: none		Humidity: 42%	
Customer Ref. No.: N/A		Power: see below	
TEST SPECIFICATIONS			
Specification: 47 CFR 2.1055 , 24.235		Year: Most Current	
Method: TIA/EIA - 603		Year: 2001	
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Transmitting mid band			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
Minimum frequency stability of 2.5 parts per million (ppm) for variations of temperature and supply voltage.			
RESULTS		MINIMUM FREQUENCY STABILITY	
Pass		0.90 ppm	
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Frequency Stability			

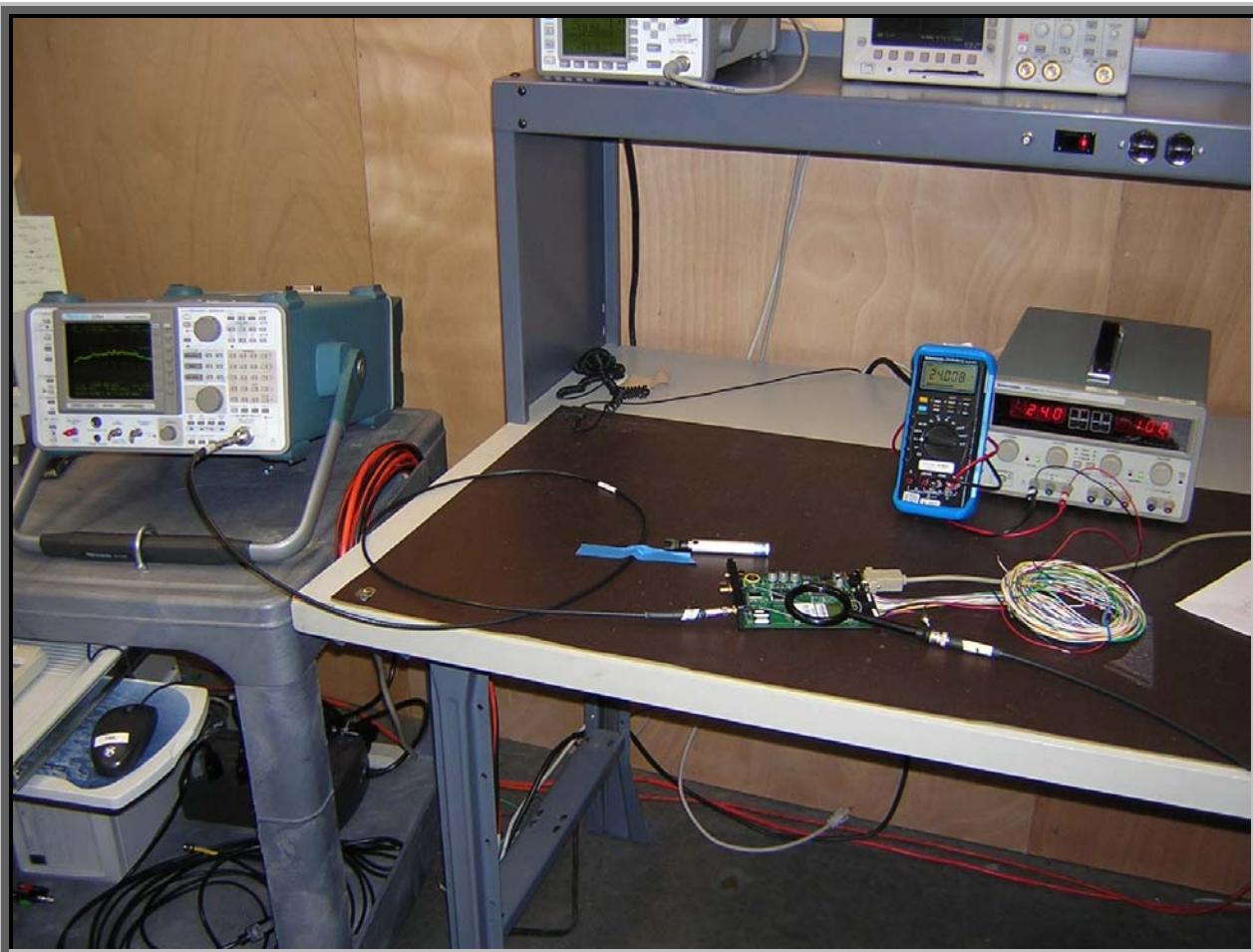
## Frequency Stability with Variation of Ambient Temperature (Primary Supply = 12 Vdc)

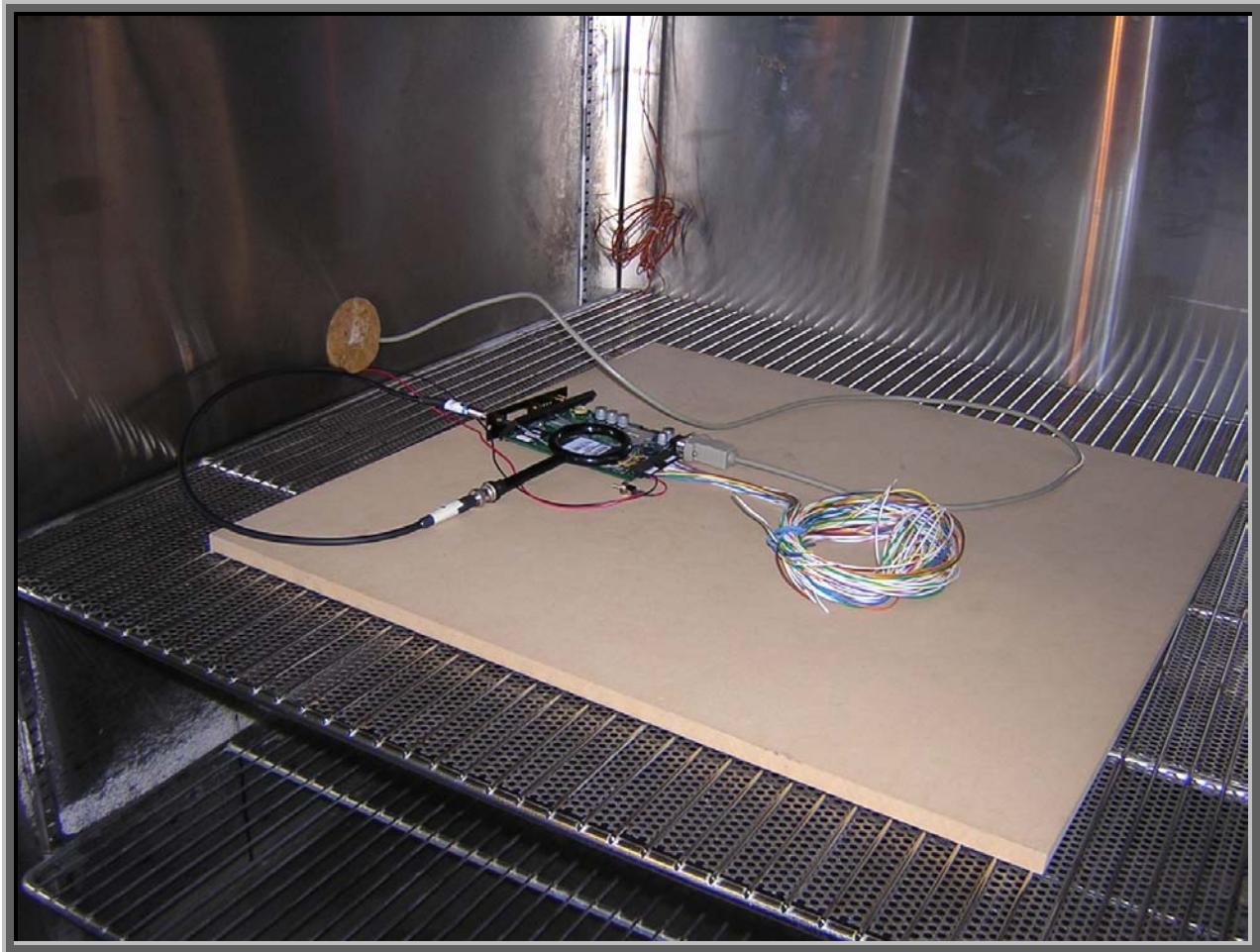
Temp (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
-30	1880.00000	1879.998500	0.80	2.5
-20	1880.00000	1879.998500	0.80	2.5
-10	1880.00000	1879.998900	0.59	2.5
0	1880.00000	1879.998600	0.74	2.5
10	1880.00000	1879.998900	0.59	2.5
20	1880.00000	1879.998800	0.64	2.5
30	1880.00000	1879.998900	0.59	2.5
40	1880.00000	1879.998700	0.69	2.5
50	1880.00000	1879.998600	0.74	2.5
60	1880.00000	1879.998300	0.90	2.5

## Frequency Stability with Variation of Primary Supply Voltage (Ambient Temperature = 22°C)

12 Vdc or 24 Vdc = Nominal Battery Supply Voltage

Voltage (Vdc)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (ppm)	Specification (ppm)
24 (100%)	1880.00000	1879.998600	0.74	2.5
12 (100%)	1880.00000	1879.999200	0.43	2.5
11.4 (95%)	1880.00000	1879.999000	0.53	2.5
10.8 (90%)	1880.00000	1879.998800	0.64	2.5
10.2 (85%)	1880.00000	1879.998600	0.74	2.5
8.0 (end point)	1880.00000	1879.998600	0.74	2.5





**Justification**

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

**Channels in Specified Band Investigated:**

GSM Cellular

**Operating Modes Investigated:**

Receive Mode

**Antennas Investigated:**

Bluetooth

GPS

Cellular

**Data Rates Investigated:**

Maximum

**Power Input Settings Investigated:**

12VDC

**Frequency Range Investigated**

<b>Start Frequency</b>	30 MHz	<b>Stop Frequency</b>	5 GHz
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**Software\Firmware Applied During Test**

<b>Exercise software</b>	Hyperterminal	<b>Version</b>	1999
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**Description**

The system was tested using hyperterminal software on a remote pc to access the EUT during the testing. A cellular band call was originated by the wireless communications test set and answered via hyperterminal on the EUT. The call was ended, but the radio remained in a receive mode

**EUT and Peripherals**

<b>Description</b>	<b>Manufacturer</b>	<b>Model/Part Number</b>	<b>Serial Number</b>
EUT	Wireless Werx	TrakLITE C4-B	100074
DC Power Supply	Topward Electric Instruments, Co. Ltd.	TPS-2000	Unknown
Cellular Antenna	Radiall/Larsen	MMC/P3ESMA	Unknown
GPS Antenna	Laipac Tech	GLP1	334083
Bluetooth Antenna	Radiall/Larsen	MS3E2400SMA	Unknown

**Remote Equipment Outside of Test Setup Boundary**

Description	Manufacturer	Model/Part Number	Serial Number
Wireless Communications Test Set	Agilent	8960 Series 10 E5515C	0844051960
Remote laptop	IBM	Thinkpad	78-HKYY6 10/00

Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary

**Cables**

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	6	No	EUT	Remote laptop
Wire harness (16)	No	1.0	No	EUT	Unterminated
Wire harness (3)	No	1.0	No	EUT	DC Power Supply
Bluetooth	Yes	2.0	No	EUT	Bluetooth Antenna
Cellular	Yes	3.0	No	EUT	Cellular Antenna
GPS	Yes	3.0	No	EUT	GPS Antenna
AC Power	No	2.0	No	DC Power Supply	AC Mains

**Measurement Equipment**

Description	Manufacturer	Model	Identifier	Last Cal	Interval
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, Biconilog	EMCO	3141	AXE	12/03/2003	24 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	03/01/2005	13 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	12/02/2004	13 mo
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	12/02/2004	13 mo
Spectrum Analyzer Display	Hewlett Packard	85662A	AALD	12/02/2004	13 mo

**Test Description**

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

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

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

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

<b>Measurement Bandwidths</b>			
<b>Frequency Range (MHz)</b>	<b>Peak Data (kHz)</b>	<b>Quasi-Peak Data (kHz)</b>	<b>Average Data (kHz)</b>
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:

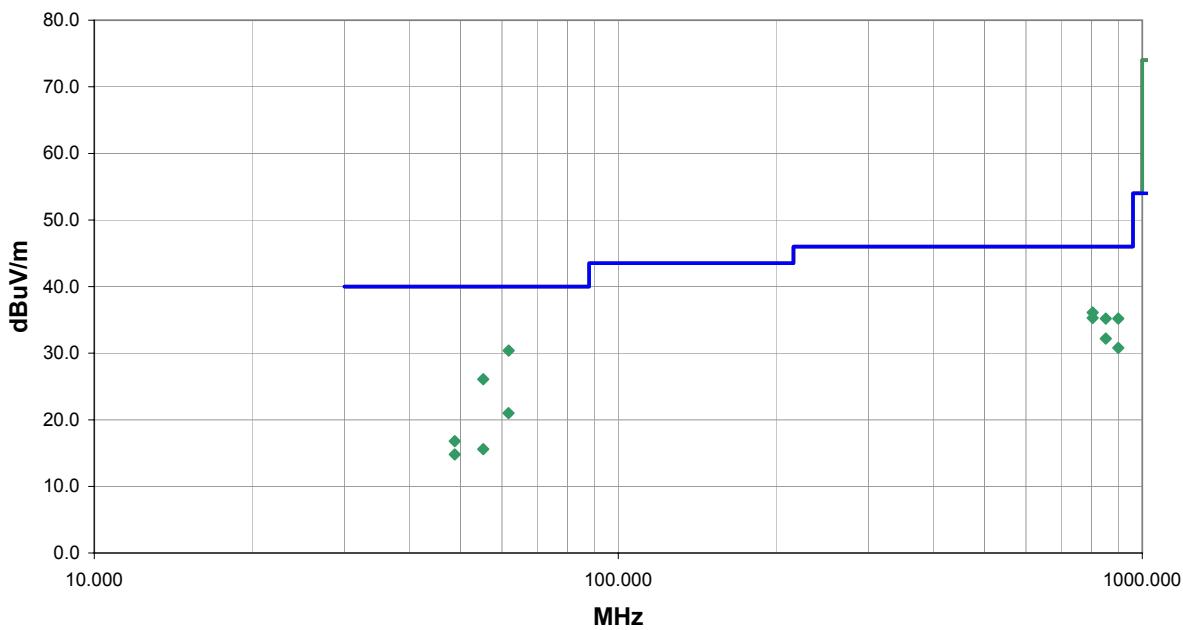


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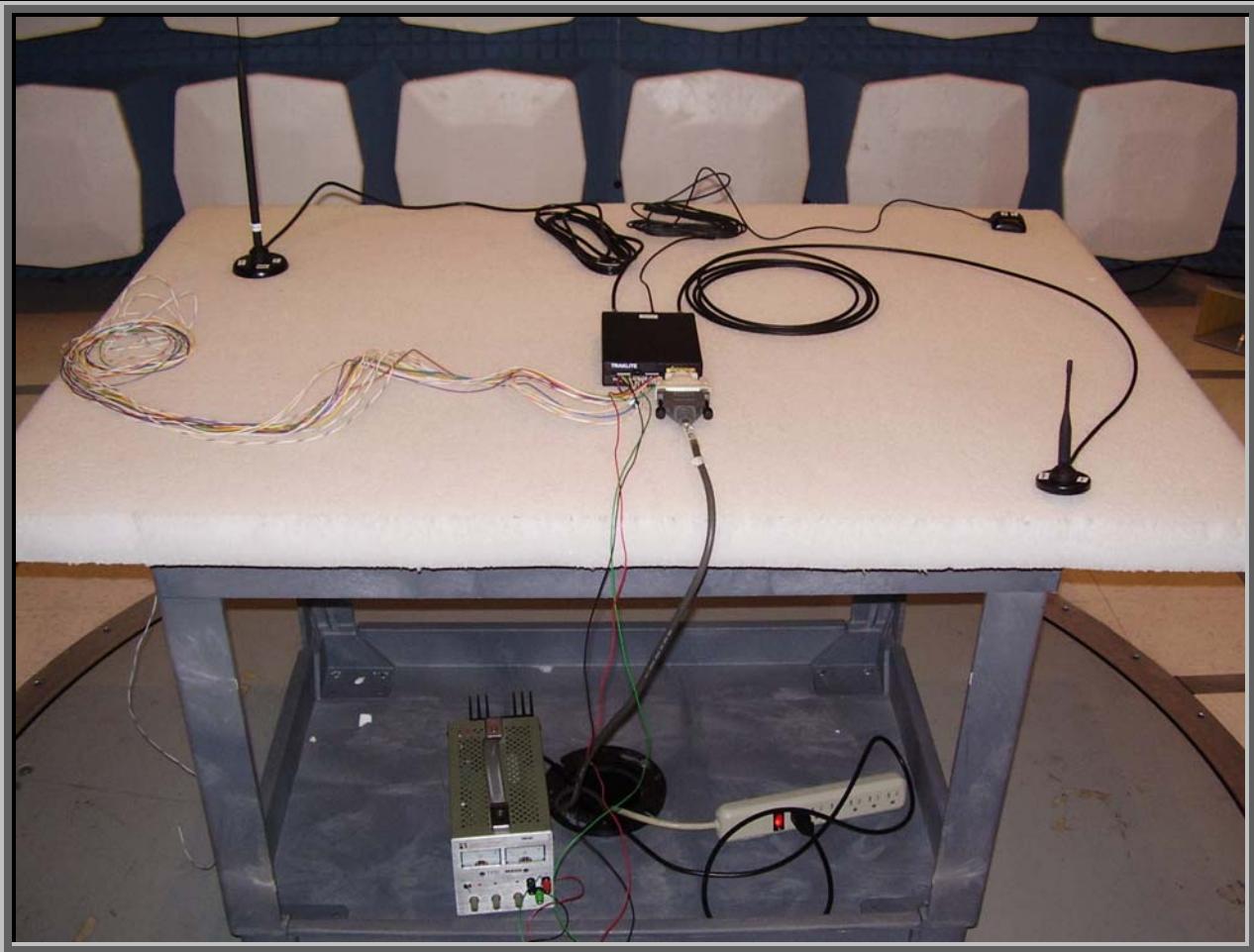
## RADIATED EMISSIONS DATA SHEET

ACQ 2005.1.3  
EMI 2005.1.3

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/21/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Rod Peloquin	Power: 12VDC
TEST SPECIFICATIONS	
Specification: FCC 15.109(a) Class B: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	
EUT OPERATING MODES	
Receive mode GSM Cellular band	
DEVIATIONS FROM TEST STANDARD	
No deviations.	
RESULTS	
Pass	Run # 18
Other	 Tested By:



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
61.776	45.3	-14.9	-1.0	3.6	3.0	0.0	V-Bilog	QP	0.0	30.4	40.0	-9.6
804.010	36.4	-0.3	208.0	1.2	3.0	0.0	V-Bilog	QP	0.0	36.1	46.0	-9.9
803.976	35.6	-0.3	298.0	1.8	3.0	0.0	H-Bilog	PK	0.0	35.3	46.0	-10.7
851.998	35.1	0.1	262.0	1.2	3.0	0.0	V-Bilog	PK	0.0	35.2	46.0	-10.8
899.983	34.3	0.9	277.0	1.2	3.0	0.0	V-Bilog	PK	0.0	35.2	46.0	-10.8
851.998	32.1	0.1	308.0	1.0	3.0	0.0	H-Bilog	PK	0.0	32.2	46.0	-13.8
55.240	40.1	-14.0	187.0	1.0	3.0	0.0	V-Bilog	PK	0.0	26.1	40.0	-13.9
899.983	29.9	0.9	161.0	1.0	3.0	0.0	H-Bilog	PK	0.0	30.8	46.0	-15.2
61.751	35.9	-14.9	219.0	2.2	3.0	0.0	H-Bilog	PK	0.0	21.0	40.0	-19.0
48.748	29.5	-12.7	352.0	1.3	3.0	0.0	V-Bilog	PK	0.0	16.8	40.0	-23.2
55.240	29.6	-14.0	135.0	3.5	3.0	0.0	H-Bilog	PK	0.0	15.6	40.0	-24.4
48.748	27.5	-12.7	187.0	2.2	3.0	0.0	H-Bilog	PK	0.0	14.8	40.0	-25.2



**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:**

Cellular Low Channel, 824.2MHz

Cellular Mid Channel, 836.4MHz

Cellular High Channel, 848.8MHz

PCS Low Channel, 1850.2MHz

PCS Mid Channel, 1880MHz

PCS High Channel, 1909.8MHz

**Operating Modes Investigated:**

Typical

**Data Rates Investigated:**

Maximum

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

Maximum

**Power Input Settings Investigated:**

12VDC

**Software\Firmware Applied During Test**

Exercise software	Hyperterminal	Version	1999
Description			
The system was tested using hyperterminal software on a remote pc to access the EUT during the testing. A call was originated by the wireless communications test set and answered via hyperterminal on the EUT.			

