

Exhibit J: Technical Report

FCC ID: QA4RP2400TX

Radiopath, L.L.C.

2400TX

March 12, 2003

Report No. RADP0003

Report Prepared By:



1-888-EMI-CERT

Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Issue Date: March 02, 2003

Radiopath, L.L.C.
Model : 2400TX
Report No: RADP0003

Emissions

Description	Pass	Fail
FCC 15.247, Spurious Radiated Emissions	☒	☐
FCC 15.247, Output Power	☒	☐
FCC 15.247, Power Spectral Density	☒	☐
FCC 15.247, Conducted Spurious Emissions	☒	☐
FCC 15.247, Occupied Bandwidth	☒	☐
FCC 15.247, Band-Edge Compliance	☒	☐
FCC 15.247, Dwell Time	☒	☐

The equipment was tested in the configuration and mode(s) of operation provided by the client. The specific tests and test levels were specified by the client. Any additional tests, or product configurations that should be tested are the responsibility of the client. Product compliance is the responsibility of the client.

List of Modifications to equipment under test required to meet the requirements:

- Cuming Microwave C-RAM MT-26/PSA 0.250" thick carbon loaded foam sheet with foil backing was added on component side of enclosure.

Deviations to the test standard

- No deviations were made to the test standard

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 the FCC (Federal Communications Commission), and accepted by the FCC in a letter maintained in our files.

Approved By:

Don Facteau, IS Manager

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.



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Revision History

Radiopath, L.L.C.
2400TX
Report No: RADP0003

Revision Number	Description	Date	Page Number
00	None		

FCC: The Open Area Test Sites, and conducted measurement facilities, have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files.

TCB: Northwest EMC has been accredited by ANSI to ISO/IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.

A2LA: Accreditation has been granted to Northwest EMC, Inc. to perform the Electromagnetic Compatibility (EMC) tests described in the Scope of Accreditation. Assessment performed to ISO/IEC 17025. Certificate Number: 1936-01, Certificate Number: 1936-02, Certificate Number 1936-03

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. (A2LA)

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. USA070102

TÜV Rheinland: Authorized to carryout EMC tests by order and under supervision of TÜV Rheinland. This authorization is based on "Conditions for EMC-Subcontractors" of November 1992.

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



Technology International: Assessed in accordance with ISO Guide 25 defining the general international requirements for the competence of calibration and testing laboratories and with ITI assessment criteria LACO196. Based upon that assessment Interference Technology International, Ltd., has granted approval for specifications implementing the EU Directive on EMC (89/336/EEC and amendments). The scope of the approval was provided on a Schedule of Assessment supplied with the certificate and is available upon request.



Industry Canada: Accredited by Industry Canada for performance of radiated measurements. Our open area test sites comply with RSP 100, Issue 7, section 3.3.



VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. (*Registration Nos. - Evergreen: C-1071 and R-1025, Trails End: C-694 and R-677, Sultan: C-905, R-871 and R-1172, North Sioux City C-1246, R-1185 and R-1217*)



BSMI: Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement. License No.SL2-IN-E-1017.



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



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



	FCC	NIST	TUV PS	TUV Rheinland	Nemko	Technology International	Industry Canada	BSMI	VCCI	GOST
EN61000-4-2 & IEC 1000-4-2			✓	✓	✓	✓				
EN61000-4-3 & IEC 1000-4-3			✓	✓	✓	✓				
EN61000-4-4 & IEC 1000-4-4			✓	✓	✓	✓				
EN61000-4-5 & IEC 1000-4-5			✓	✓	✓	✓				
EN61000-4-6 & IEC 1000-4-6			✓	✓	✓	✓				
EN61000-4-8 & IEC 1000-4-8			✓	✓	✓	✓				
EN61000-4-11 & IEC 1000-4-11			✓	✓	✓	✓				
EN61000-3-2 & IEC 1000-3-2			✓	✓	✓	✓				
EN61000-3-3 & IEC 1000-3-3			✓	✓	✓	✓				
AS/NZS 3548										
CNS 13438										
ISO/IEC Guide 25			✓	✓	✓	✓		✓		
ISO/IEC17025			✓	✓	✓	✓				
Radiated Emissions			✓	✓	✓	✓	✓	✓	✓	✓
Conducted Emissions			✓	✓	✓	✓	✓	✓	✓	✓
OATS Sites	✓		✓	✓	✓	✓	✓	✓	✓	✓
TCB for Licensed Transmitters	✓									
TCB for un-Licensed Transmitters	✓									
Cab for R&TTE		✓								
CAB for EMC		✓								

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.