**EUT and Peripherals**

Description	Manufacturer	Model/Part Number	Serial Number
EUT	Wireless Werx	TrakLITE C4-B	100074
DC Power Supply	Tektronix, Inc	PS280	TW60580

## Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Wireless Communications Test Set	Agilent	8960 Series 10 E5515C	0844051960
Remote laptop	IBM	Thinkpad	78-HKYY6 10/00
Near Field Probe	EMCO	7405-901	3337

Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary

## Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	6	No	EUT	Remote laptop
Wire harness (16)	No	1.0	No	EUT	Unterminated
Wire harness (3)	No	1.0	No	EUT	DC Power Supply
AC Power	No	2.0	No	DC Power Supply	AC Mains

## Measurement Equipment

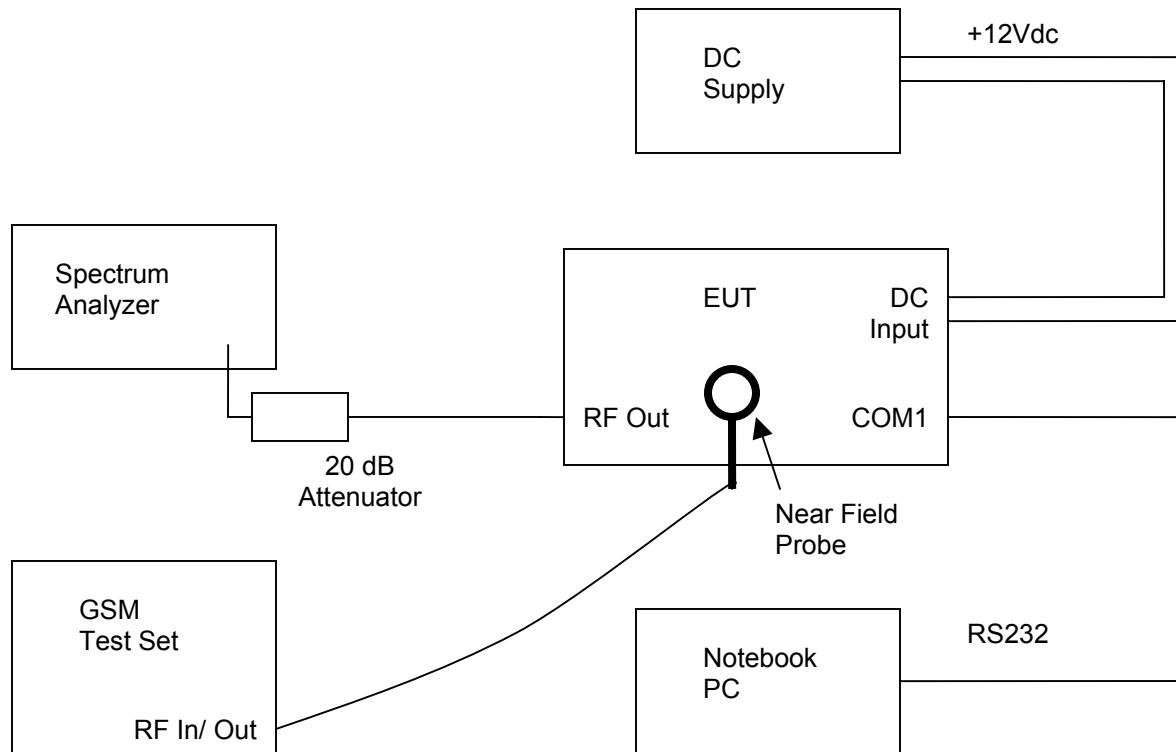
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo

## Test Description

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

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

## Test Setup Diagram



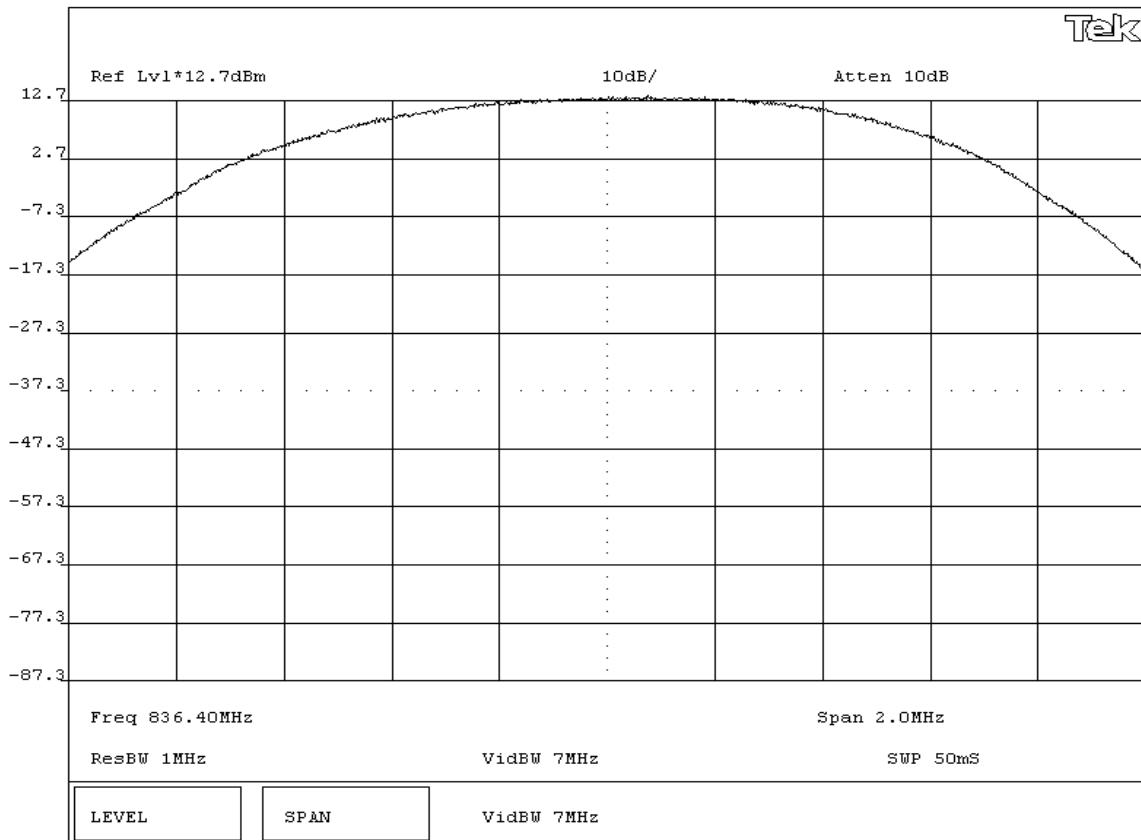
Completed by:

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/25/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Tested by:	Greg Kiemel
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Job Site: EV06	
Specification: 47 CFR 2.1049, 22.917, 24.238		Method: TIA / EIA 603	Year: 2001
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10\log(P)$ dB.			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Occupied Bandwidth - Reference Level Plot - Cellular Band			



KNOB 2

KNOB 1

KEYPAD

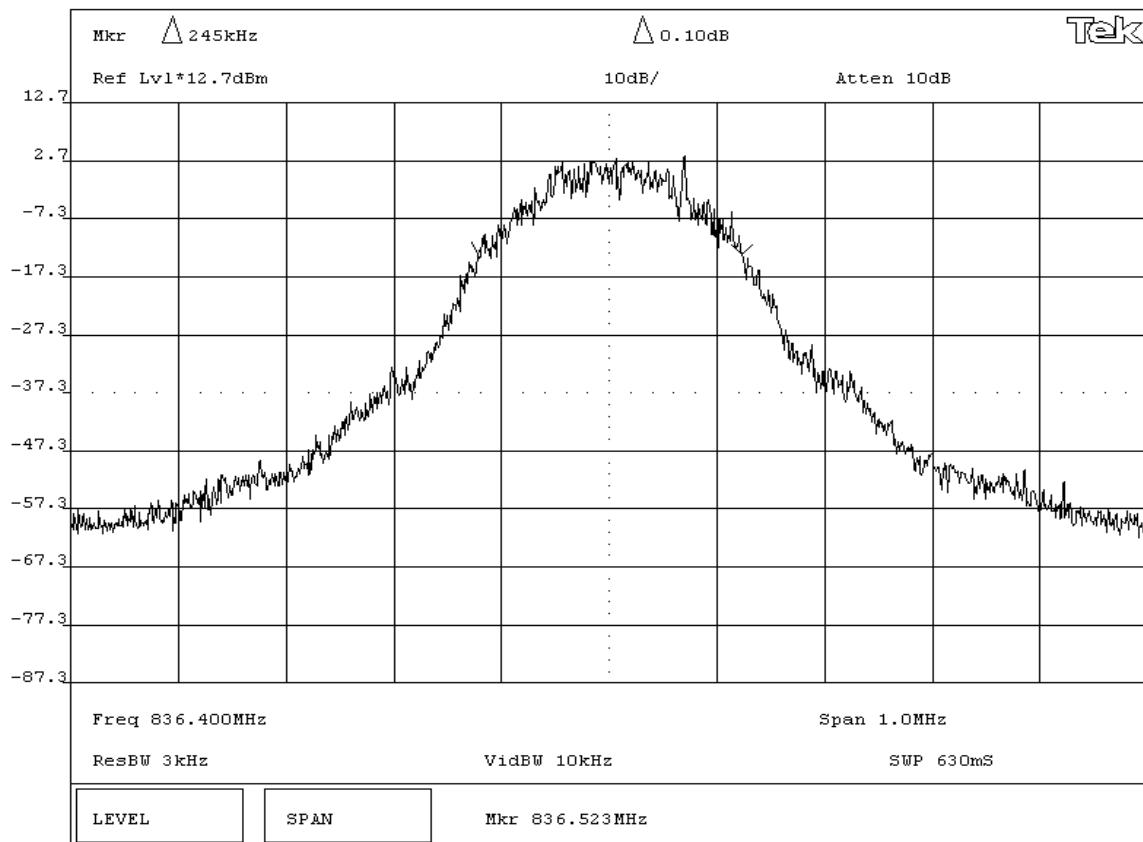
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/25/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Tested by:	Greg Kiemel
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Humidity: 42%	
Specification: 47 CFR 2.1049, 22.917, 24.238		Job Site: EV06	
Year: 2004 Method: TIA / EIA 603 Year: 2001			
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10\log(P)$ dB.			
RESULTS	OCCUPIED BANDWIDTH		
Pass	245 kHz		
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Occupied Bandwidth - Mid Channel - Cellular Band			



KNOB 2

KNOB 1

KEYPAD

Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/25/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Tested by:	Greg Kiemel
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Method:	TIA / EIA 603
Specification:	47 CFR 2.1049, 22.917, 24.238	Year:	2004
Year:		Method:	2001

## SAMPLE CALCULATIONS

## COMMENTS

## EUT OPERATING MODES

Modulated by PRBS at maximum data rate, at maximum output power.

## DEVIATIONS FROM TEST STANDARD

None

## REQUIREMENTS

On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least  $43 + 10\log(P)$  dB.

## RESULTS

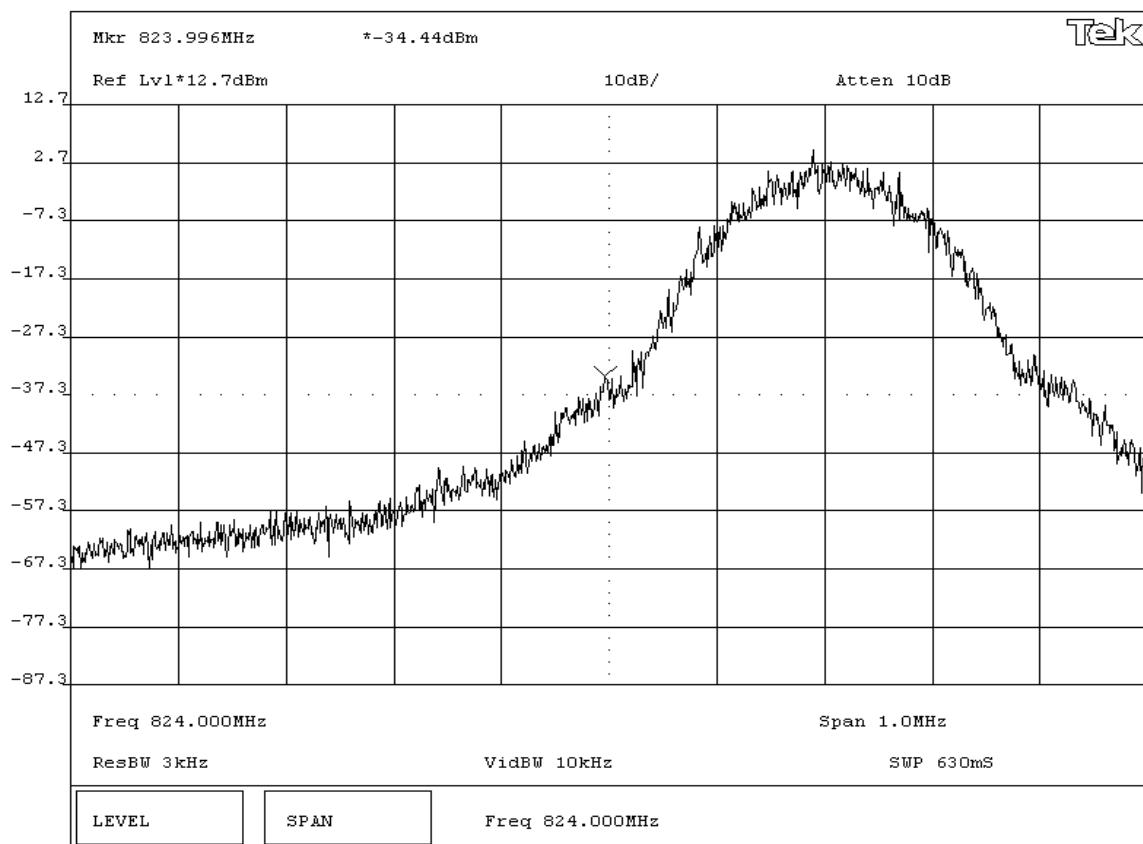
Pass

## SIGNATURE

Tested By: 

## DESCRIPTION OF TEST

## Occupied Bandwidth - Lower Band Edge - Cellular Band



KNOB 2

KNOB 1

KEYPAD

Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/25/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Method:	TIA / EIA 603
Specification:	47 CFR 2.1049, 22.917, 24.238	Year:	2004
Method:		Year:	2001

## SAMPLE CALCULATIONS

## COMMENTS

## EUT OPERATING MODES

Modulated by PRBS at maximum data rate, at maximum output power.

## DEVIATIONS FROM TEST STANDARD

None

## REQUIREMENTS

On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least  $43 + 10\log(P)$  dB.

## RESULTS

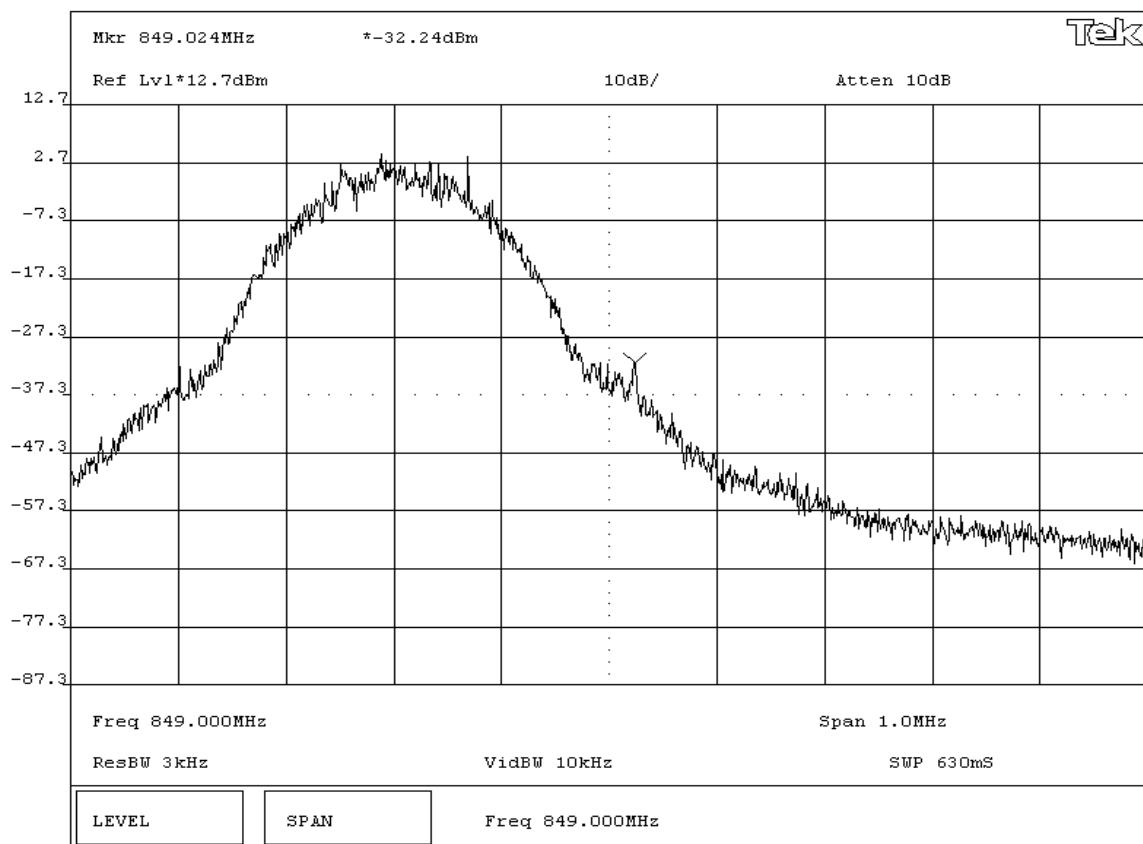
Pass

## SIGNATURE

Tested By: 

## DESCRIPTION OF TEST

## Occupied Bandwidth - Upper Band Edge - Cellular Band



KNOB 2

KNOB 1

KEYPAD

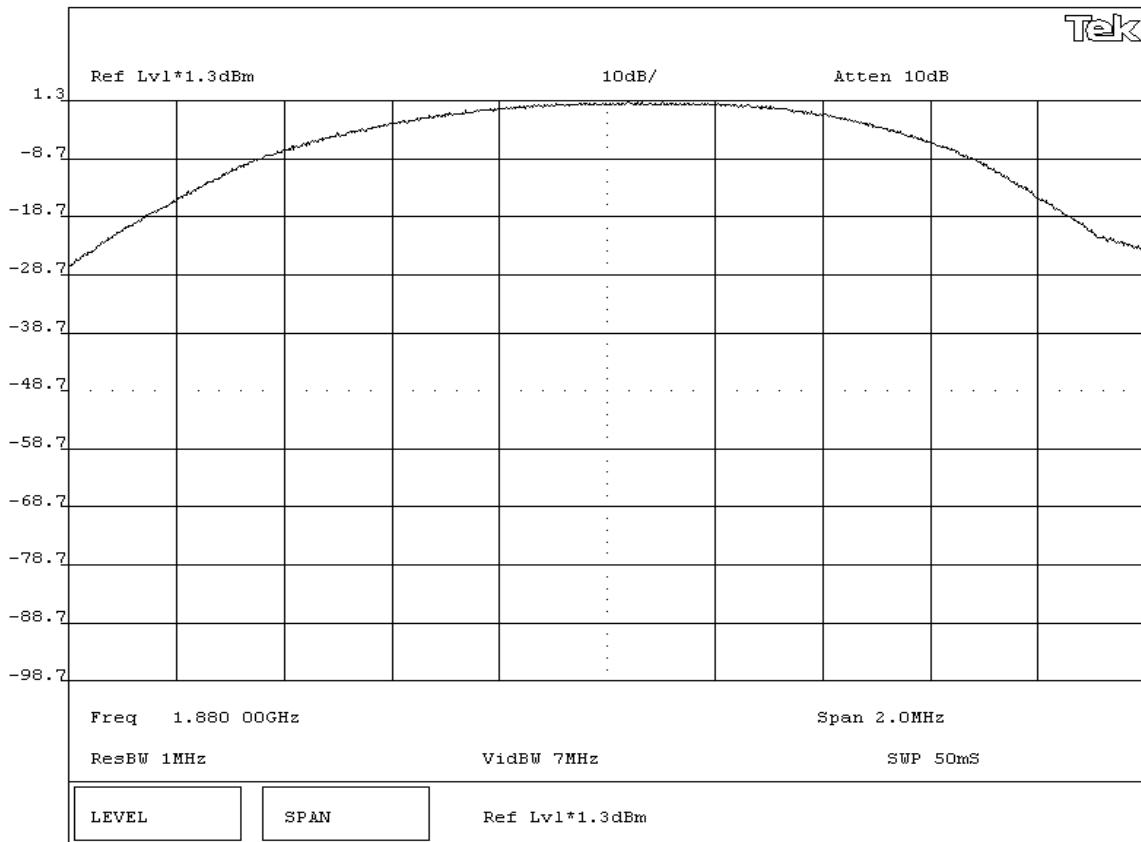
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/25/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Tested by:	Greg Kiemel
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Job Site:	EV06
Specification: 47 CFR 2.1049, 22.917, 24.238		Method:	TIA / EIA 603
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10\log(P)$ dB.			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Occupied Bandwidth - Reference Level Plot - PCS Band			



KNOB 2

KNOB 1

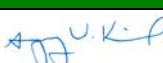
KEYPAD

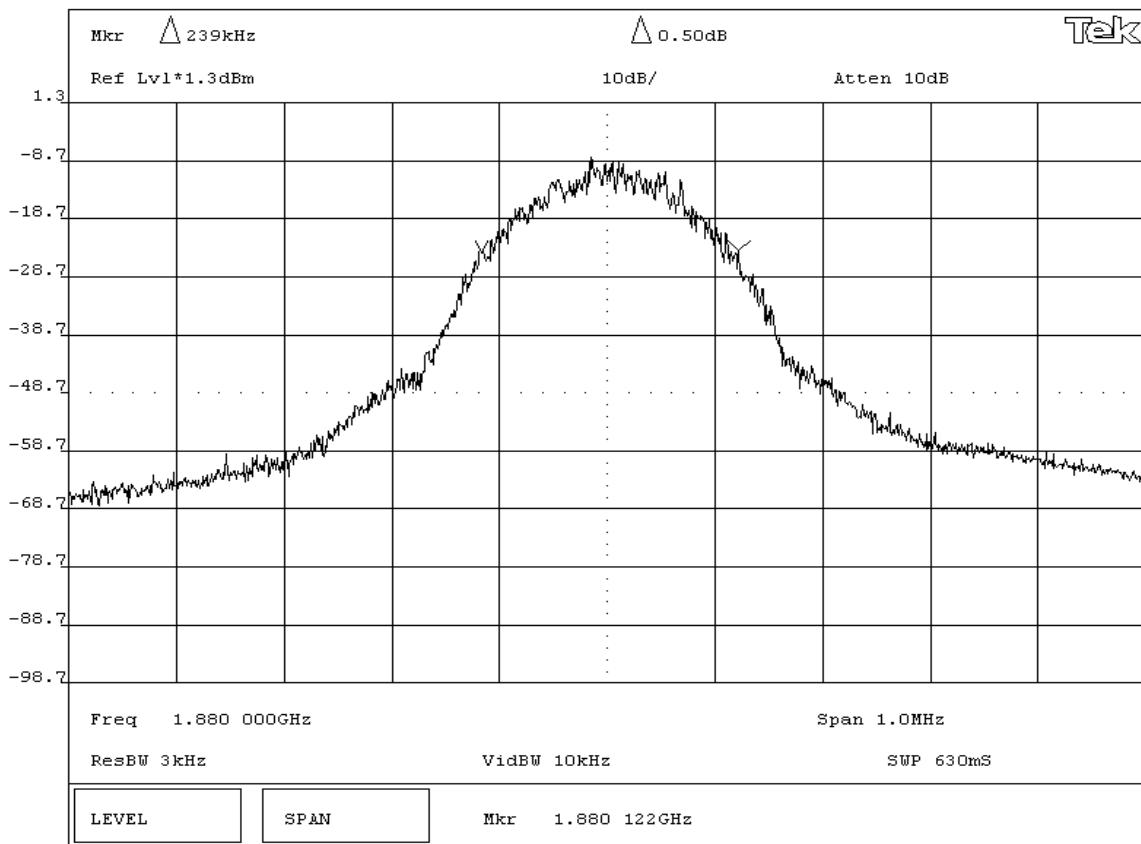
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/25/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Tested by:	Greg Kiemel
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Humidity: 42%	
Specification: 47 CFR 2.1049, 22.917, 24.238		Job Site: EV06	
Year: 2004 Method: TIA / EIA 603 Year: 2001			
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10\log(P)$ dB.			
RESULTS	OCCUPIED BANDWIDTH		
Pass	239 kHz		
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Occupied Bandwidth - Mid Channel - PCS Band			



KNOB 2

KNOB 1

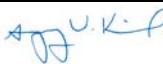
KEYPAD

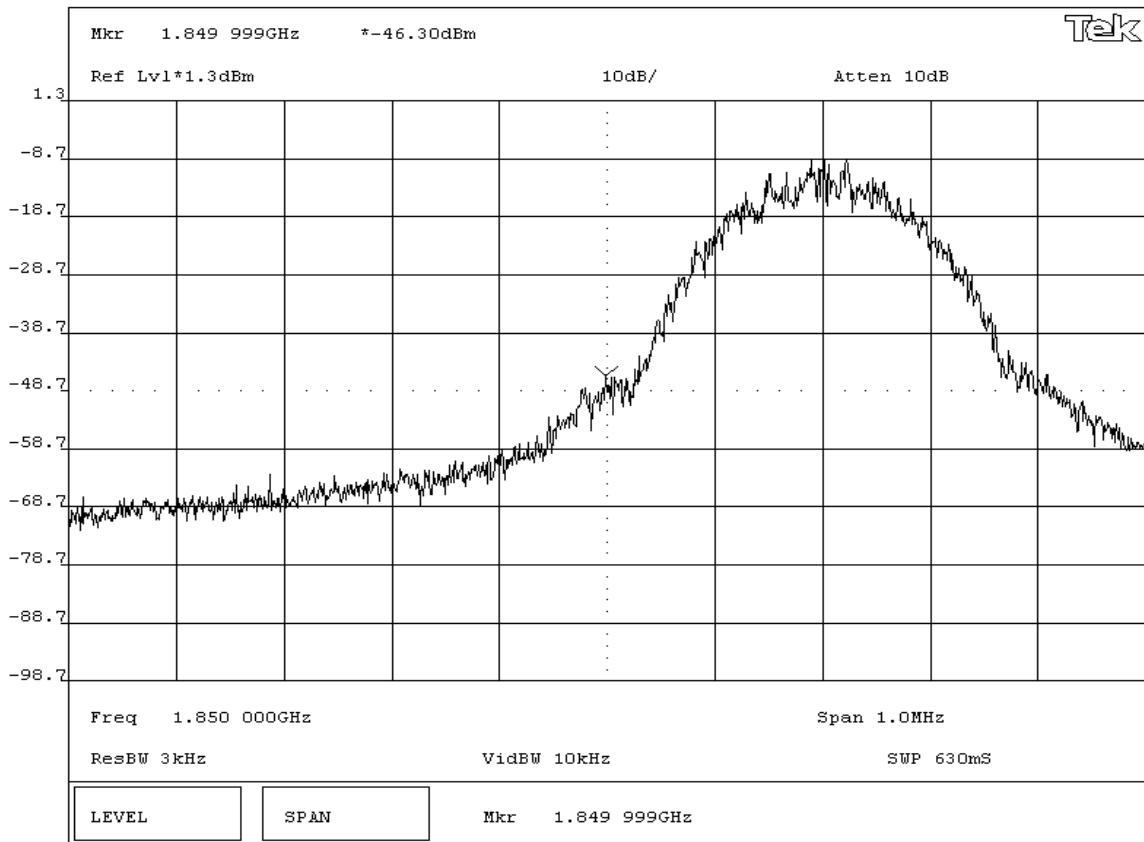
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/25/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Tested by:	Greg Kiemel
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Humidity: 42%	
Specification: 47 CFR 2.1049, 22.917, 24.238		Job Site: EV06	
Year: 2004 Method: TIA / EIA 603 Year: 2001			
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10\log(P)$ dB.			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Occupied Bandwidth - Lower Band Edge - PCS Band			



KNOB 2

KNOB 1

KEYPAD

Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/25/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Method:	TIA / EIA 603
Specification:	47 CFR 2.1049, 22.917, 24.238	Year:	2004
Method:		Year:	2001

## SAMPLE CALCULATIONS

## COMMENTS

## EUT OPERATING MODES

Modulated by PRBS at maximum data rate, at maximum output power.