Radiated Emissions ≤ 1 GHz

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

Radiated Emissions > 1 GHz

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

Conducted Emissions

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

Radiated Immunity

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

Conducted Immunity

	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $u_c(y)$	normal	1.05
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal ($k = 2$)	2.10

$u_c(y)$ = square root of the sum of squares of the individual standard uncertainties

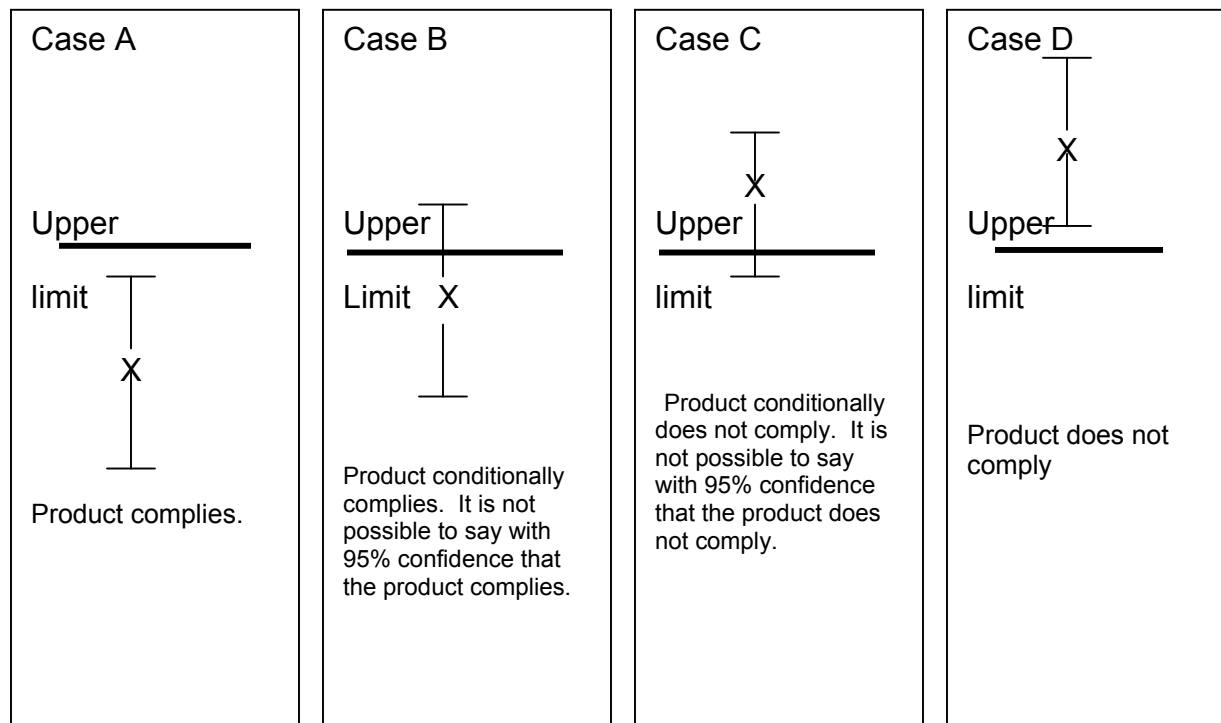
U = combined standard uncertainty multiplied by the coverage factor: k . This defines an interval about the measured result that will encompass the true value with a confidence level of approximately 95%. If a higher level of confidence is required, then $k=3$ (CL of 99.7%) can be used. Please note that with a coverage factor of one, $u_c(y)$ yields a confidence level of only 68%.

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

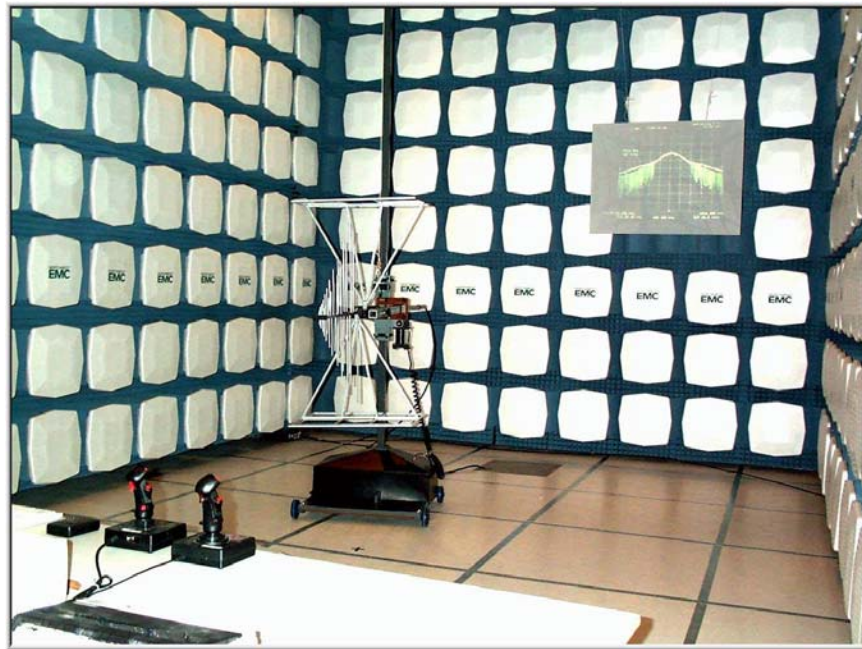
How do I apply measurement uncertainty to test results?

If 'X' marks the measured value for the test and the vertical bars bracket the range of + and – measurement uncertainty values, then test results can be interpreted from the diagram below.



Hillsboro - Evergreen Facility

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



5 Meter Chamber



Trails End - Facility

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



Sultan - Facility

14128 339th Avenue SE
Sultan, WA 98294
(360) 793-8675
FAX (360) 793-2536



North Sioux City - Facility

745 N. Derby Lane / P.O. Box 217

N. Sioux City, SD 57079

(605) 232-5267

FAX (605) 232-3873



Party Requesting the Test

Company Name:	Radiopath, L.L.C.
Address:	15209 NE 90th St.
City, State, Zip:	Redmond, WA 98052
Test Requested By:	Jon Marshall
Model:	2400TX
First Date of Test:	July 16, 2002
Last Date of Test:	March 02, 2003
Receipt Date of Samples:	July 16, 2002
Equipment Design Stage:	Production
Equipment Condition:	No visual damage.

Information Provided by the Party Requesting the Test

Clocks/Oscillators:	2.477 GHz, 38.703125 MHz, 4 MHz, 32.768 kHz
I/O Ports:	DC connection to utility meters

Functional Description of the EUT (Equipment Under Test):

The EUT is a 2.477 GHz transmitter that is a data link transmitter used for data acquisition in the True Read automated utility metering system by Radiopath. The automatic meter reading system is a fully computerized radio device. It requires no human intervention after initial installation. The system enables remote, continuous and accurate reading of consumption of a utility from a utility meter. The RP2400TX transmits the data acquired from a utility meter to a regional repeater or directly to the central base station for data collection. The transmitter is powered by an internal 3.6 volt lithium battery.

Client Justification for EUT Selection:

Not Provided

Client Justification for Test Selection

Not Provided

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:

Single

Operating Modes Investigated:

Typical

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

6VDC Battery

Software\Firmware Applied During Test

Exercise software	Standard Production Software	Version	1.5
Description			
The system was tested using standard operating production software to place the device into a special test mode to exercise the functions of the device during the testing.			

Equipment Modifications

No EMI suppression devices were added or modified. The EUT was tested as delivered.

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT - Meter Transmitter	Radiopath	2400TX	Unknown

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
N/A	N/A	N/A	N/A	N/A	N/A

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	03/08/2001	24 mo

Test Description

Requirement: Since the EUT has a factory-set transmit duty cycle, average emission measurements can be further reduced by a duty cycle correction factor per 15.35(c):

Duty Cycle = On time/100 milliseconds (or the period, whichever is less)

Where "On time" = $N_1L_1 + N_2L_2 + \dots$

Where N_1 is the number of type 1 pulses, L_1 is length of type 1 pulses, N_2 is the number of type 2 pulses, L_2 is the length of type 2 pulses, etc.

Therefore, Duty Cycle = $(N_1L_1 + N_2L_2 + \dots)/100\text{ms}$ or T , whichever is less. Where T is the period of the pulse train.

Configuration: The dwell time was measured at the transmitting channel within the authorized band. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The normal transmit function of the EUT was enabled. The measured values for the EUT's pulse train are as follows:

Period = 265 mSec

Pulsewidth of Short Pulse = 13.8 mSec

Pulsewidth of Long Pulse = N/A

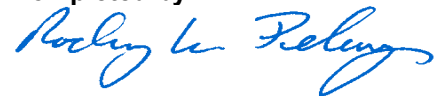
Number of Short Pulses = 2

Number of Long Pulses = N/A

Duty Cycle = $((2)(13.8) / 100) = -11.2 \text{ dB}$

The duty cycle correction factor of -11.2 dB was added to the average readings taken above 1 GHz with a 1 MHz resolution bandwidth and 10 Hz video bandwidth.