## DEVIATIONS FROM TEST STANDARD

None

## REQUIREMENTS

On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least  $43 + 10\log(P)$  dB.

## RESULTS

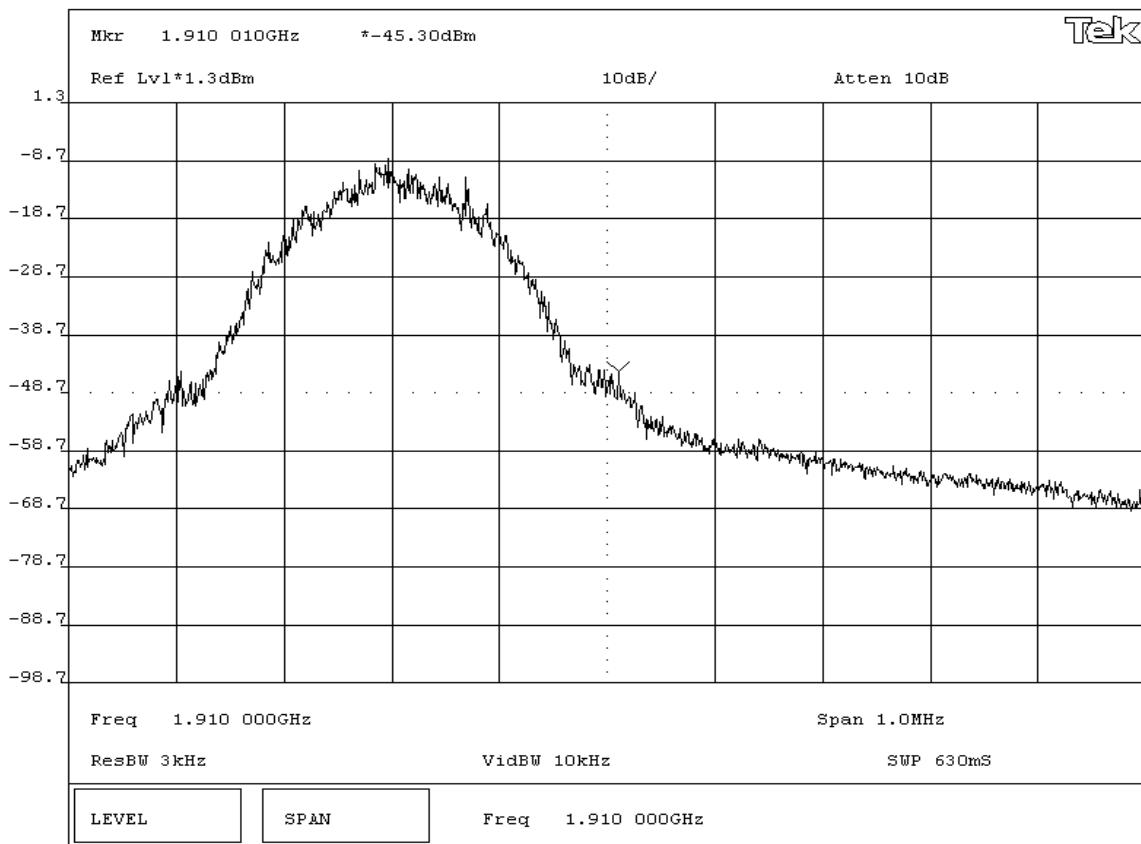
Pass

## SIGNATURE

Tested By: 

## DESCRIPTION OF TEST

Occupied Bandwidth - Upper Band Edge - PCS Band

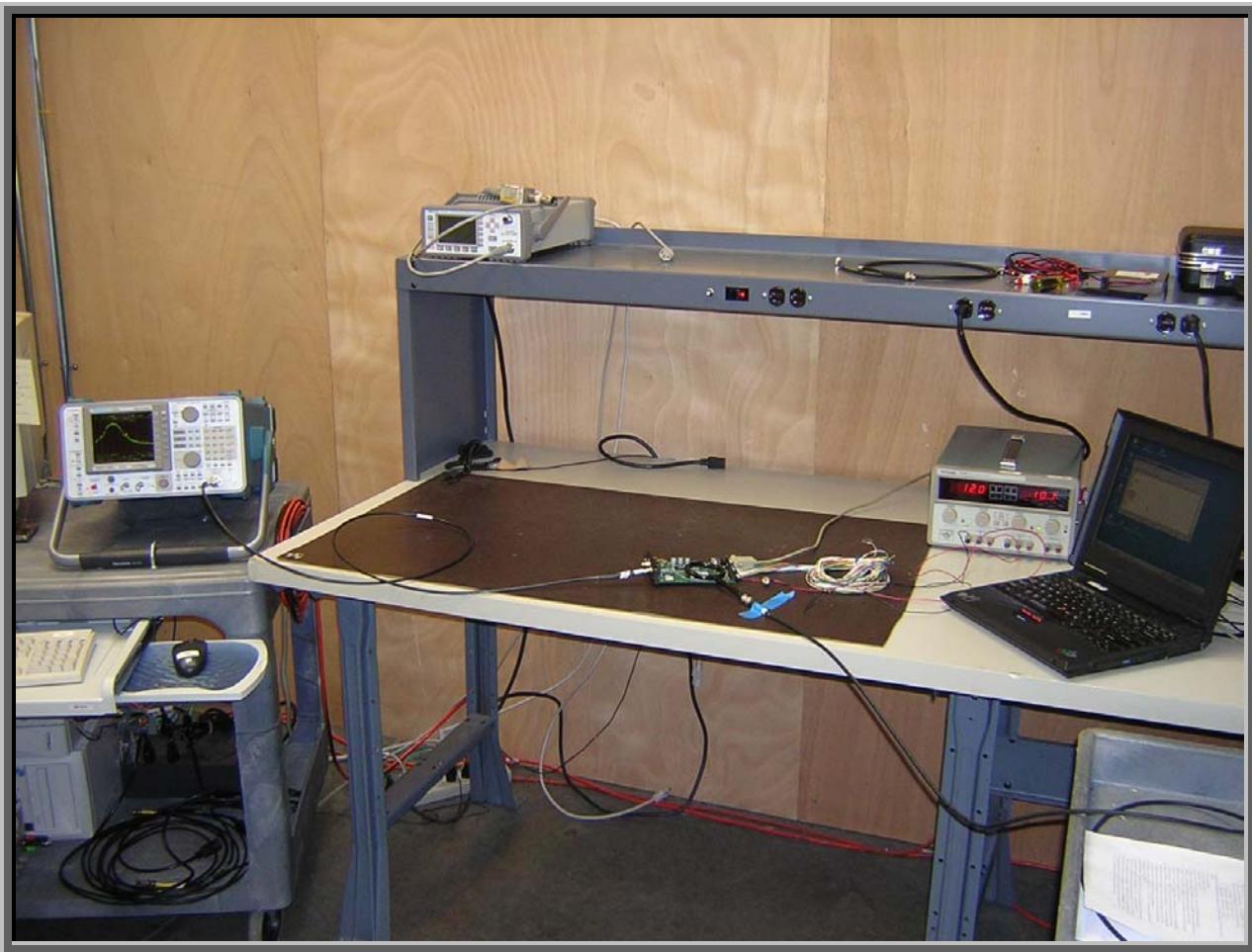


KNOB 2

KNOB 1

KEYPAD

Tektronix 2784



**Justification**

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

**Channels in Specified Band Investigated:**

Cellular Low Channel, 824.2MHz

Cellular Mid Channel, 836.4MHz

Cellular High Channel, 848.8MHz

PCS Low Channel, 1850.2MHz

PCS Mid Channel, 1880MHz

PCS High Channel, 1909.8MHz

**Operating Modes Investigated:**

Typical

**Data Rates Investigated:**

Maximum

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

Maximum

**Power Input Settings Investigated:**

12VDC

**Software\Firmware Applied During Test**

Exercise software	Hyperterminal	Version	1999
Description			
The system was tested using hyperterminal software on a remote pc to access the EUT during the testing. A call was originated by the wireless communications test set and answered via hyperterminal on the EUT.			

**EUT and Peripherals**

Description	Manufacturer	Model/Part Number	Serial Number
EUT	Wireless Werx	TrakLITE C4-B	100074
DC Power Supply	Tektronix, Inc	PS280	TW60580

## Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Wireless Communications Test Set	Agilent	8960 Series 10 E5515C	0844051960
Remote laptop	IBM	Thinkpad	78-HKYY6 10/00
Near Field Probe	EMCO	7405-901	3337

Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary

## Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	6	No	EUT	Remote laptop
Wire harness (16)	No	1.0	No	EUT	Unterminated
Wire harness (3)	No	1.0	No	EUT	DC Power Supply
AC Power	No	2.0	No	DC Power Supply	AC Mains

## Measurement Equipment

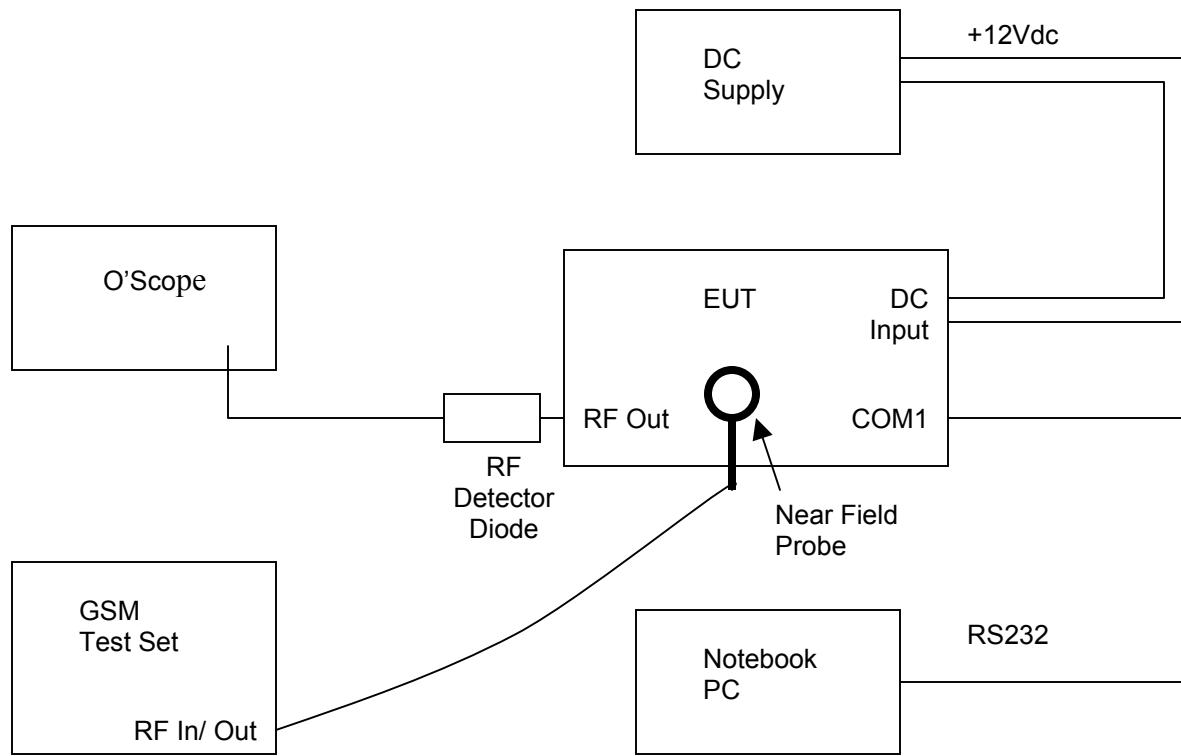
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Power Meter	Hewlett Packard	E4418A	SPA	07/23/2004	24 mo
Power Sensor	Hewlett-Packard	8481H	SPB	07/23/2004	24 mo
Signal Generator	Hewlett Packard	8341B	TGN	02/07/2005	13 mo
Oscilloscope	Tektronix	TDS 3052	TOF	12/02/2004	13 mo
RF Detector	RLC Electronics	CR-133-R	ZZA	NCR	NA

## Test Description

**Requirement:** Per 47 CFR 2.1046, the conducted power output was measured at the RF output terminals.

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

## Test Setup Diagram



Completed by:

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

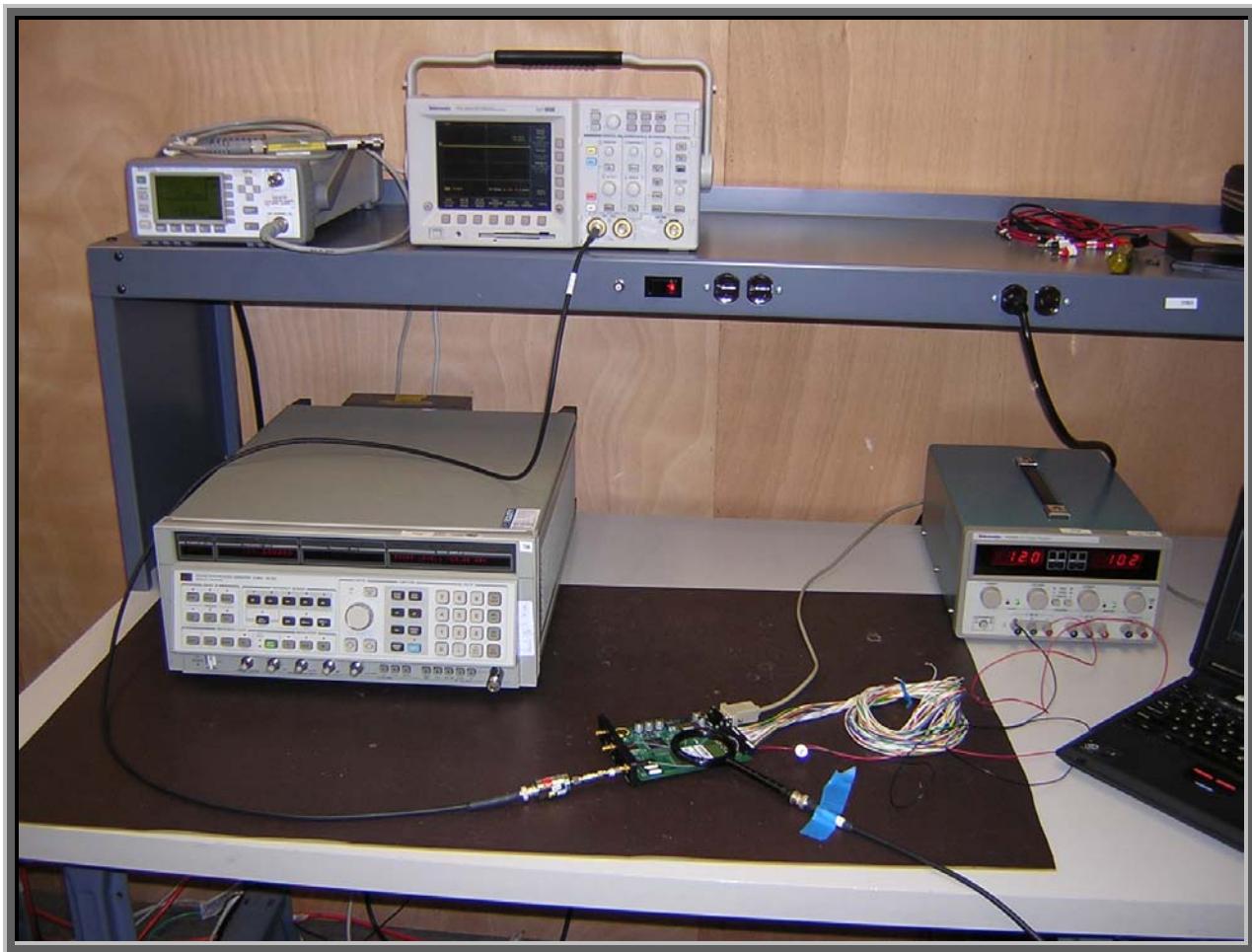
EUT:	TrakLITE C4-B			Work Order:	7LAY0037
Serial Number:	100074			Date:	03/25/05
Customer:	WirelessWERX, Inc.			Temperature:	22 C
Attendees:	none	Tested by:	Greg Kiemel	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 VDC	Job Site:	EV06
<b>TEST SPECIFICATIONS</b>					
Specification:	47 CFR 2.1046	Year:	2004	Method:	TIA / EIA 603
<b>SAMPLE CALCULATIONS</b>					
<b>COMMENTS</b>					
<b>EUT OPERATING MODES</b> Modulated by PRBS at maximum data rate, at maximum output power.					
<b>DEVIATIONS FROM TEST STANDARD</b> None					
<b>REQUIREMENTS</b> Maximum peak conducted output power is measured.					
<b>RESULTS</b> Pass		<b>AMPLITUDE</b> 18.49 mW (Cellular band), 1.34 mW (PCS band)			
<b>SIGNATURE</b> 					
Tested By:					
<b>DESCRIPTION OF TEST</b> <b>Output Power - Low, Mid, &amp; High Channels</b>					

**Cellular Band**

Frequency (MHz)	Power (mW)
824.20	18.49
836.40	18.45
848.80	18.45

**PCS Band**

Frequency (MHz)	Power (mW)
1850.20	1.18
1880.00	1.34
1909.80	1.33



**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:**

Cellular Low Channel, 824.2MHz

Cellular Mid Channel, 836.4MHz

Cellular High Channel, 848.8MHz

PCS Low Channel, 1850.2MHz

PCS Mid Channel, 1880MHz

PCS High Channel, 1909.8MHz

**Operating Modes Investigated:**

Typical

**Data Rates Investigated:**

Maximum

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

Maximum

**Power Input Settings Investigated:**

12VDC

**Software\Firmware Applied During Test**

Exercise software	Hyperterminal	Version	1999
Description			
The system was tested using hyperterminal software on a remote pc to access the EUT during the testing. A call was originated by the wireless communications test set and answered via hyperterminal on the EUT.			

**EUT and Peripherals**

Description	Manufacturer	Model/Part Number	Serial Number
EUT	Wireless Werx	TrakLITE C4-B	100074
DC Power Supply	Tektronix, Inc	PS280	TW60580

## Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Wireless Communications Test Set	Agilent	8960 Series 10 E5515C	0844051960
Remote laptop	IBM	Thinkpad	78-HKYY6 10/00
Near Field Probe	EMCO	7405-901	3337

Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary

## Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	6	No	EUT	Remote laptop
Wire harness (16)	No	1.0	No	EUT	Unterminated
Wire harness (3)	No	1.0	No	EUT	DC Power Supply
AC Power	No	2.0	No	DC Power Supply	AC Mains

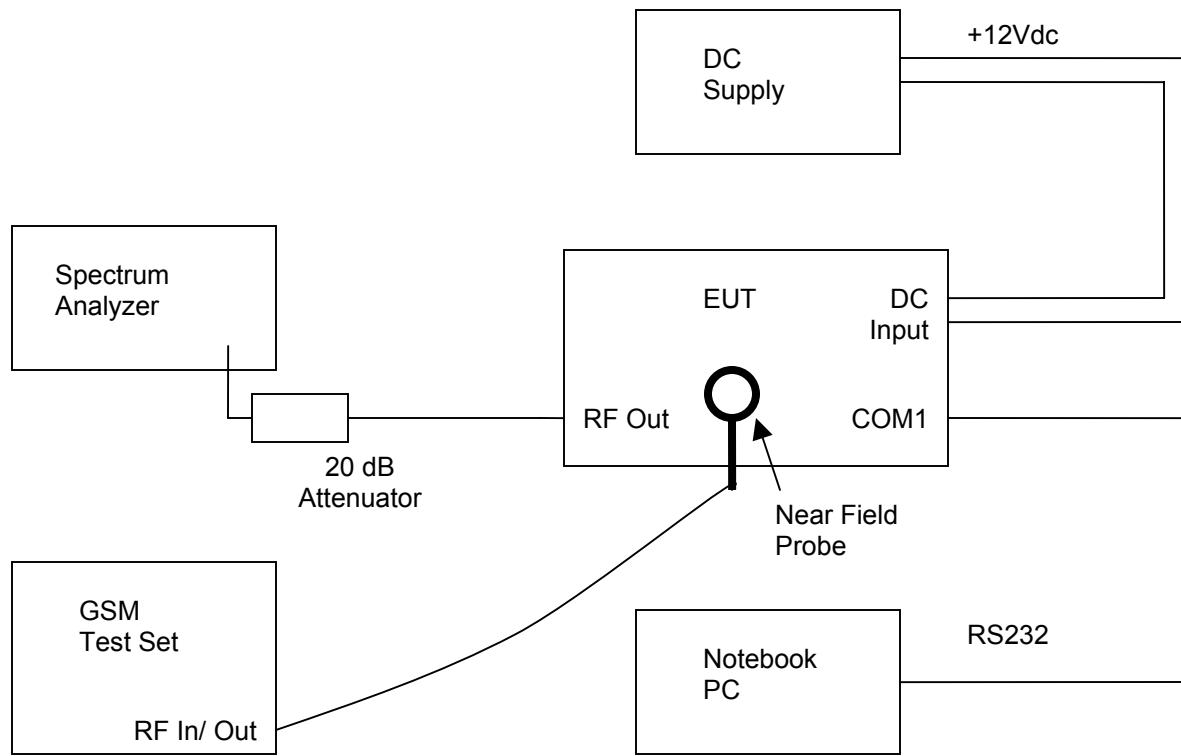
## Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo

## Test Description

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

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

**Test Setup Diagram****Completed by:**

NORTHWEST  
**EMC**

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/24/05
Customer: WirelessWERX, Inc.	Temperature: 22 C
Attendees: none	Humidity: 42%
Customer Ref. No.: N/A	Power: 12 Vdc
	Job Site: EV06

## TEST SPECIFICATIONS

Specification: 47 CFR 2.1051, 22.917, 24.238 Year: 2004 Method: TIA / EIA 603 Year: 2001

## SAMPLE CALCULATIONS

## COMMENTS

## EUT OPERATING MODES

Modulated by PRBS at maximum data rate, at maximum output power.

## DEVIATIONS FROM TEST STANDARD

DEVI  
Nene

## None

The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm.

## The peak

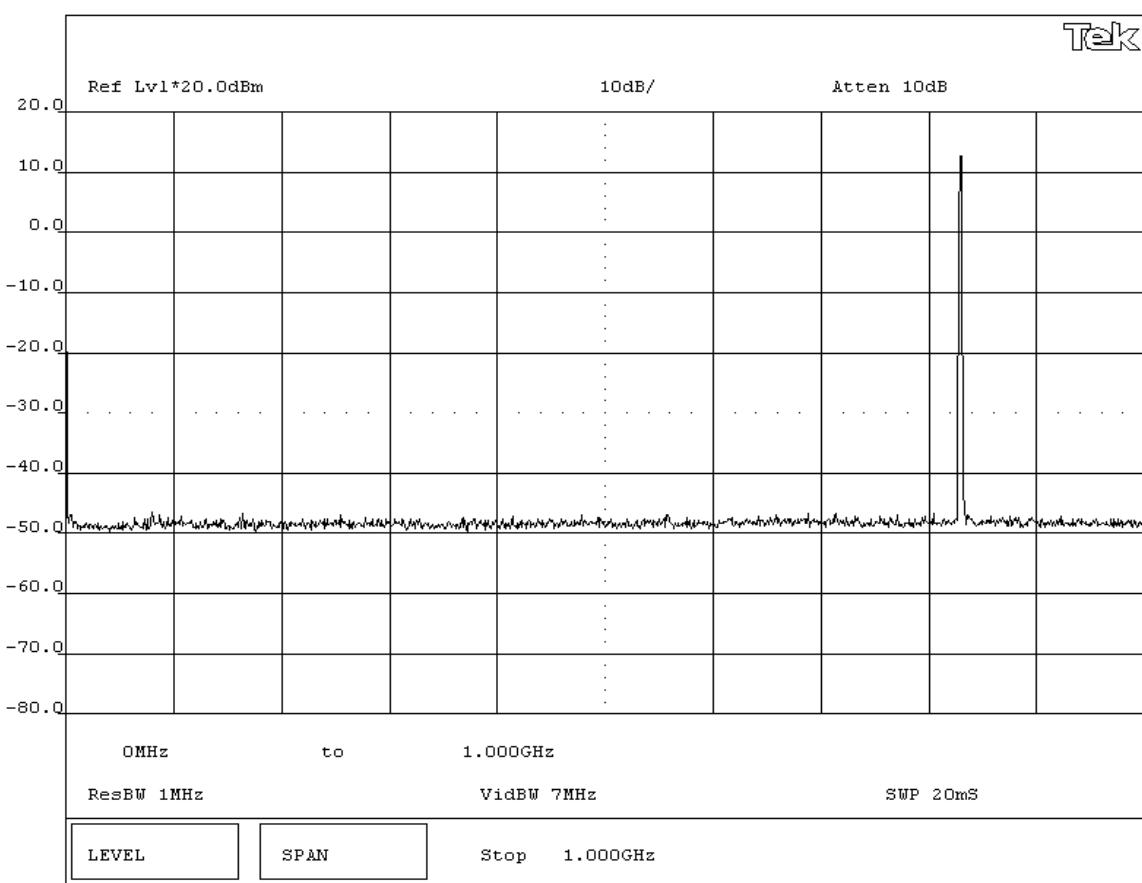
## RESULTS

Pass

Tested By:

### DESCRIPTION OF TEST

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



KNOB 2

KNO

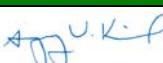
Stop 1.000GHz

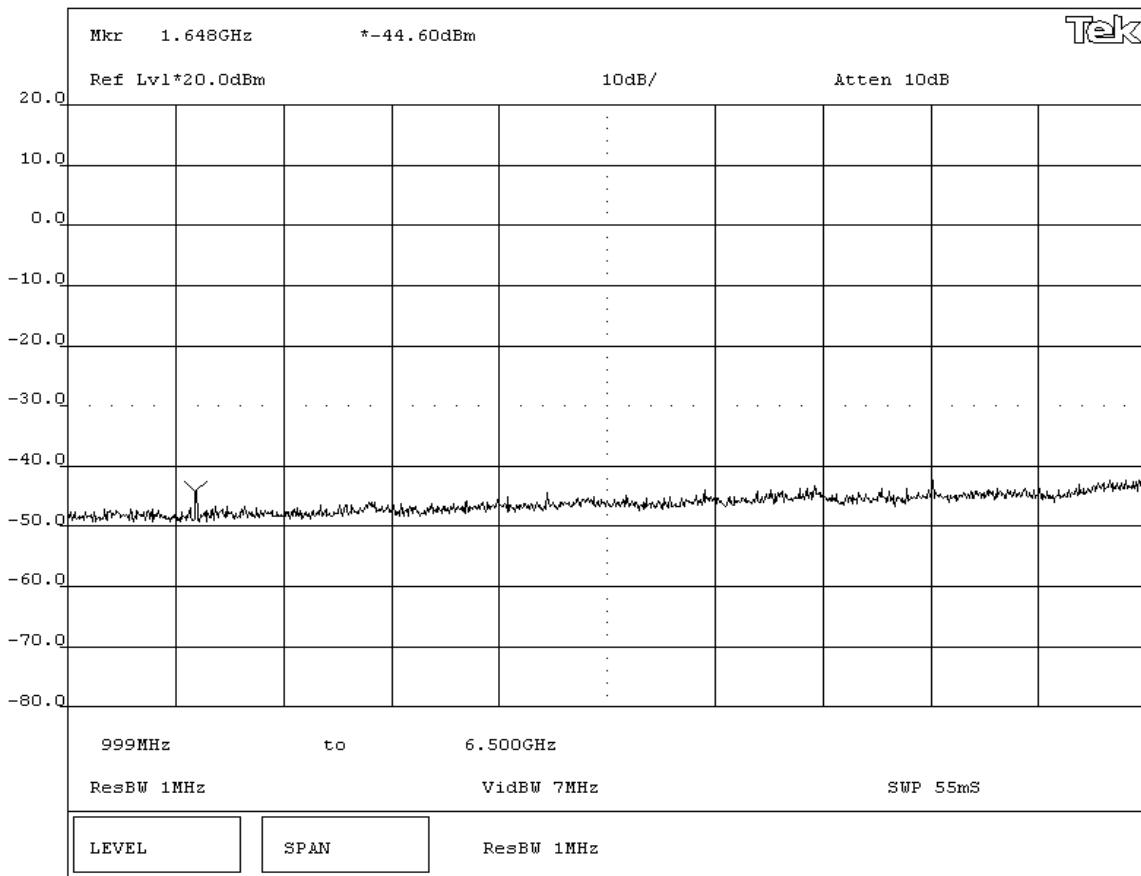
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/24/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
		Job Site:	EV06
TEST SPECIFICATIONS			
Specification: 47 CFR 2.1051, 22.917, 24.238		Year: 2004	Method: TIA / EIA 603
Year: 2001			
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Spurious Conducted Emissions - Low Channel - Cellular Band			



KNOB 2

KNOB 1

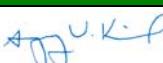
KEYPAD

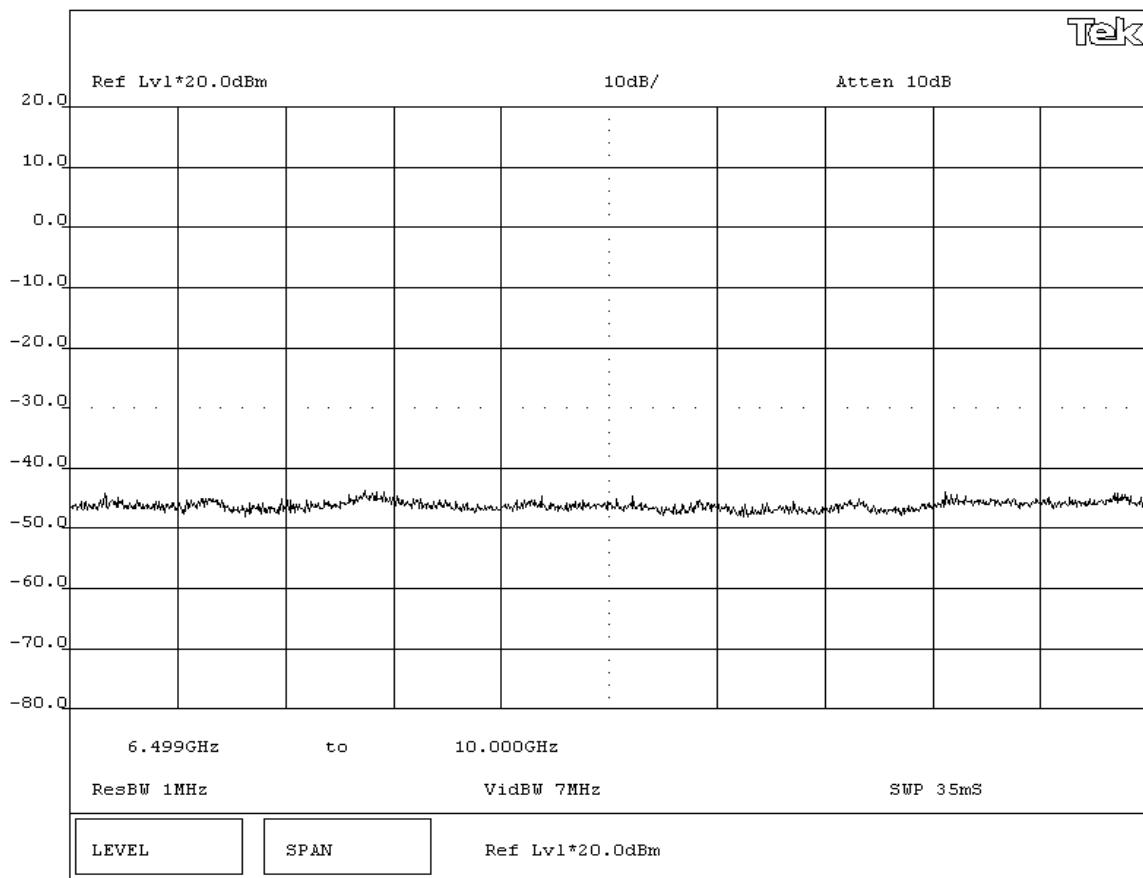
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/24/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
		Job Site: EV06	
TEST SPECIFICATIONS			
Specification: 47 CFR 2.1051, 22.917, 24.238		Year: 2004	Method: TIA / EIA 603
Year: 2001			
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Spurious Conducted Emissions - Low Channel - Cellular Band			



KNOB 2

KNOB 1

KEYPAD

Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/24/05
Customer: WirelessWERX, Inc.	Temperature: 22 C
Attendees: none	Humidity: 42%
Customer Ref. No.: N/A	Job Site: EV06

## TEST SPECIFICATIONS

Specification: 47 CFR 2.1051, 22.917, 24.238 Year: 2004 Method: TIA / EIA 603 Year: 2001

## SAMPLE CALCULATIONS

## COMMENTS

## EUT OPERATING MODES

Modulated by PRBS at maximum data rate, at maximum output power.

## DEVIATIONS FROM TEST STANDARD

None

## REQUIREMENTS

The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm

## RESULTS

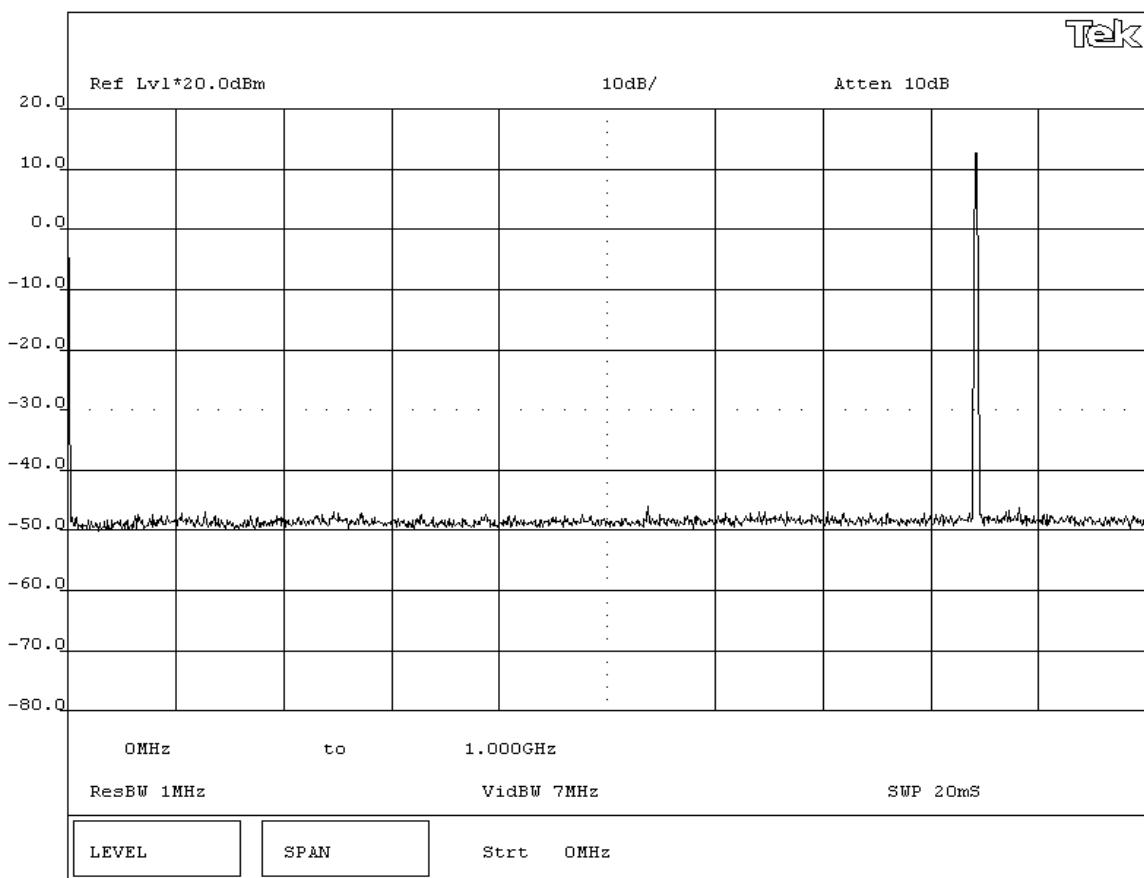
Pass

## SIGNATURE

Tested By: 

## DESCRIPTION OF TEST

Spurious Conducted Emissions - Mid Channel - Cellular Band



KNOB 2

KNOB 1

KEYPAD

Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/24/05
Customer: WirelessWERX, Inc.	Temperature: 22 C
Attendees: none	Humidity: 42%
Customer Ref. No.: N/A	Job Site: EV06

## TEST SPECIFICATIONS

Specification: 47 CFR 2.1051, 22.917, 24.238 Year: 2004 Method: TIA / EIA 603 Year: 2001

## SAMPLE CALCULATIONS

## COMMENTS

## EUT OPERATING MODES

Modulated by PRBS at maximum data rate, at maximum output power.

## DEVIATIONS FROM TEST STANDARD

None

## REQUIREMENTS

The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm

## RESULTS

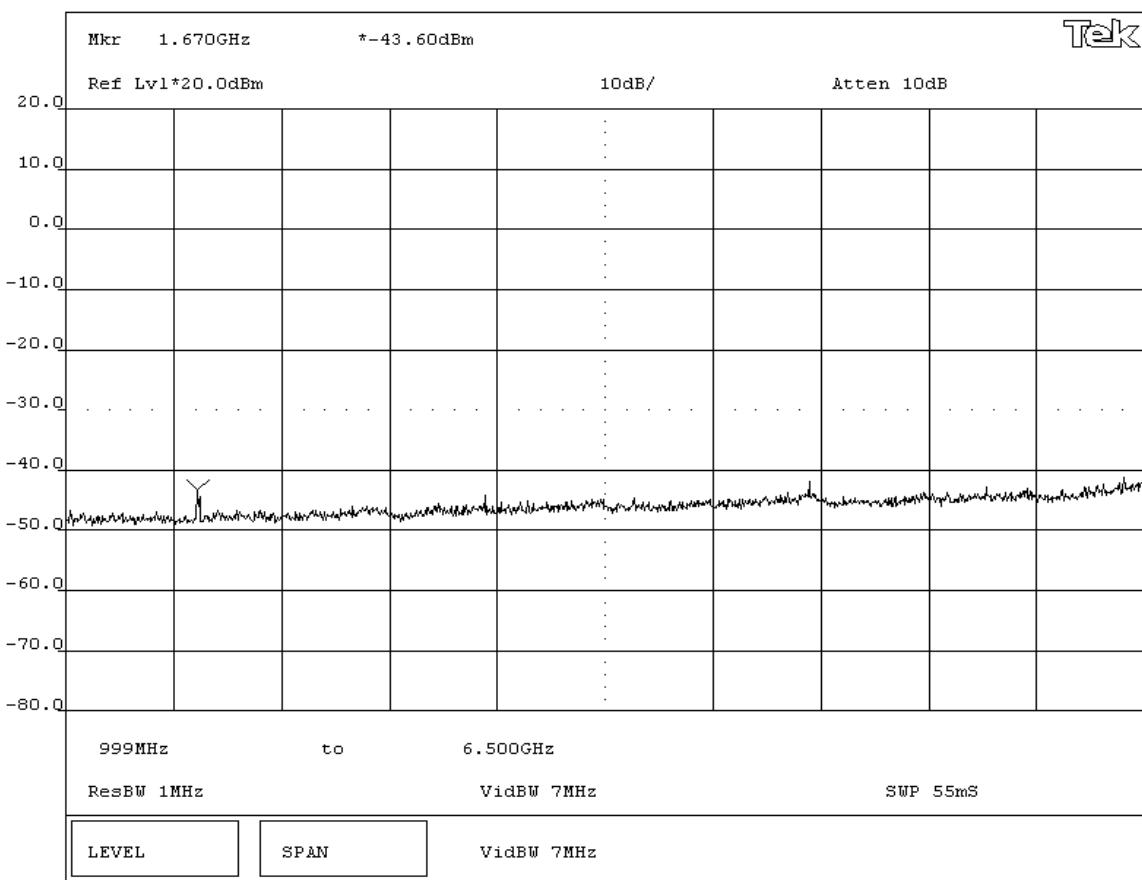
Pass

## SIGNATURE

Tested By: 

## DESCRIPTION OF TEST

Spurious Conducted Emissions - Mid Channel - Cellular Band



KNOB 2

KNOB 1

KEYPAD

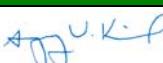
Tektronix 2784

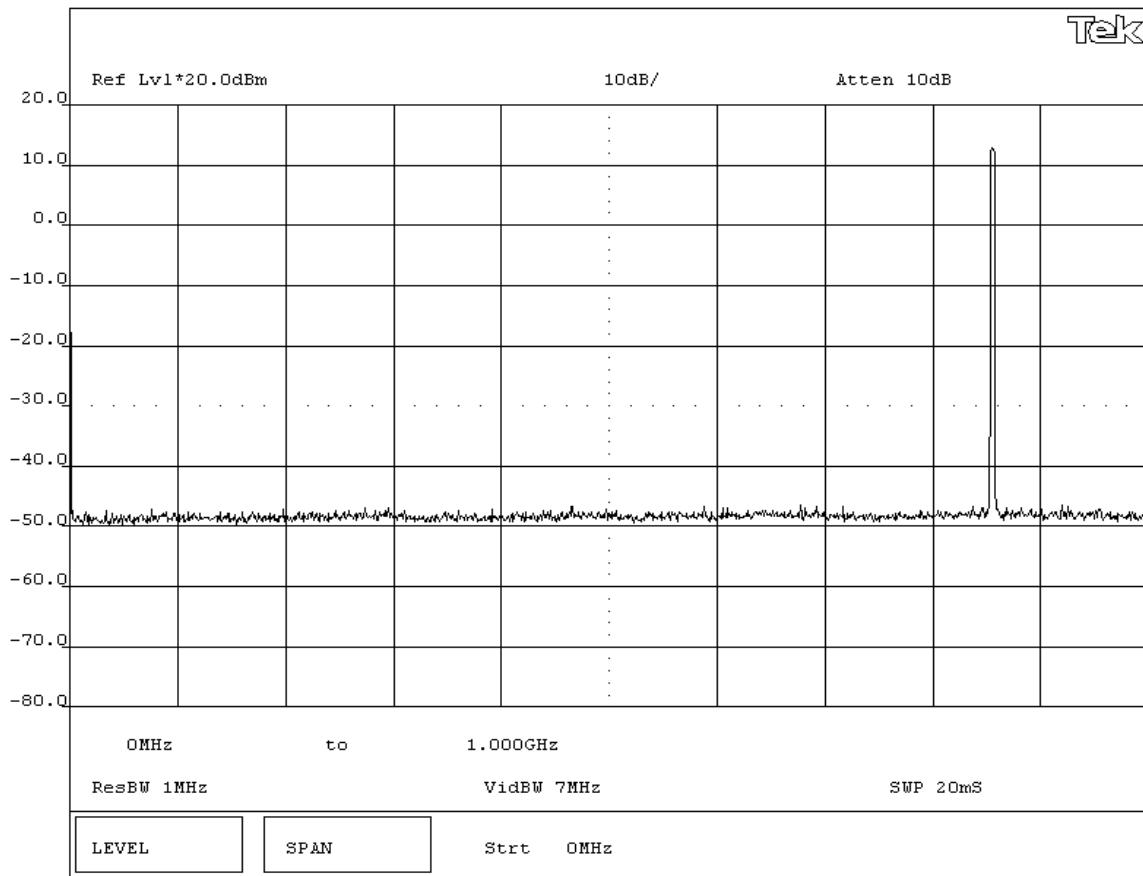


NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/24/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Job Site:	
Specification: 47 CFR 2.1051, 22.917, 24.238		Method: TIA / EIA 603	
Year: 2004		Year: 2001	
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Spurious Conducted Emissions - High Channel - Cellular Band			



KNOB 2

KNOB 1

KEYPAD

Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/24/05
Customer: WirelessWERX, Inc.	Temperature: 22 C
Attendees: none	Humidity: 42%
Customer Ref. No.: N/A	Job Site: EV06

## TEST SPECIFICATIONS

Specification: 47 CFR 2.1051, 22.917, 24.238 Year: 2004 Method: TIA / EIA 603 Year: 2001

## SAMPLE CALCULATIONS

## COMMENTS

## EUT OPERATING MODES

Modulated by PRBS at maximum data rate, at maximum output power.

## DEVIATIONS FROM TEST STANDARD

None

## REQUIREMENTS

The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm

## RESULTS

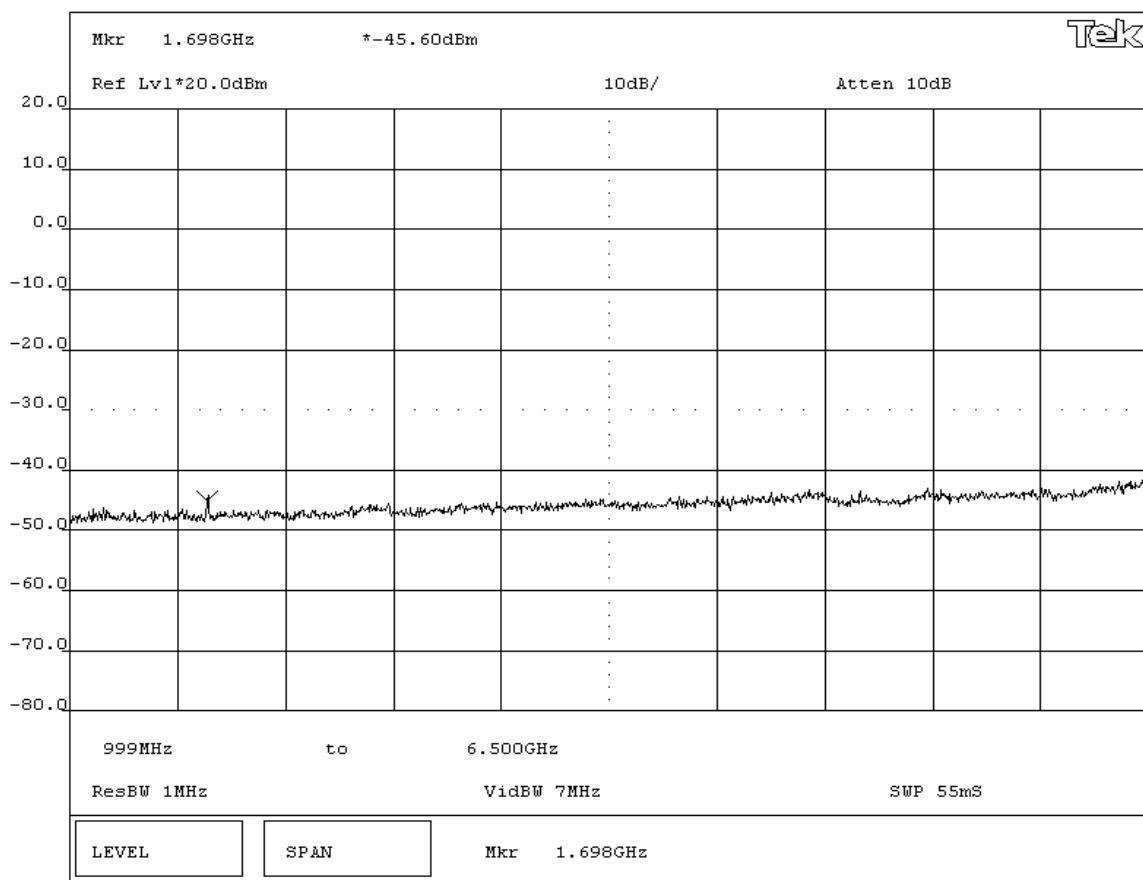
Pass

## SIGNATURE

Tested By: 

## DESCRIPTION OF TEST

## Spurious Conducted Emissions - High Channel - Cellular Band



KNOB 2

KNOB 1

KEYPAD

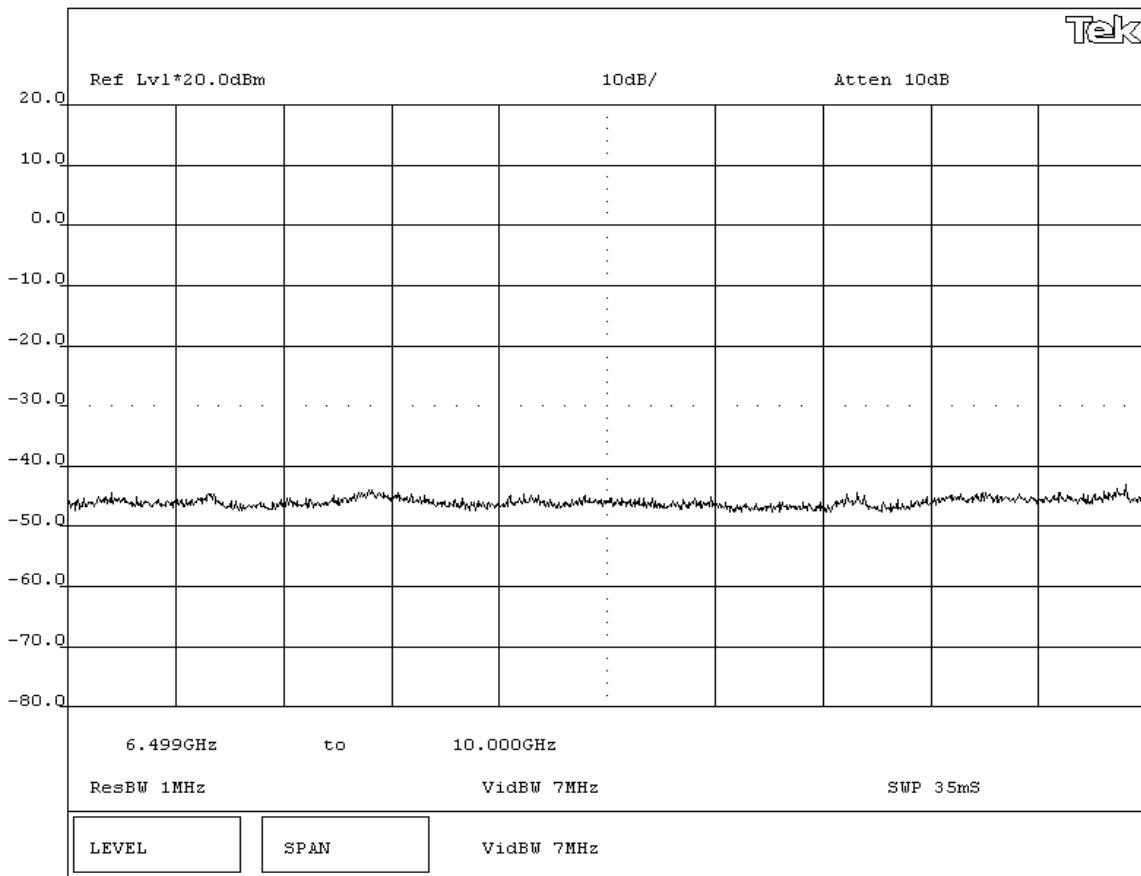
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/24/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
		Job Site: EV06	
TEST SPECIFICATIONS			
Specification: 47 CFR 2.1051, 22.917, 24.238		Year: 2004	Method: TIA / EIA 603
Year: 2001			
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Spurious Conducted Emissions - High Channel - Cellular Band			



KNOB 2

KNOB 1

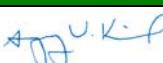
KEYPAD

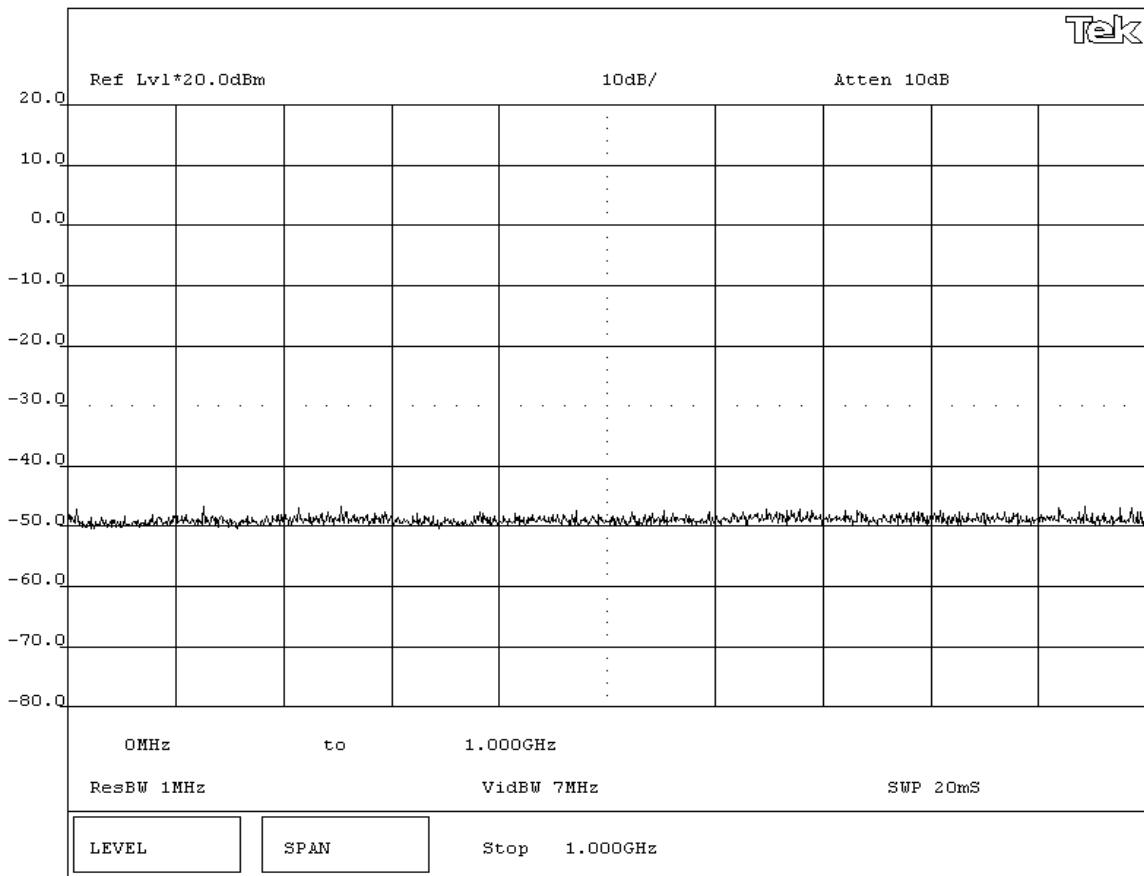
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/24/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Job Site:	
Specification: 47 CFR 2.1051, 22.917, 24.238		Method: TIA / EIA 603	
Year: 2004		Year: 2001	
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Spurious Conducted Emissions - Low Channel - PCS Band			



KNOB 2

KNOB 1

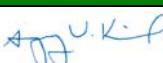
KEYPAD

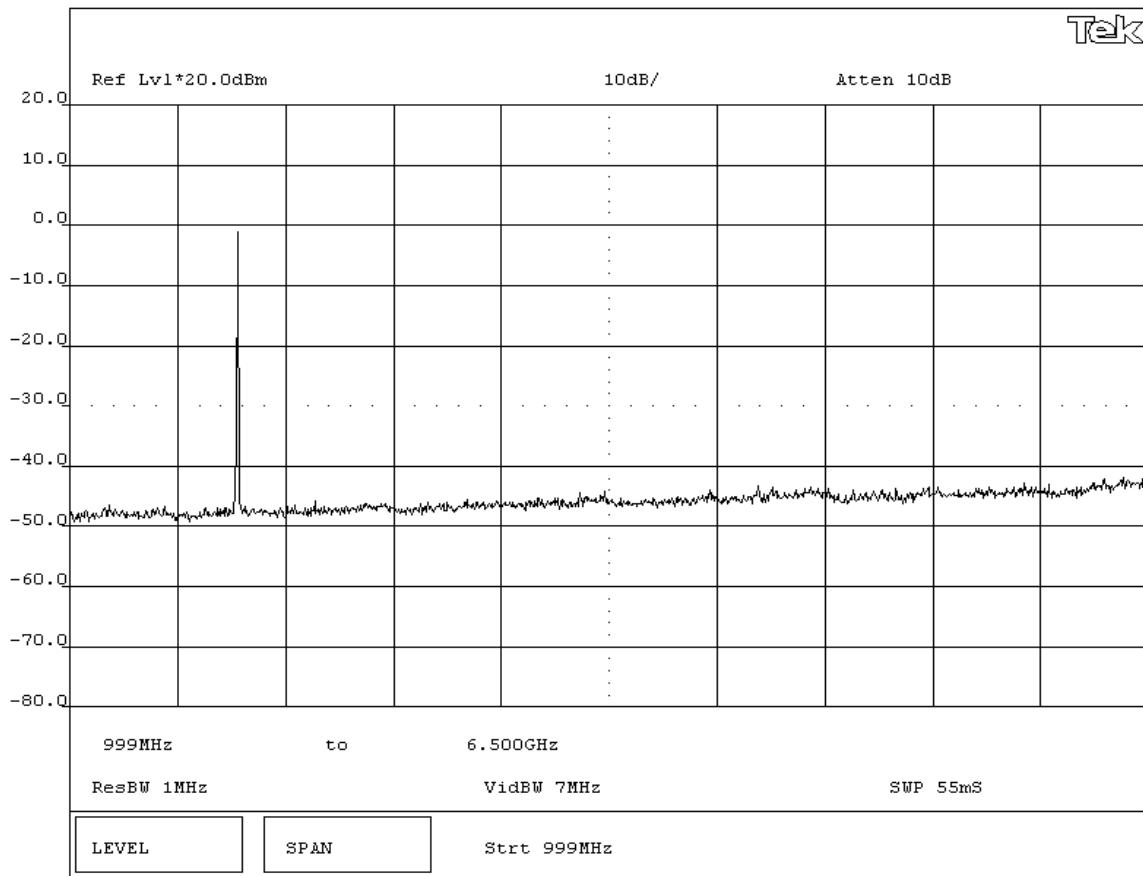
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/24/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Job Site:	
Specification: 47 CFR 2.1051, 22.917, 24.238		TIA / EIA 603	
Year: 2004		Year: 2001	
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Spurious Conducted Emissions - Low Channel - PCS Band			



KNOB 2

KNOB 1

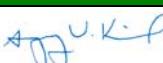
KEYPAD

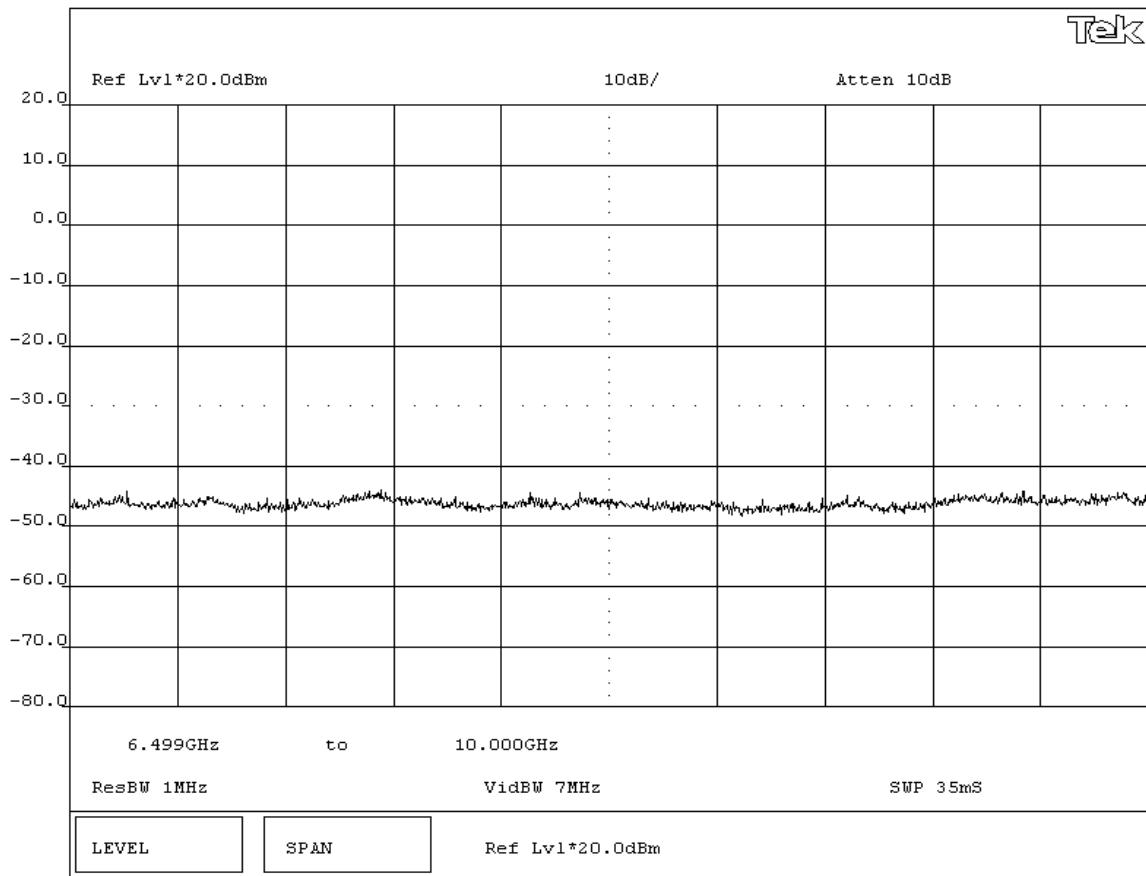
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/24/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Job Site:	
Specification: 47 CFR 2.1051, 22.917, 24.238		Method: TIA / EIA 603	
Year: 2004		Year: 2001	
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Spurious Conducted Emissions - Low Channel - PCS Band			



KNOB 2

KNOB 1

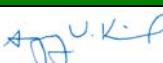
KEYPAD

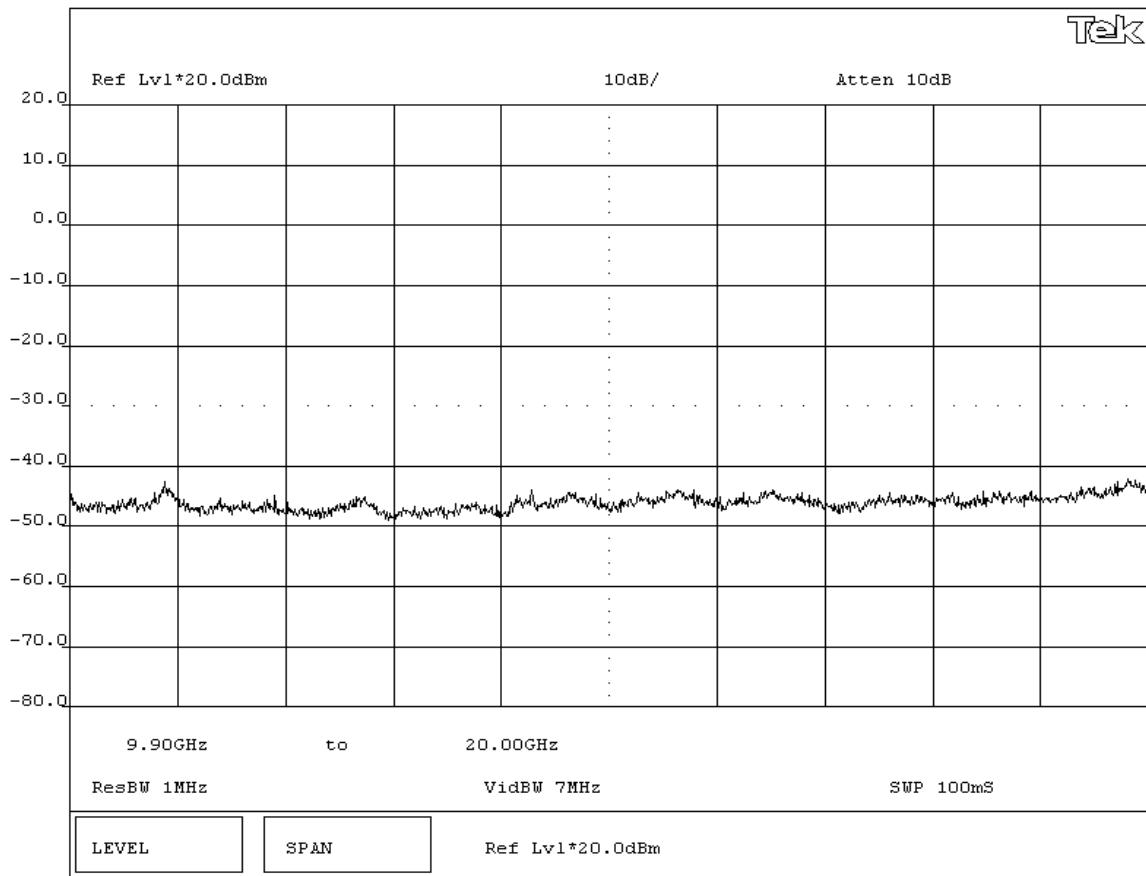
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/24/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Job Site:	
Specification: 47 CFR 2.1051, 22.917, 24.238		Method: TIA / EIA 603	
Year: 2004		Year: 2001	
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Spurious Conducted Emissions - Low Channel - PCS Band			



KNOB 2

KNOB 1

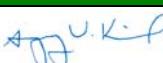
KEYPAD

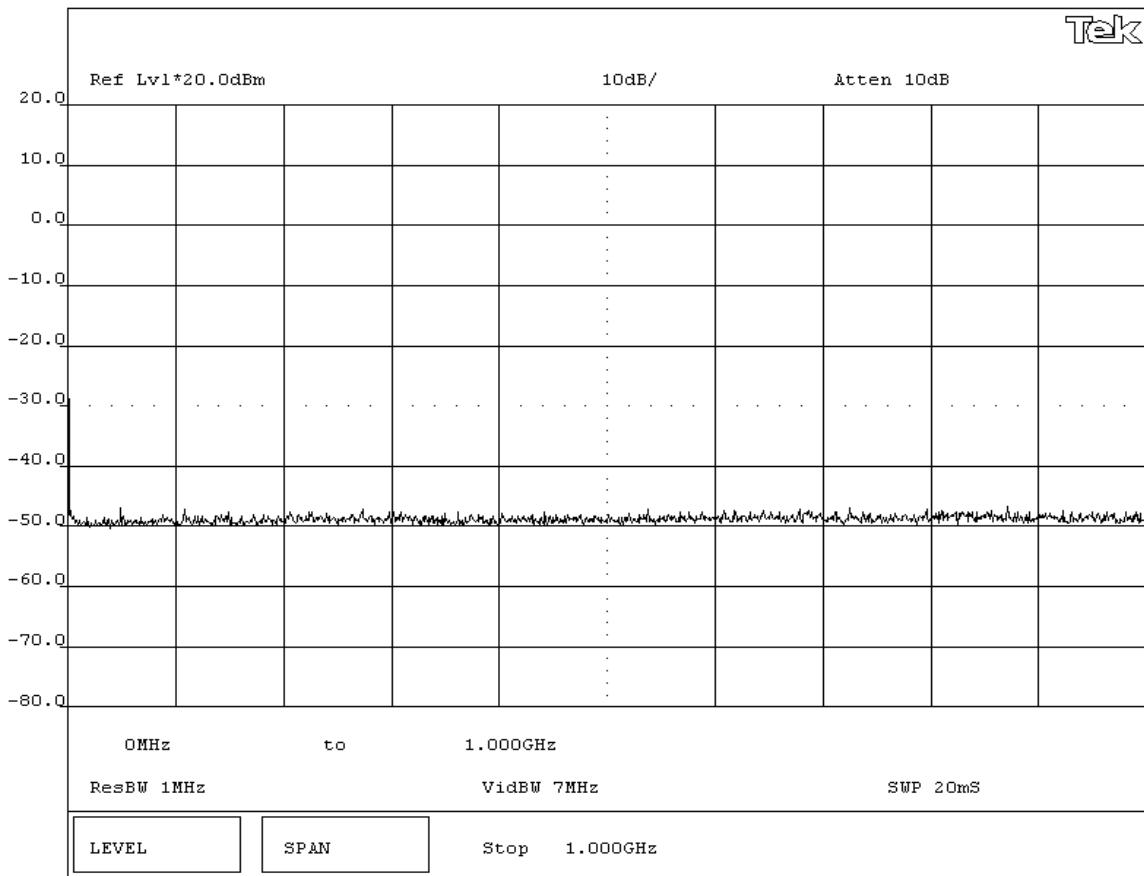
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/24/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Job Site:	
Specification: 47 CFR 2.1051, 22.917, 24.238		Method: TIA / EIA 603	
Year: 2004		Year: 2001	
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Spurious Conducted Emissions - Mid Channel - PCS Band			



KNOB 2

KNOB 1

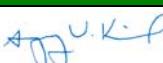
KEYPAD

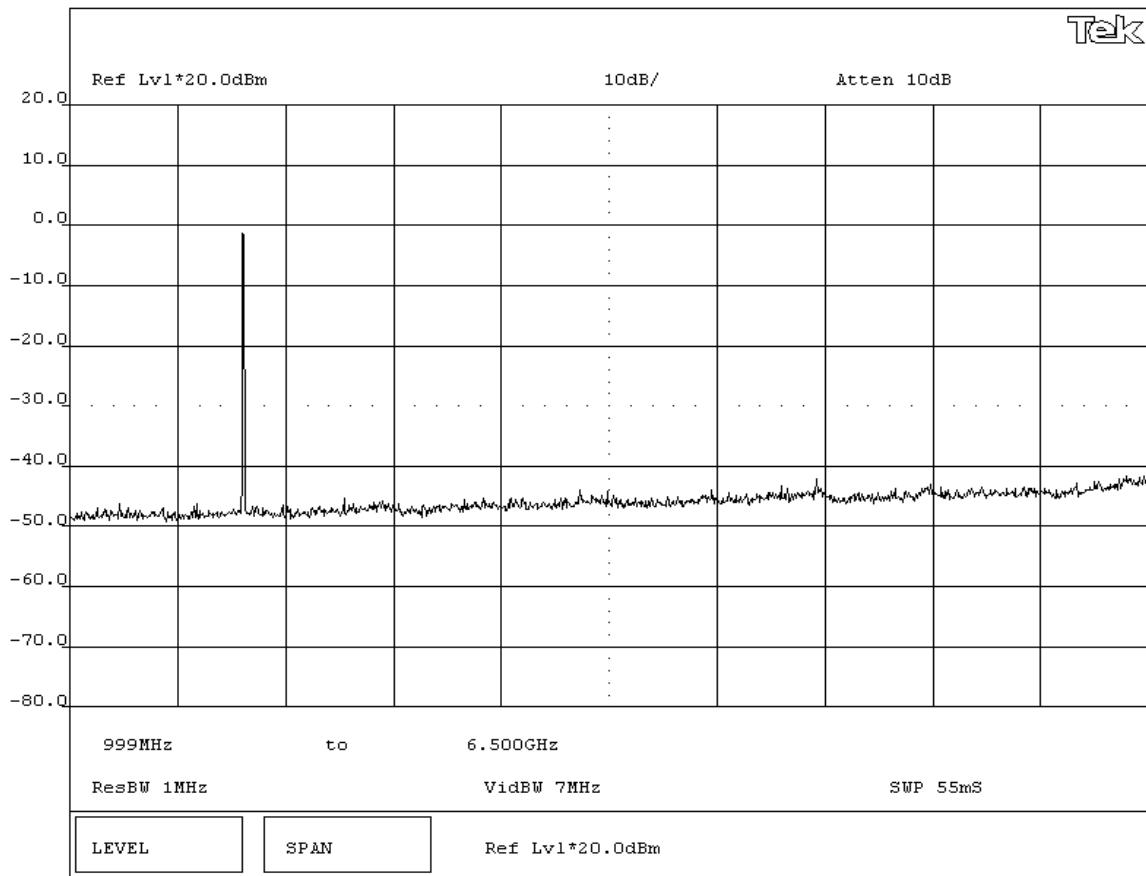
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/24/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Job Site:	
Specification: 47 CFR 2.1051, 22.917, 24.238		Method: TIA / EIA 603	
Year: 2004		Year: 2001	
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Spurious Conducted Emissions - Mid Channel - PCS Band			



KNOB 2

KNOB 1

KEYPAD

Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/24/05
Customer: WirelessWERX, Inc.	Temperature: 22 C
Attendees: none	Humidity: 42%
Customer Ref. No.: N/A	Job Site: EV06

## TEST SPECIFICATIONS

Specification: 47 CFR 2.1051, 22.917, 24.238 Year: 2004 Method: TIA / EIA 603 Year: 2001

## SAMPLE CALCULATIONS

## COMMENTS

## EUT OPERATING MODES

Modulated by PRBS at maximum data rate, at maximum output power.

## DEVIATIONS FROM TEST STANDARD

None

## REQUIREMENTS

The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm

## RESULTS

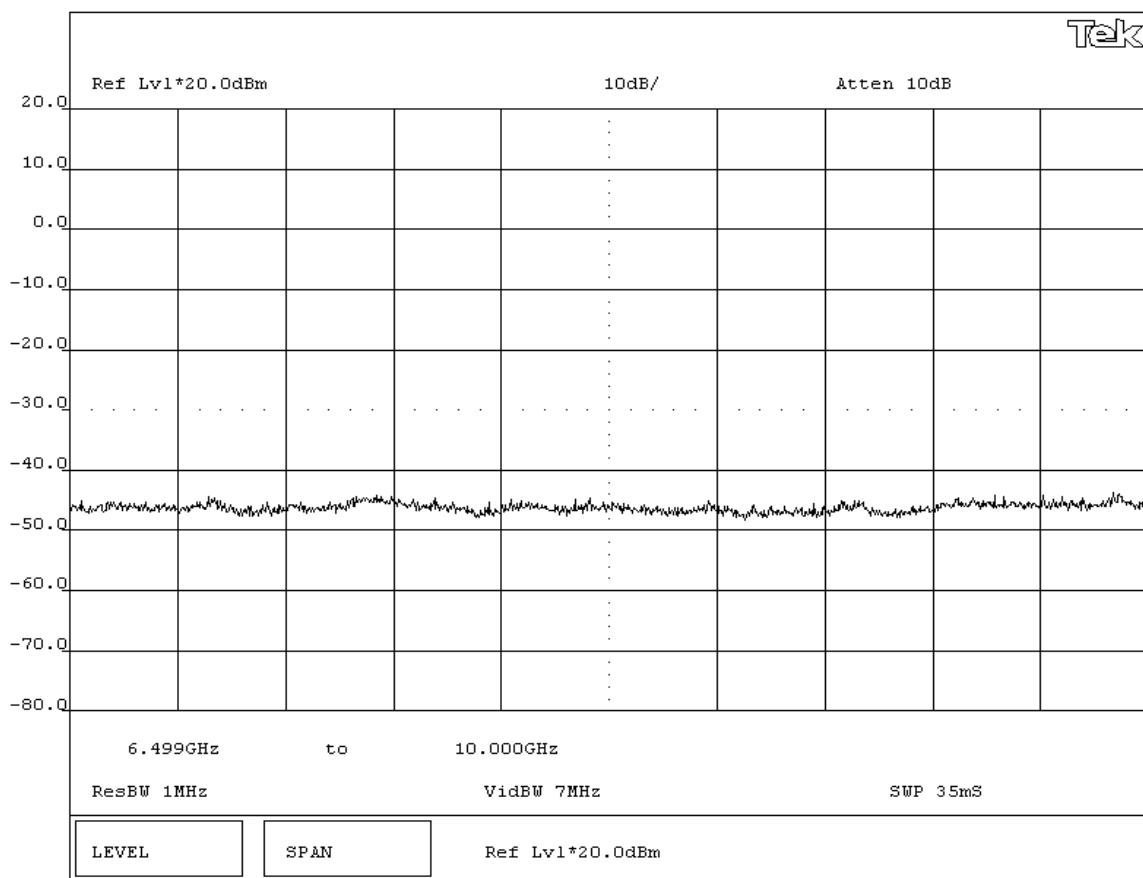
Pass

## SIGNATURE

Tested By: 

## DESCRIPTION OF TEST

## Spurious Conducted Emissions - Mid Channel - PCS Band



KNOB 2

KNOB 1

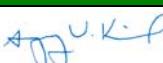
KEYPAD

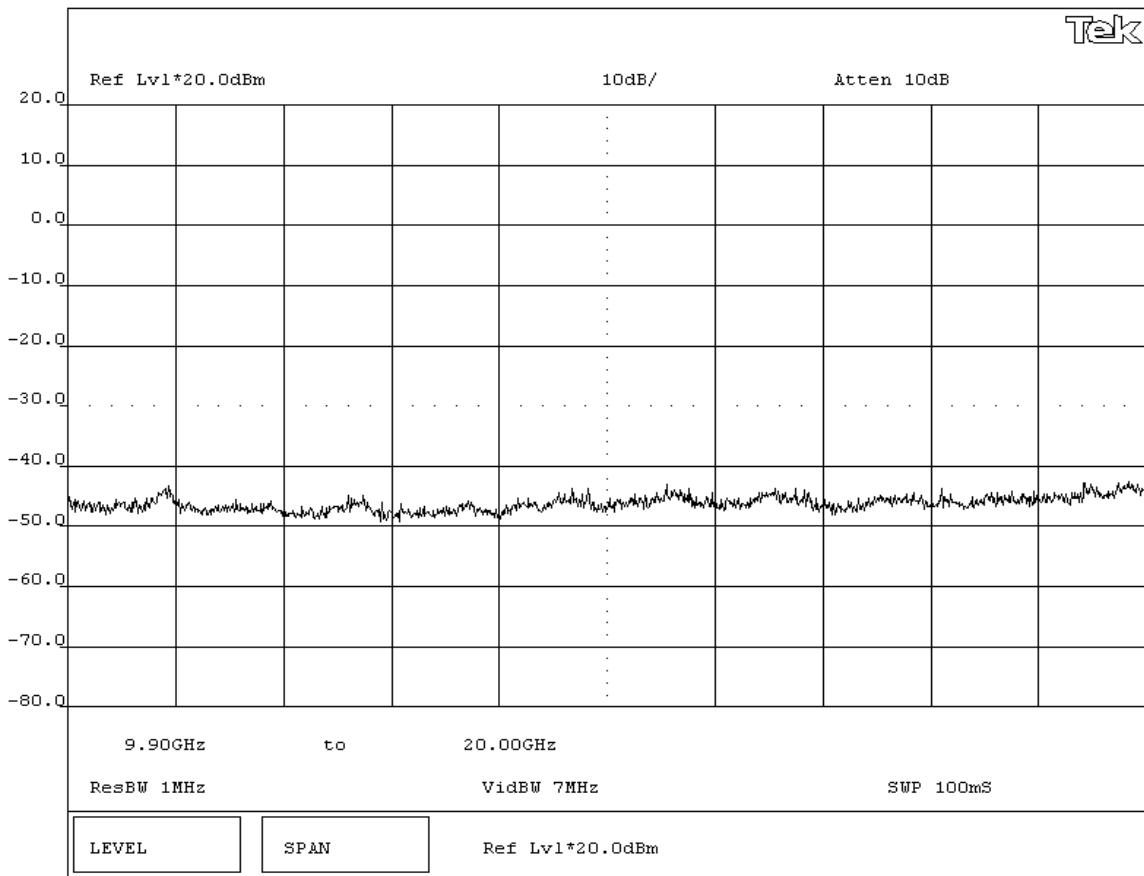
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/24/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Job Site:	
Specification: 47 CFR 2.1051, 22.917, 24.238		Method: TIA / EIA 603	
Year: 2004		Year: 2001	
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Spurious Conducted Emissions - Mid Channel - PCS Band			



KNOB 2

KNOB 1

KEYPAD

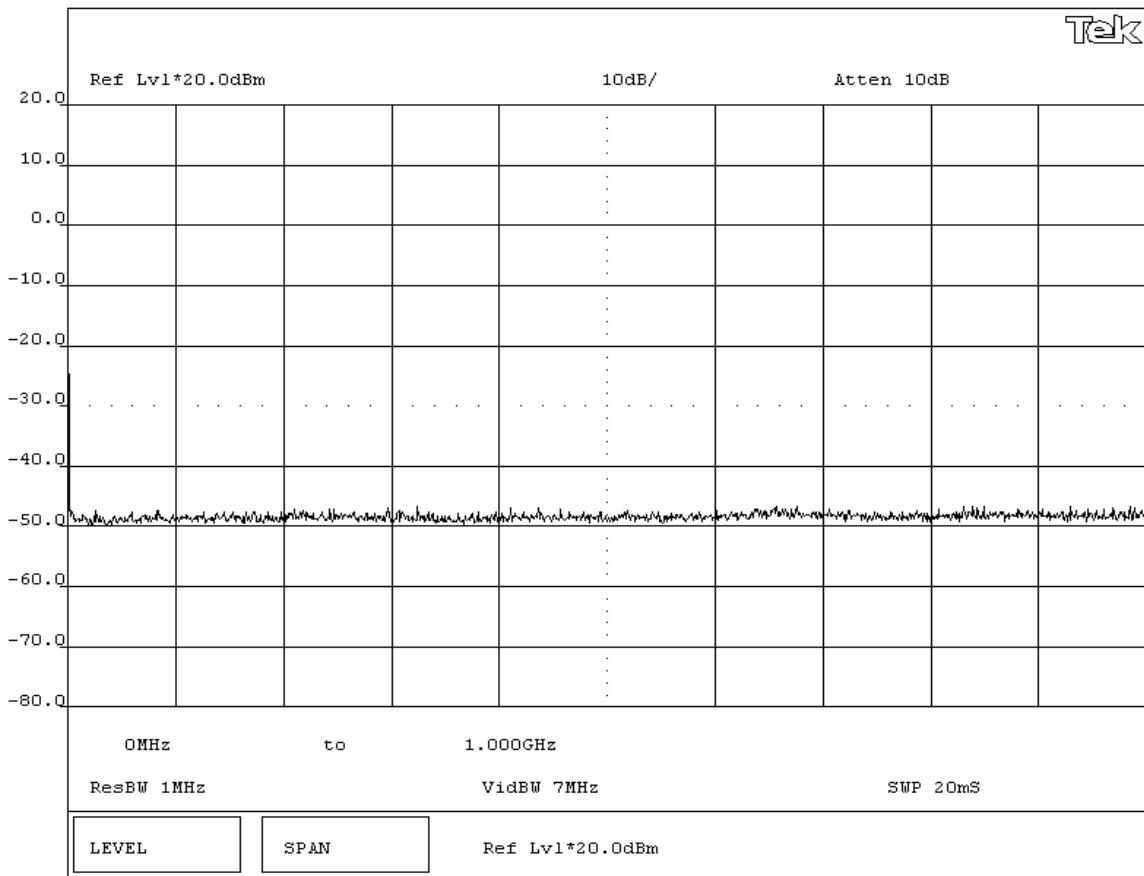
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/24/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
TEST SPECIFICATIONS		Job Site:	
Specification: 47 CFR 2.1051, 22.917, 24.238		TIA / EIA 603	
Year: 2004		Year: 2001	
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Spurious Conducted Emissions - High Channel - PCS Band			



KNOB 2

KNOB 1

KEYPAD

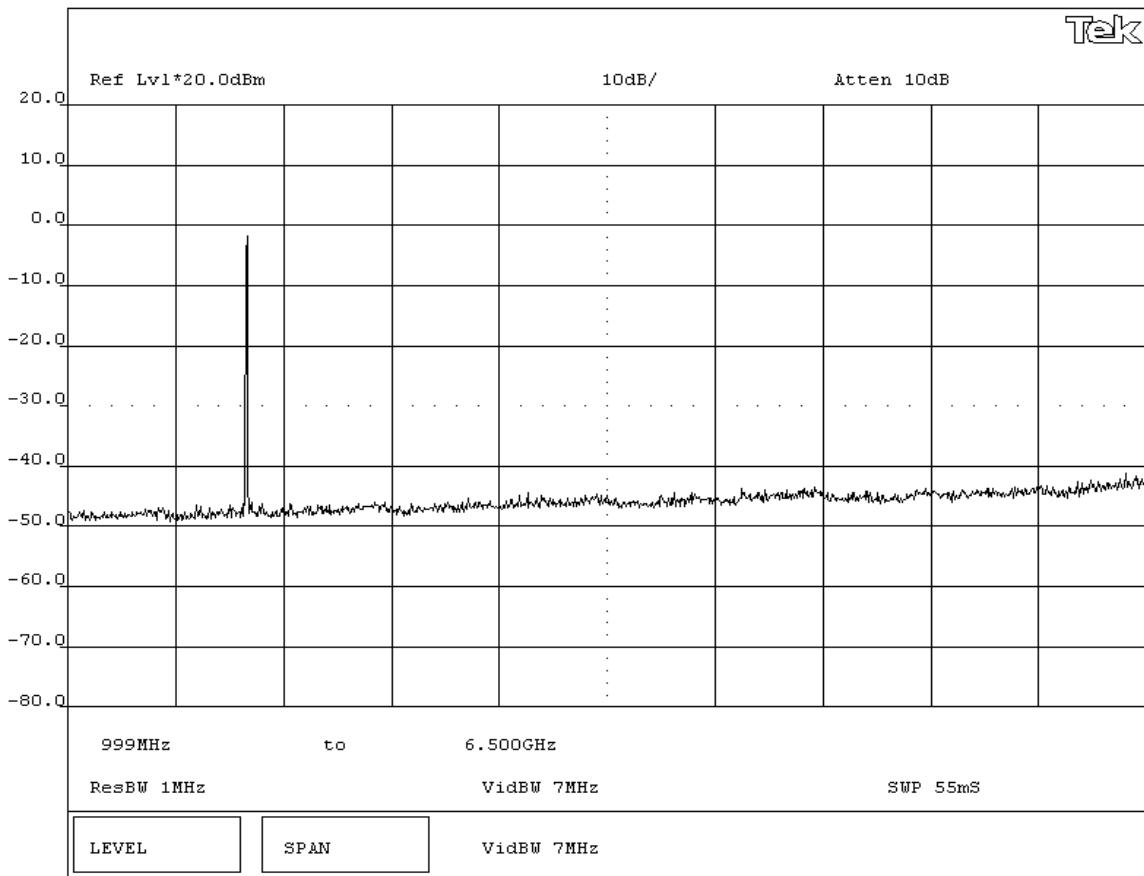
Tektronix 2784

NORTHWEST  
EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT:	TrakLITE C4-B	Work Order:	7LAY0037
Serial Number:	100074	Date:	03/24/05
Customer:	WirelessWERX, Inc.	Temperature:	22 C
Attendees:	none	Humidity:	42%
Customer Ref. No.:	N/A	Power:	12 Vdc
		Job Site:	EV06
TEST SPECIFICATIONS			
Specification: 47 CFR 2.1051, 22.917, 24.238		Year: 2004	Method: TIA / EIA 603
SAMPLE CALCULATIONS			
COMMENTS			
EUT OPERATING MODES			
Modulated by PRBS at maximum data rate, at maximum output power.			
DEVIATIONS FROM TEST STANDARD			
None			
REQUIREMENTS			
The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm			
RESULTS			
Pass			
SIGNATURE			
 Tested By: _____			
DESCRIPTION OF TEST			
Spurious Conducted Emissions - High Channel - PCS Band			



KNOB 2

KNOB 1

KEYPAD

Tektronix 2784

NORTHWEST  
**EMC**

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/24/05
Customer: WirelessWERX, Inc.	Temperature: 22 C
Attendees: none	Humidity: 42%
Customer Ref. No.: N/A	Power: 12 Vdc
	Job Site: EV06

## TEST SPECIFICATIONS

Specification: 47 CFR 2.1051, 22.917, 24.238 Year: 2004 Method: TIA / EIA 603 Year: 2001

## SAMPLE CALCULATIONS

## COMMENTS

## EUT OPERATING MODES

Modulated by PRBS at maximum data rate, at maximum output power.

## DEVIATIONS FROM TEST STANDARD

DEVI  
Nene

## None

**REQUIREMENTS** The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm.

## RESULTS

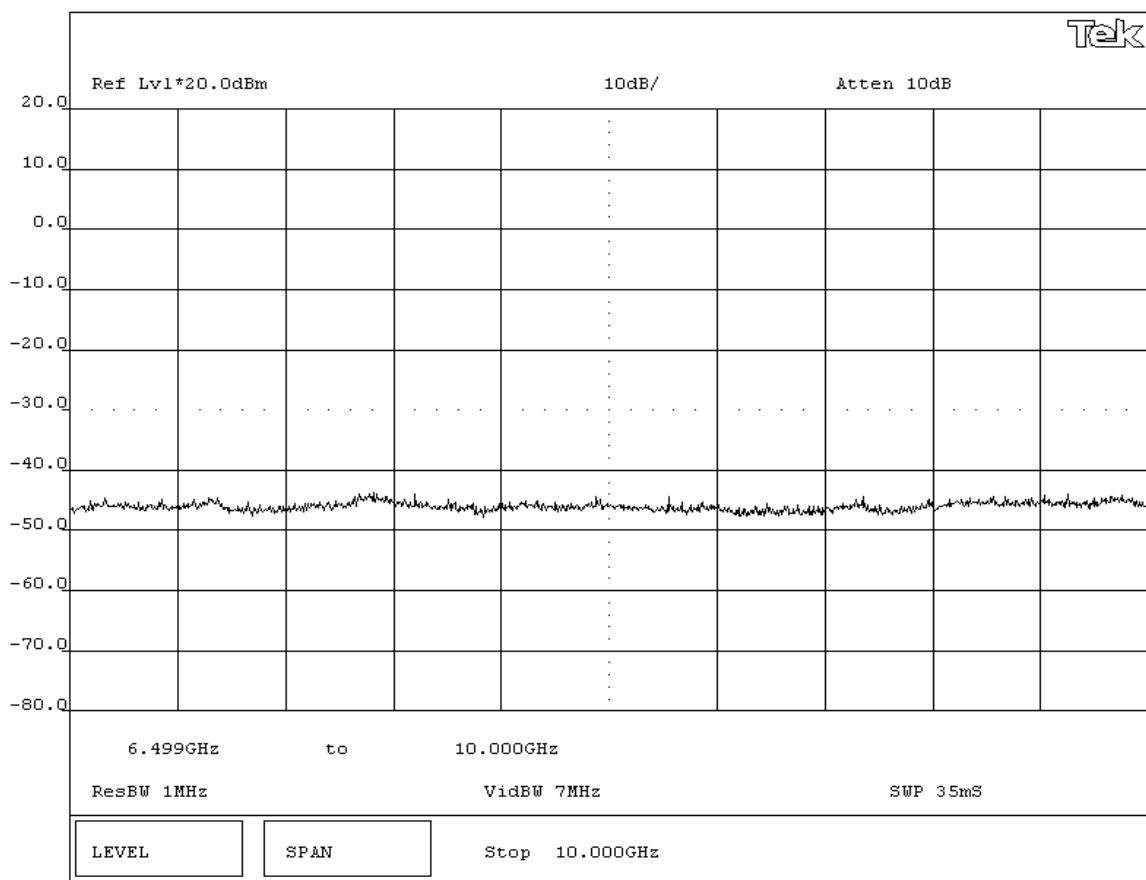
## RESULTS

## Pass

Tested By: 

## DESCRIPTION OF TEST

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



KNOB 2

KNO

Stop 10.000GHz

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EMC

## EMISSIONS DATA SHEET

Rev BETA  
01/30/01

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/24/05
Customer: WirelessWERX, Inc.	Temperature: 22 C
Attendees: none	Humidity: 42%
Customer Ref. No.: N/A	Job Site: EV06

## TEST SPECIFICATIONS

Specification: 47 CFR 2.1051, 22.917, 24.238 Year: 2004 Method: TIA / EIA 603 Year: 2001

## SAMPLE CALCULATIONS

## COMMENTS

## EUT OPERATING MODES

Modulated by PRBS at maximum data rate, at maximum output power.

## DEVIATIONS FROM TEST STANDARD

None

## REQUIREMENTS

The peak conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, must be less than or equal to -13 dBm

## RESULTS

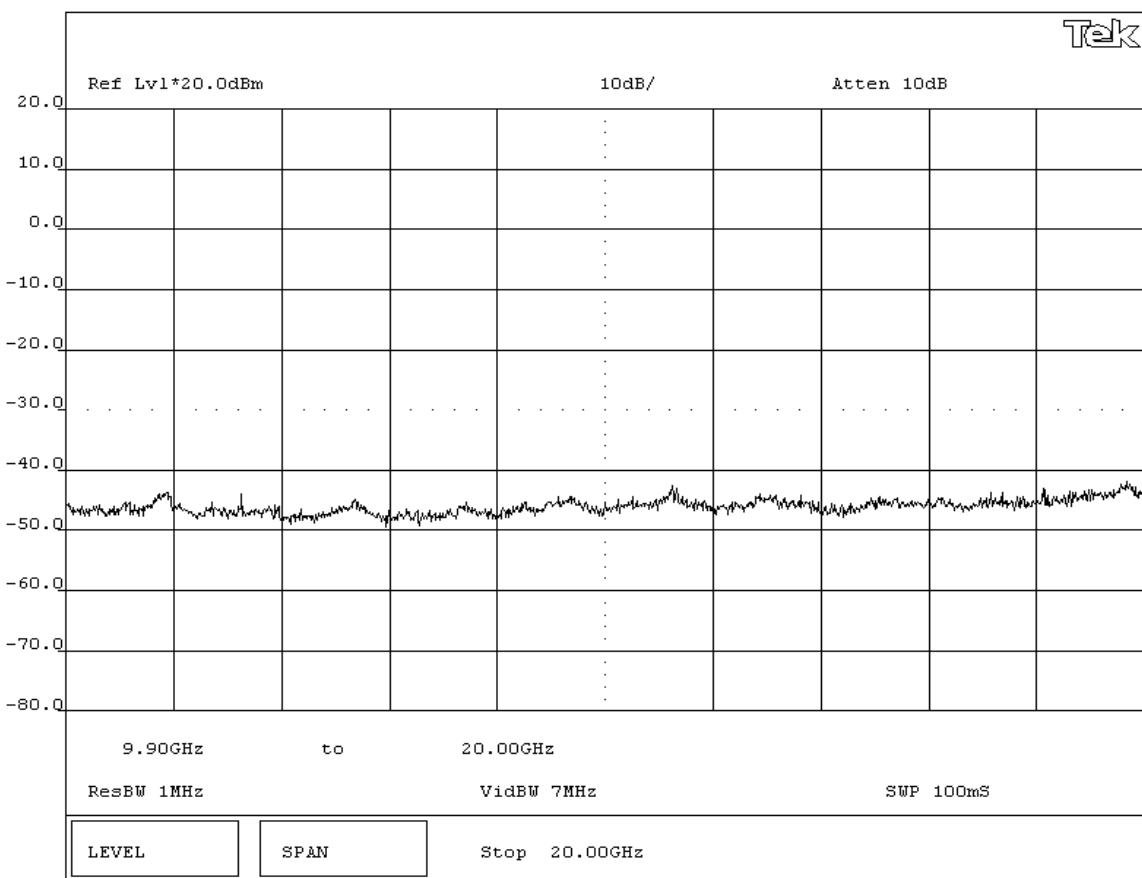
Pass

## SIGNATURE

Tested By: 

## DESCRIPTION OF TEST

Spurious Conducted Emissions - High Channel - PCS Band

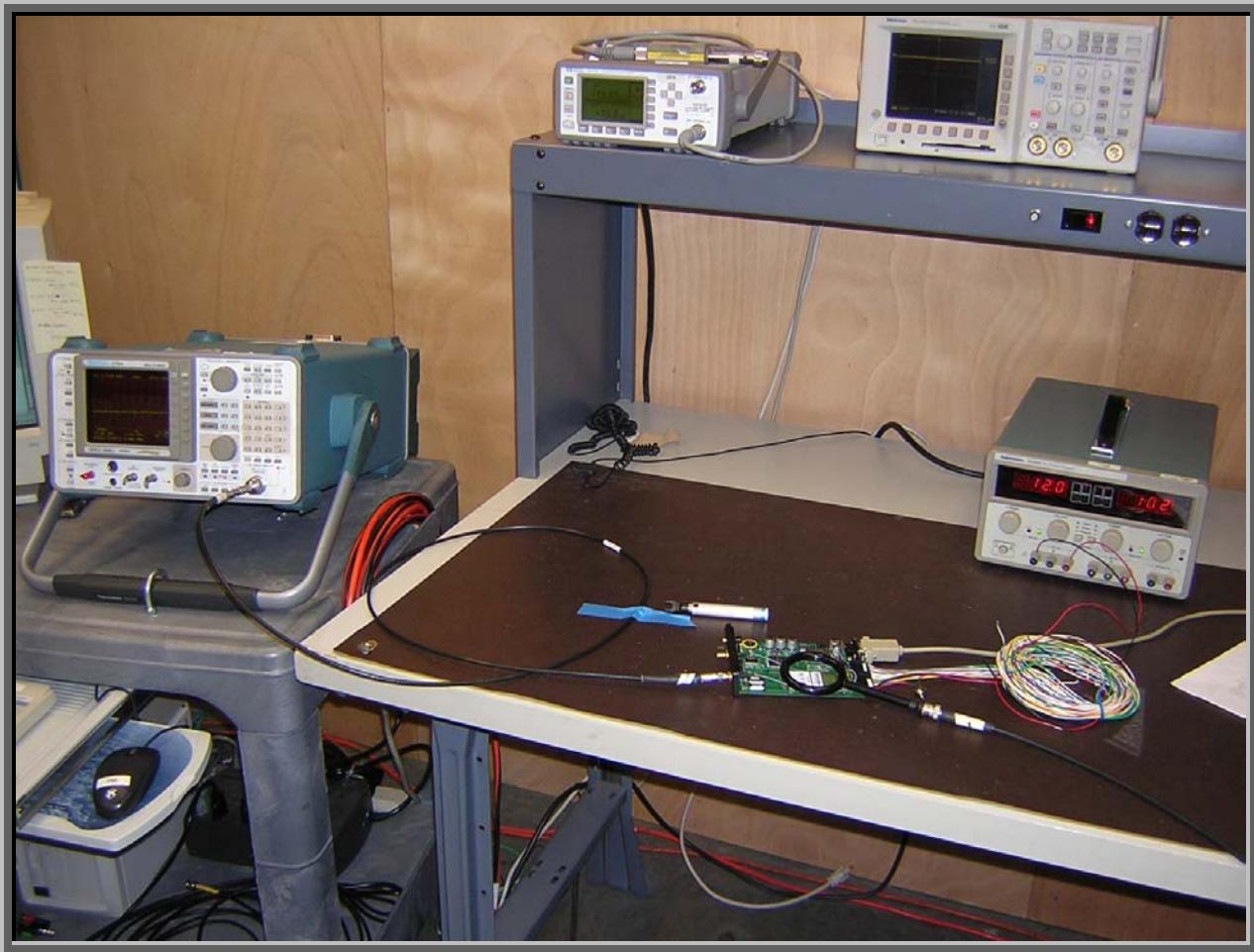


KNOB 2

KNOB 1

KEYPAD

Tektronix 2784



**Justification**

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

**Channels in Specified Band Investigated:**

GSM Cellular Low Channel, 824.2MHz

GSM Cellular Mid Channel, 836.4MHz

GSM Cellular High Channel, 848.8MHz

GSM PCS Low Channel, 1850.2MHz

GSM PCS Mid Channel, 1880MHz

GSM PCS High Channel, 1909.8MHz

Simultaneous transmission of GSM Cellular Channel 132 and Bluetooth Channel 74

Simultaneous transmission of GSM Cellular Channel 251 and Bluetooth Channel 4

Simultaneous transmission of GSM Cellular Channel 207 and Bluetooth Channel 14

Simultaneous transmission of GSM PCS Channel 516 and Bluetooth Channel 67

**Operating Modes Investigated:**

Typical

**Antennas Investigated:**

Bluetooth

GPS

Cellular

**Data Rates Investigated:**

Maximum

**Power Input Settings Investigated:**

12VDC

**Frequency Range Investigated**

Start Frequency	30 MHz	Stop Frequency	26GHz
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**Software\Firmware Applied During Test**

Exercise software	Hyperterminal	Version	1999
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**Description**

The system was tested using hyperterminal software on a remote pc to access the EUT during the testing. A call was originated by the wireless communications test set and answered via hyperterminal on the EUT.

EUT and Peripherals			
Description	Manufacturer	Model/Part Number	Serial Number
EUT	Wireless Werx	TrakLITE C4-B	100074
DC Power Supply	Topward Electric Instruments, Co. Ltd.	TPS-2000	Unknown
Cellular Antenna	Radiall/Larsen	MMC/P3ESMA	Unknown
GPS Antenna	Laipac Tech	GLP1	334083
Bluetooth Antenna	Radiall/Larsen	MS3E2400SMA	Unknown

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Wireless Communications Test Set	Agilent	8960 Series 10 E5515C	0844051960
Remote laptop	IBM	Thinkpad	78-HKYY6 10/00
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Serial	Yes	6	No	EUT	Remote laptop
Wire harness (16)	No	1.0	No	EUT	Unterminated
Wire harness (3)	No	1.0	No	EUT	DC Power Supply
Bluetooth	Yes	2.0	No	EUT	Bluetooth Antenna
Cellular	Yes	3.0	No	EUT	Cellular Antenna
GPS	Yes	3.0	No	EUT	GPS Antenna
AC Power	No	2.0	No	DC Power Supply	AC Mains

Measurement Equipment					
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Antenna, Horn	EMCO	3160-09	AHG	NCR	NA
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	02/15/2005	13 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
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APJ	01/05/2004	16 mo
Antenna, Biconilog	EMCO	3141	AXE	12/03/2003	24 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	03/01/2005	13 mo
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	12/02/2004	13 mo
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	12/02/2004	13 mo
Spectrum Analyzer Display	Hewlett Packard	85662A	AALD	12/02/2004	13 mo
Attenuator	Coaxicom	66702 5910-6	ATZ	02/25/2005	13 mo
Attenuator	Coaxicom	66702 5910-20	RBJ	02/25/2005	13 mo
High Pass Filter	Micro-Tronics	HPM50111	HFO	03/09/2005	13 mo
Antenna, Horn	EMCO	3115	AHF	03/18/2004	24 mo
Antenna, Dipole (ADAA included)	Roberts	Roberts	ADA	01/06/2005	24 mo
Signal Generator	Hewlett Packard	8341B	TGN	02/07/2005	13 mo

**Test Description**

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

Per 22.917(a), The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB (-13 dBm).

Per 24.238(a), The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB (-13 dBm).

**Configuration:** The highest gain of each type of 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 EUT antenna in three orthogonal axis, and adjusting the measurement antenna height and polarization (per ANSI C63.4:1992). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

**Simultaneous Transmission:**

The following is an excerpt from the FCC / TCB Training Q & A, October 2002, Day 2, Question 7:

**Assuming that the radios do not share an antenna, only radiated tests for simultaneous transmission is required. If the radios share an antenna, antenna conducted measurements would also be required. Only one set of worst case simultaneous transmission data is going to be requested to be submitted at this time. The test engineer should indicate the worst case condition and provide justification as to why the worst case condition was chosen. The grantee should be reminded that even if the FCC requests one set of data, they are responsible for compliance for all modes of simultaneous transmission.**

All possible combinations of harmonic emissions from the GSM and Bluetooth radios were compared numerically. It was determined that there were no possible coincidental harmonics below 1 GHz. The frequency range from 1 GHz to 26 GHz was investigated for channel combinations that would produce coincidental harmonics.

The substitution method as described in ANSI/TIA-603-B Section 2.2.12 was used for the highest spurious emissions.

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

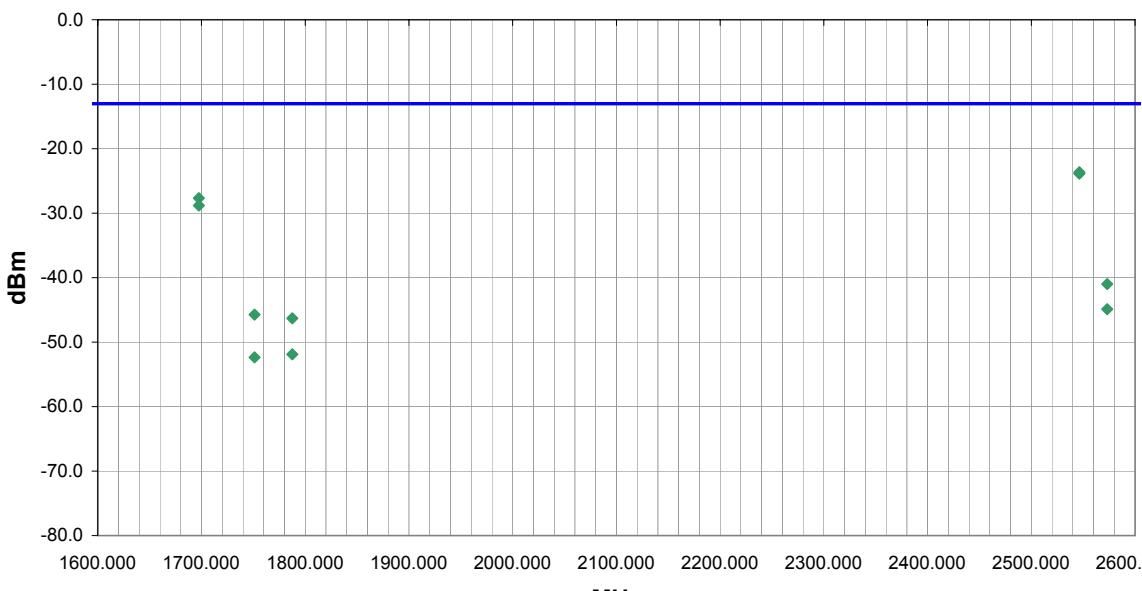
At an approved test site, the transmitter is placed on a remotely controlled turntable, and the measurement antenna is placed 3 meters from the transmitter. The turntable azimuth is varied to maximize the level of emissions. The height of the measurement antenna is also varied from 1 to 4 meters. The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

<b>Bandwidths Used for Measurements</b>			
<b>Frequency Range (MHz)</b>	<b>Peak Data (kHz)</b>	<b>Quasi-Peak Data (kHz)</b>	<b>Average Data (kHz)</b>
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:



Apparent Power Data Sheet																																																																																																																																																										
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NORTHWEST  
EMC

## Apparent Power Data Sheet

ACQ 2005.1.3  
EMI 2005.1.3

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/20/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Holly Ashkannejhad	Power: 12VDC
	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 22.917(a):2004 Method: TIA/EIA-603:2001

## 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

10dB external attenuation

## EUT OPERATING MODES

Transmitting GSM Cellular Mid Channel

## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Run #

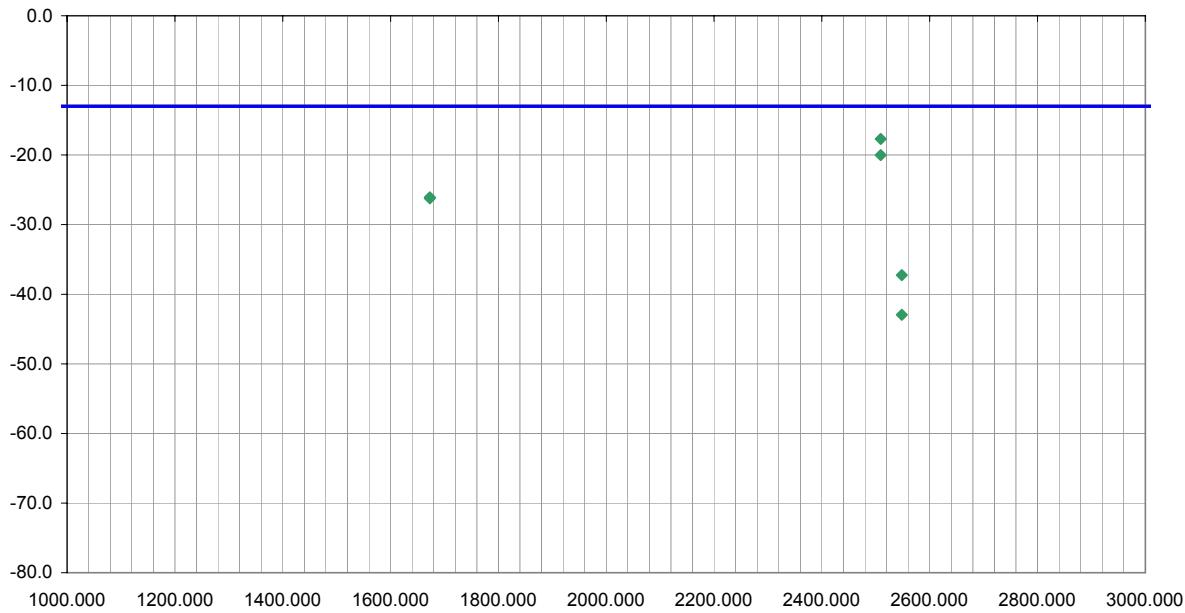
Pass

10

Other

*Holly Ashkannejhad*

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
2509.102			82.0	1.4			V-Horn	PK	1.6988E-05	-17.7	-13.0	-4.7
2509.102			131.0	1.3			H-Horn	PK	9.9474E-06	-20.0	-13.0	-7.0
1672.820			130.0	1.4			H-Horn	PK	2.4623E-06	-26.1	-13.0	-13.1
1672.820			46.0	1.3			V-Horn	PK	2.3905E-06	-26.2	-13.0	-13.2
2548.446			36.0	1.3			V-Horn	PK	1.8825E-07	-37.3	-13.0	-24.3
2548.446			135.0	1.5			H-Horn	PK	5.0573E-08	-43.0	-13.0	-30.0

## Apparent Power Data Sheet

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/20/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Holly Ashkannejhad	Power: 12VDC
	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 22.917(a):2004 Method: TIA/EIA-603:2001

## 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

10dB external attenuation

## EUT OPERATING MODES

Transmitting GSM Cellular Low Channel

## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Run #

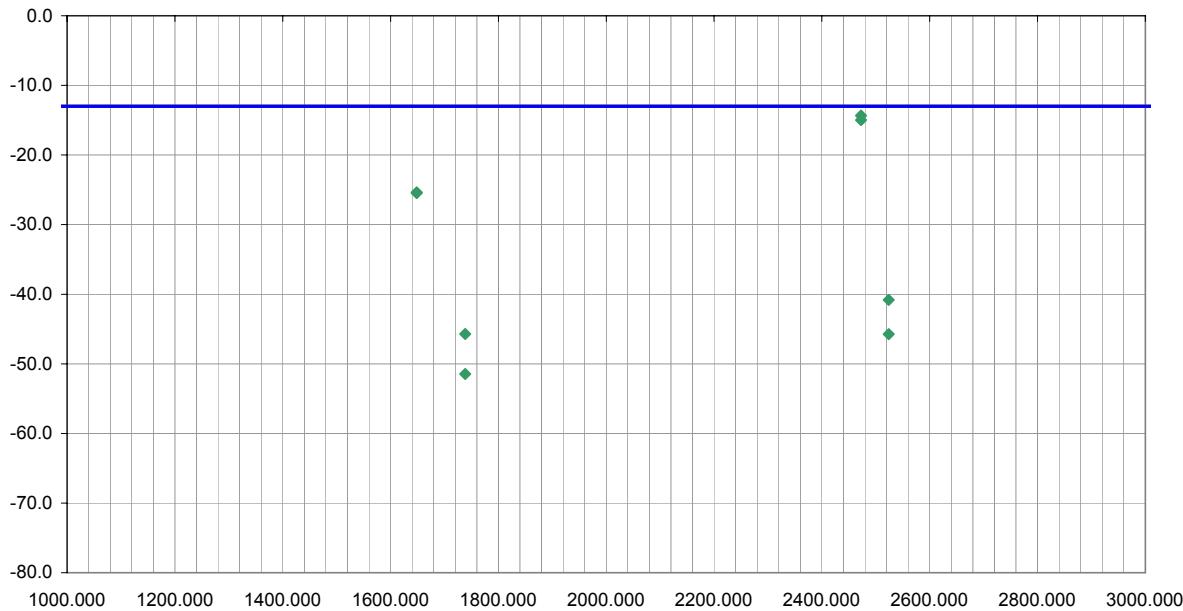
Pass

11

Other

*Holly Ashkannejhad*

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Spec. (dB)
2472.560				75.0	1.5		V-Horn	PK	3.6750E-05	-14.3	-13.0	-1.3
2472.560				131.0	1.3		H-Horn	PK	3.1716E-05	-15.0	-13.0	-2.0
1648.423				137.0	1.4		H-Horn	PK	2.9086E-06	-25.4	-13.0	-12.4
1648.423				77.0	1.4		V-Horn	PK	2.8350E-06	-25.5	-13.0	-12.5
2524.077				34.0	1.3		V-Horn	PK	8.2810E-08	-40.8	-13.0	-27.8
1738.373				345.0	1.1		V-Horn	PK	2.6781E-08	-45.7	-13.0	-32.7
2524.077				134.0	1.3		H-Horn	PK	2.6684E-08	-45.7	-13.0	-32.7
1738.373				306.0	1.2		H-Horn	PK	7.1655E-09	-51.4	-13.0	-38.4

NORTHWEST  
EMC

## Apparent Power Data Sheet

ACQ 2005.1.3  
EMI 2005.1.3

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/20/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Holly Ashkannejhad	Power: 12VDC
	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 24.238(a):2004 Method: TIA/EIA-603:2001

## SAMPLE CALCULATIONS

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

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

## COMMENTS

## EUT OPERATING MODES

Transmitting GSM PCS Low Channel

## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Pass

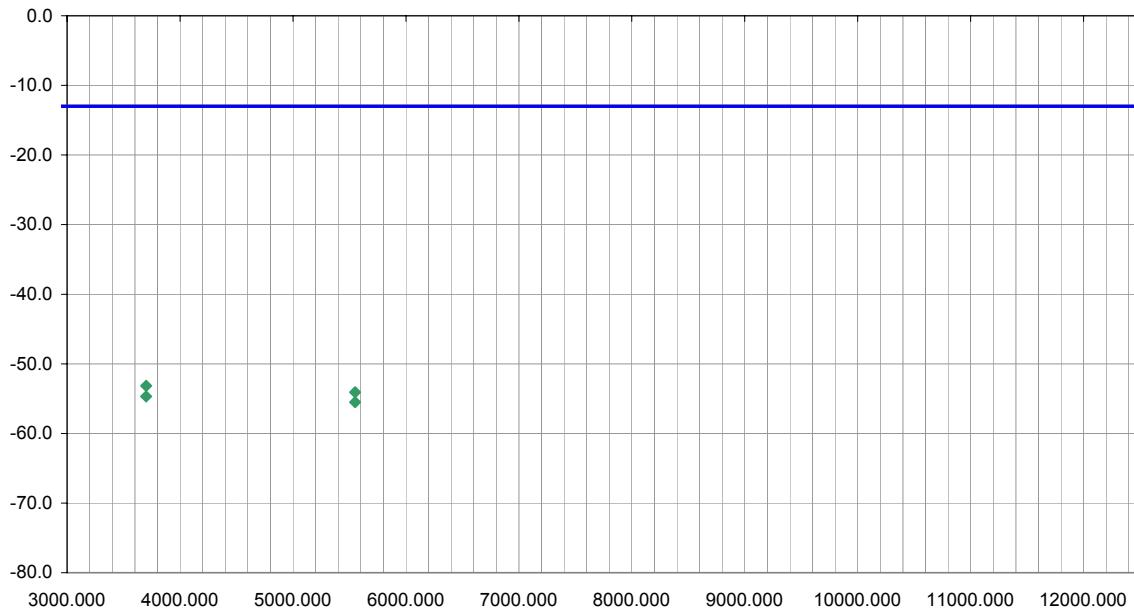
Run #

12

Other

*Holly Ashkannejhad*

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
3700.388			169.0	1.2			V-Horn	PK	4.8425E-09	-53.1	-13.0	-40.1
5550.600			193.0	1.2			V-Horn	PK	3.9206E-09	-54.1	-13.0	-41.1
3700.388			10.0	1.1			H-Horn	PK	3.4118E-09	-54.7	-13.0	-41.7
5550.600			321.0	2.1			H-Horn	PK	2.8115E-09	-55.5	-13.0	-42.5

## Apparent Power Data Sheet

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/20/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Holly Ashkannejhad	Power: 12VDC
	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 24.238(a):2004 Method: TIA/EIA-603:2001

## SAMPLE CALCULATIONS

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

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

## COMMENTS

## EUT OPERATING MODES

Transmitting GSM PCS Mid Channel

## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Pass

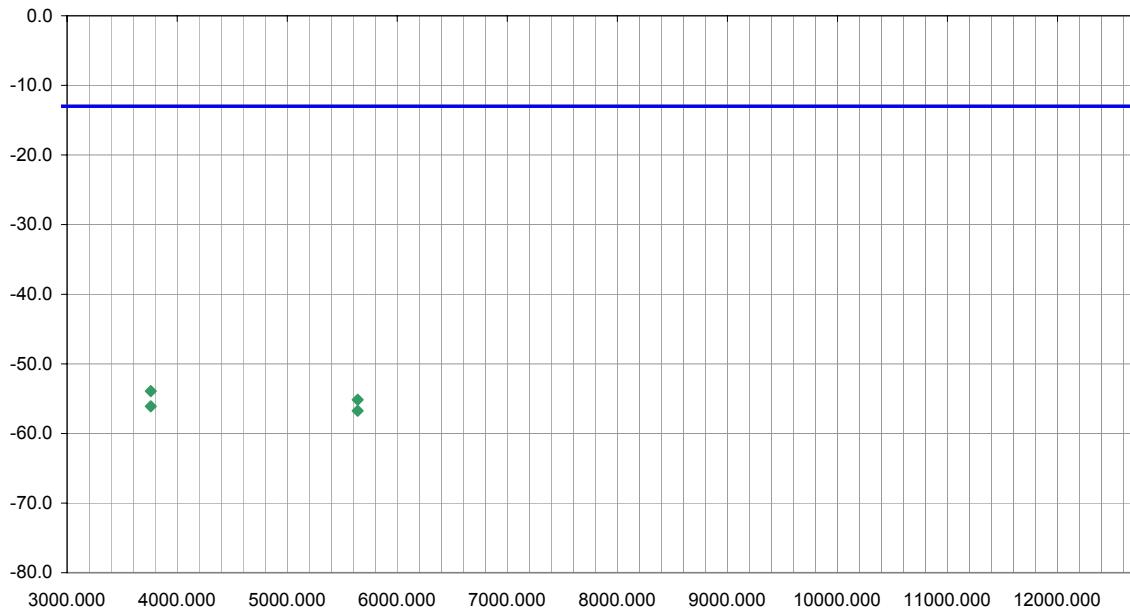
Run #

13

Other

*Holly Ashkannejhad*

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
3759.949			117.0	2.0			V-Horn	PK	4.0693E-09	-53.9	-13.0	-40.9
5640.000			204.0	1.2			V-Horn	PK	3.0486E-09	-55.2	-13.0	-42.2
3759.949			10.0	1.3			H-Horn	PK	2.4496E-09	-56.1	-13.0	-43.1
5640.000			245.0	1.3			H-Horn	PK	2.1160E-09	-56.7	-13.0	-43.7

NORTHWEST  
EMC

## Apparent Power Data Sheet

ACQ 2005.1.3  
EMI 2005.1.3

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/20/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Holly Ashkannejhad	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 24.238(a):2004	Method: TIA/EIA-603:2001
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## SAMPLE CALCULATIONS

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

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

## COMMENTS

## EUT OPERATING MODES

Transmitting GSM PCS High Channel

## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Pass

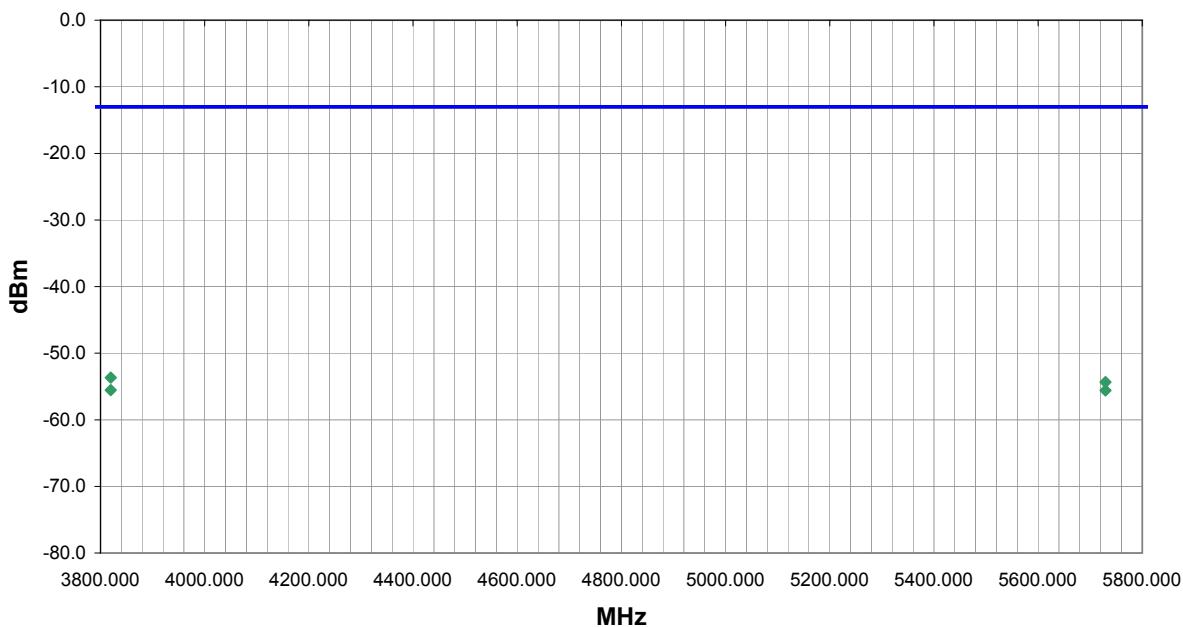
Run #

14

Other

*Holly Ashkannejhad*

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
3819.713			211.0	1.2			V-Horn	PK	0.0000	-53.7	-13.0	-40.7
5729.400			316.0	1.2			V-Horn	PK	0.0000	-54.4	-13.0	-41.4
3819.713			182.0	1.9			H-Horn	PK	0.0000	-55.5	-13.0	-42.5
5729.400			154.0	1.3			H-Horn	PK	0.0000	-55.6	-13.0	-42.6

NORTHWEST  
EMC

## Apparent Power Data Sheet

ACQ 2005.1.3  
EMI 2005.1.3

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/21/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Rod Peloquin	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 22.917(a):2004	Method: TIA/EIA-603:2001
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## SAMPLE CALCULATIONS

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

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

## COMMENTS

## EUT OPERATING MODES

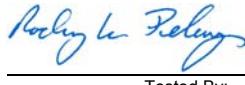
Transmitting GSM PCS 516, Bluetooth 67

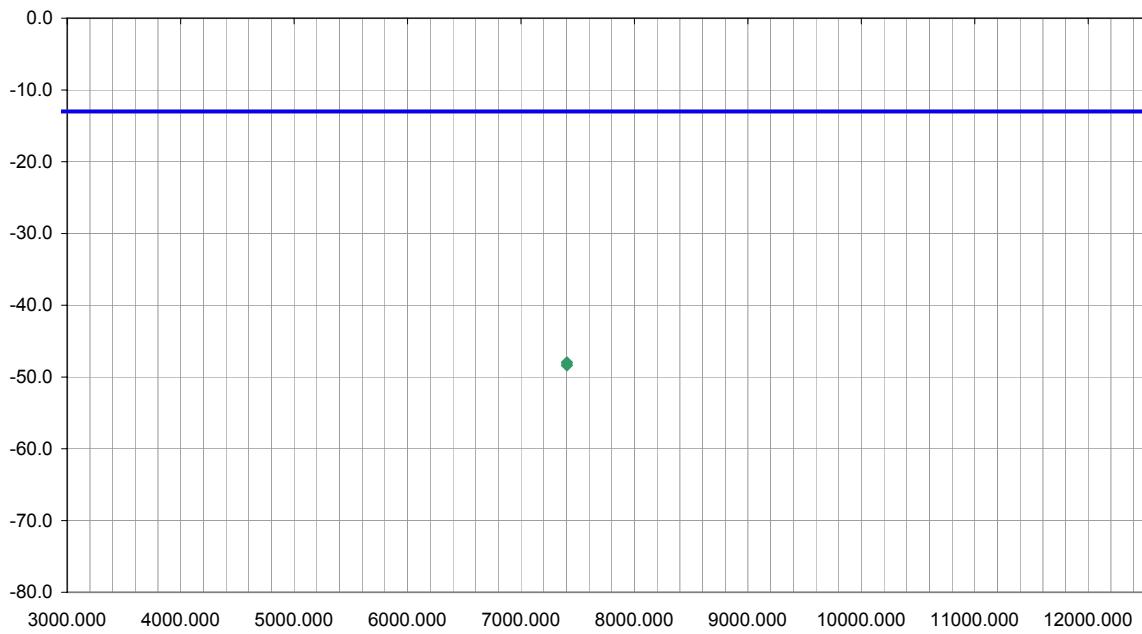
## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Pass	Run #
15	

Other	
Tested By:	



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
7404.000			139.0	3.2			H-Horn	PK	0.0000	-48.0	-13.0	-35.0
7404.000			181.0	2.4			V-Horn	PK	0.0000	-48.4	-13.0	-35.4

NORTHWEST  
EMC

## Apparent Power Data Sheet

ACQ 2005.1.3  
EMI 2005.1.3

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/21/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Rod Peloquin	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 22.917(a):2004	Method: TIA/EIA-603:2001
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## SAMPLE CALCULATIONS

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

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

## COMMENTS

## EUT OPERATING MODES

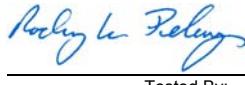
Transmitting GSM Cellular 251, Bluetooth 4

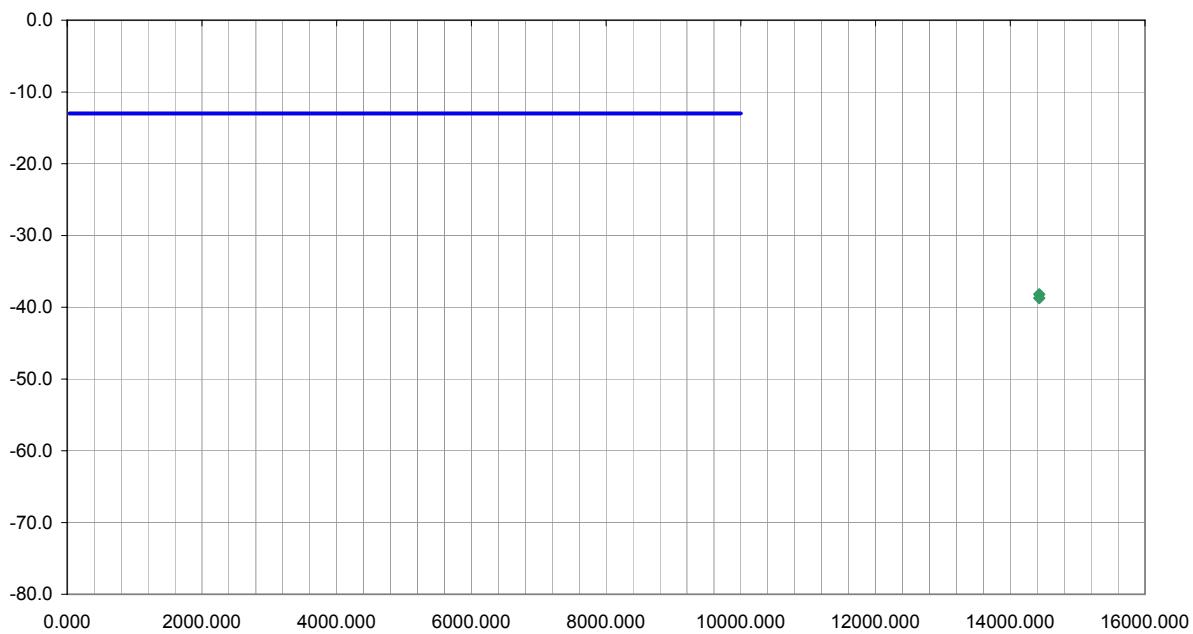
## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Pass	Run #
	16

Other	
	Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
14429.800			145.0	1.3			H-Horn	PK	0.0000	-38.2	-13.0	-25.2
14429.800			276.0	1.2			V-Horn	PK	0.0000	-38.7	-13.0	-25.7

NORTHWEST  
EMC

## Apparent Power Data Sheet

ACQ 2005.1.3  
EMI 2005.1.3

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/21/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Rod Peloquin	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 22.917(a):2004	Method: TIA/EIA-603:2001
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## SAMPLE CALCULATIONS

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

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

## COMMENTS

## EUT OPERATING MODES

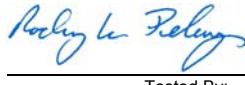
Transmitting GSM Cellular 132, Bluetooth 74

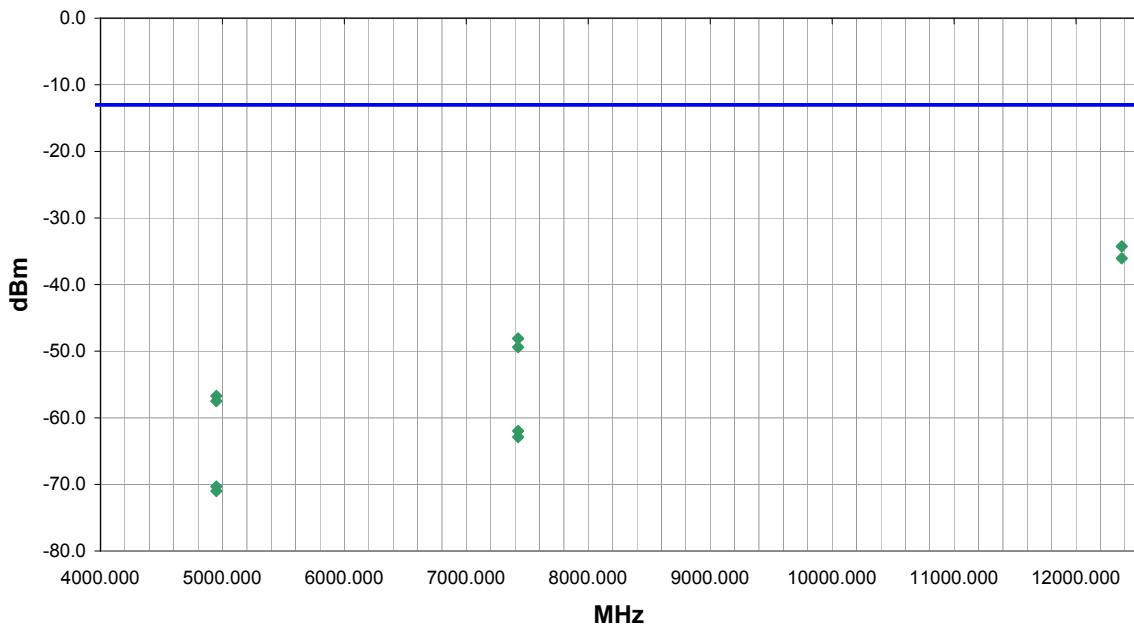
## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Pass	Run #
Pass	17

Other	
	Tested By: _____



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
12375.000			181.0	3.7			H-Horn	PK	0.0000	-34.3	-13.0	-21.3
12375.000			35.0	1.2			V-Horn	PK	0.0000	-36.1	-13.0	-23.1
7425.000			360.0	1.3			H-Horn	PK	0.0000	-48.1	-13.0	-35.1
7425.000			307.0	1.2			V-Horn	PK	0.0000	-49.4	-13.0	-36.4
4950.000			91.0	2.7			V-Horn	PK	0.0000	-56.7	-13.0	-43.7
4950.000			254.0	1.2			H-Horn	PK	0.0000	-57.5	-13.0	-44.5
7425.000			360.0	1.3			H-Horn	AV	0.0000	-62.0	-13.0	-49.0
7425.000			307.0	1.2			V-Horn	AV	0.0000	-62.9	-13.0	-49.9
4950.000			91.0	2.7			V-Horn	AV	0.0000	-70.3	-13.0	-57.3
4950.000			254.0	1.2			H-Horn	AV	0.0000	-71.0	-13.0	-58.0

## Apparent Power Data Sheet

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/21/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Holly Ashkannejhad	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 22.917(a):2004	Method: TIA/EIA-603:2001
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## 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

Bluetooth and GSM co-located.

## EUT OPERATING MODES

Transmitting Bluetooth Channel 74 and GSM (cellular) Channel 132

## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Pass

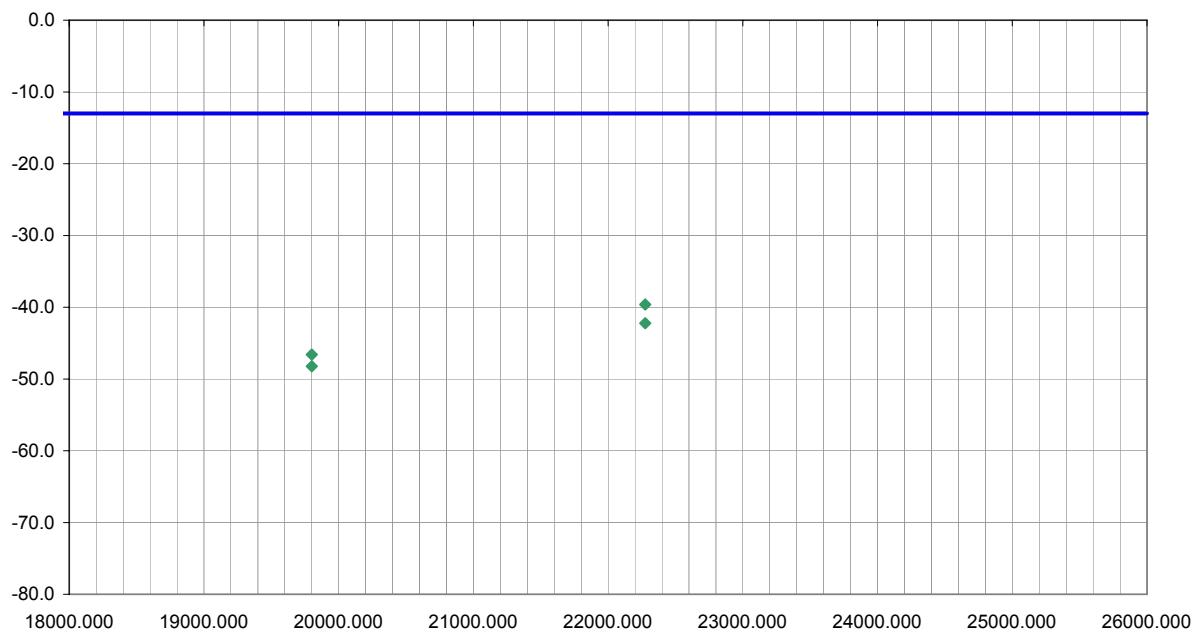
Run #

19

Other

*Holly Ashkannejhad*

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
22275.000			360.0	1.0			V-High Horr	PK	0.0000	-39.6	-13.0	-26.6
22275.000			-1.0	1.0			H-High Horr	PK	0.0000	-42.2	-13.0	-29.2
19800.000			-1.0	1.0			V-High Horr	PK	0.0000	-46.6	-13.0	-33.6
19800.000			360.0	1.0			H-High Horr	PK	0.0000	-48.2	-13.0	-35.2

## Apparent Power Data Sheet

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/21/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Holly Ashkannejhad	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 22.917(a):2004	Method: TIA/EIA-603:2001
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## 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

Bluetooth and GSM co-located.

## EUT OPERATING MODES

Transmitting Bluetooth Channel 14 and GSM (cellular) Channel 207

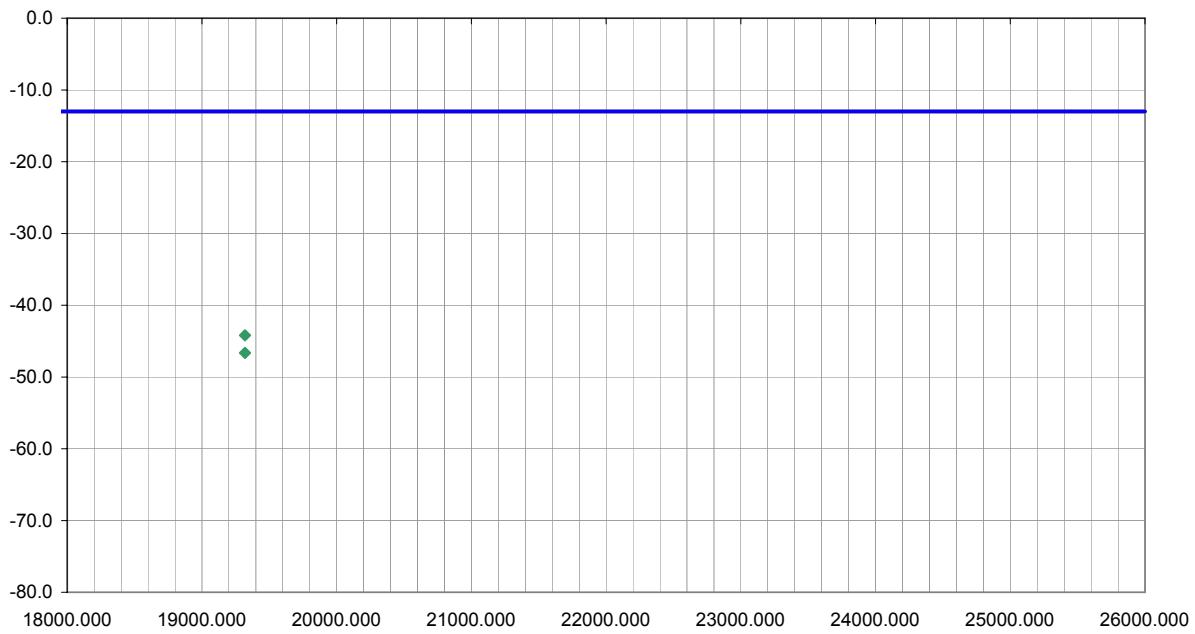
## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Pass	Run #
Pass	20

Other	
	Tested By: _____



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
19320.000			360.0	1.0			V-High Horr	PK	0.0000	-44.2	-13.0	-31.2
19320.000			-1.0	1.0			H-High Horr	PK	0.0000	-46.6	-13.0	-33.6

NORTHWEST  
EMC

## Apparent Power Data Sheet

ACQ 2005.1.3  
EMI A2.13

EUT: TrakLITE C4-B	Work Order: 7LAY0037
Serial Number: 100074	Date: 03/21/05
Customer: WirelessWERX, Inc.	Temperature: 24
Attendees: none	Humidity: 31%
Cust. Ref. No.:	Barometric Pressure 29.67
Tested by: Holly Ashkannejhad	Job Site: EV01

## TEST SPECIFICATIONS

Specification: FCC 24.238(a):2004	Method: TIA/EIA-603:2001
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## 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

Bluetooth and GSM co-located.

## EUT OPERATING MODES

Transmitting Bluetooth Channel 67 and GSM (PCS) Channel 516

## DEVIATIONS FROM TEST STANDARD

No deviations.

## RESULTS

Pass

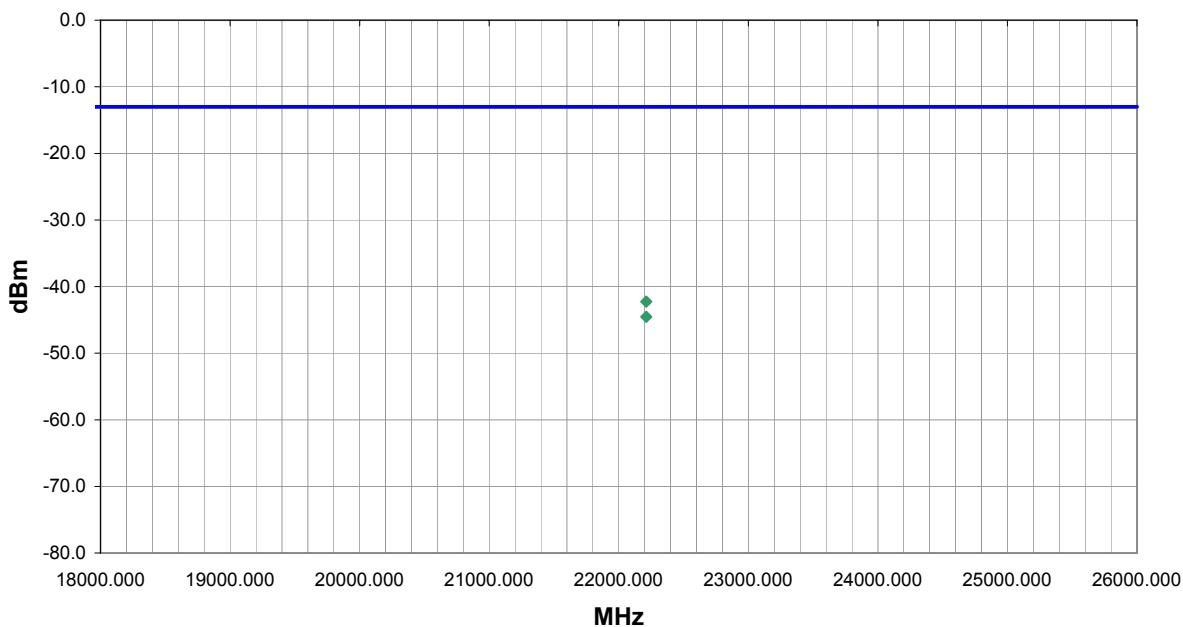
Run #

21

Other

*Holly Ashkannejhad*

Tested By:



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
22212.000			360.0	1.0			V-High Horr	PK	0.0000	-42.3	-13.0	-29.3
22212.000			-1.0	1.0			H-High Horr	PK	0.0000	-44.5	-13.0	-31.5