Completed by:



NORTHWEST
EMC**EMISSIONS DATA SHEET**

Transmitters

Rev d/11/13/02

EUT:	2400TX	Work Order:	RADP0011
Serial Number:	Unknown	Date:	11/25/02
Customer:	Radiopath	Temperature:	23 °C
Attendees:	Matt Monforte	Humidity:	35%
Customer Ref. No.:	N/A	Bar. Pressure:	30.14
Tested by:	Rod Peloquin	Power:	6VDC Battery
		Job Site:	EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(c)	Year:	Most Current	Method:	FCC 97-114, ANSI C63.4	Year:	1992
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SAMPLE CALCULATIONS

$20 \times \log(\text{total on time}/100\text{ms}) = \text{duty cycle correction factor for radiated spurious emission average measurements.}$

$20 \times \log((13.8 \times 2)/100\text{ms}) = 11.2\text{dB}$

COMMENTS

Maximum high time in any 100ms interval

EUT OPERATING MODES

Modulated carrier

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

N/A

RESULTS

Maximum number of transmissions in any 100ms interval

N/A

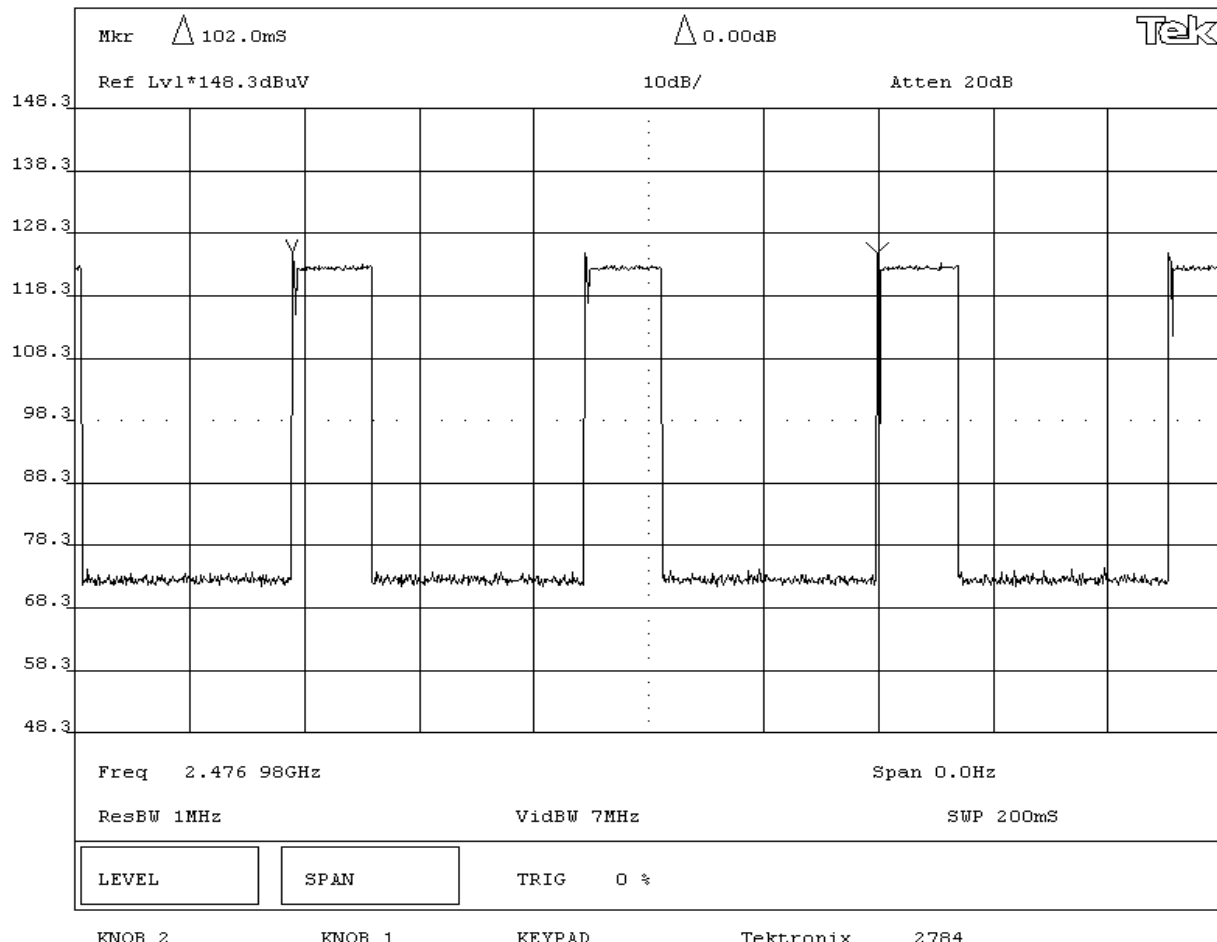
2

SIGNATURE

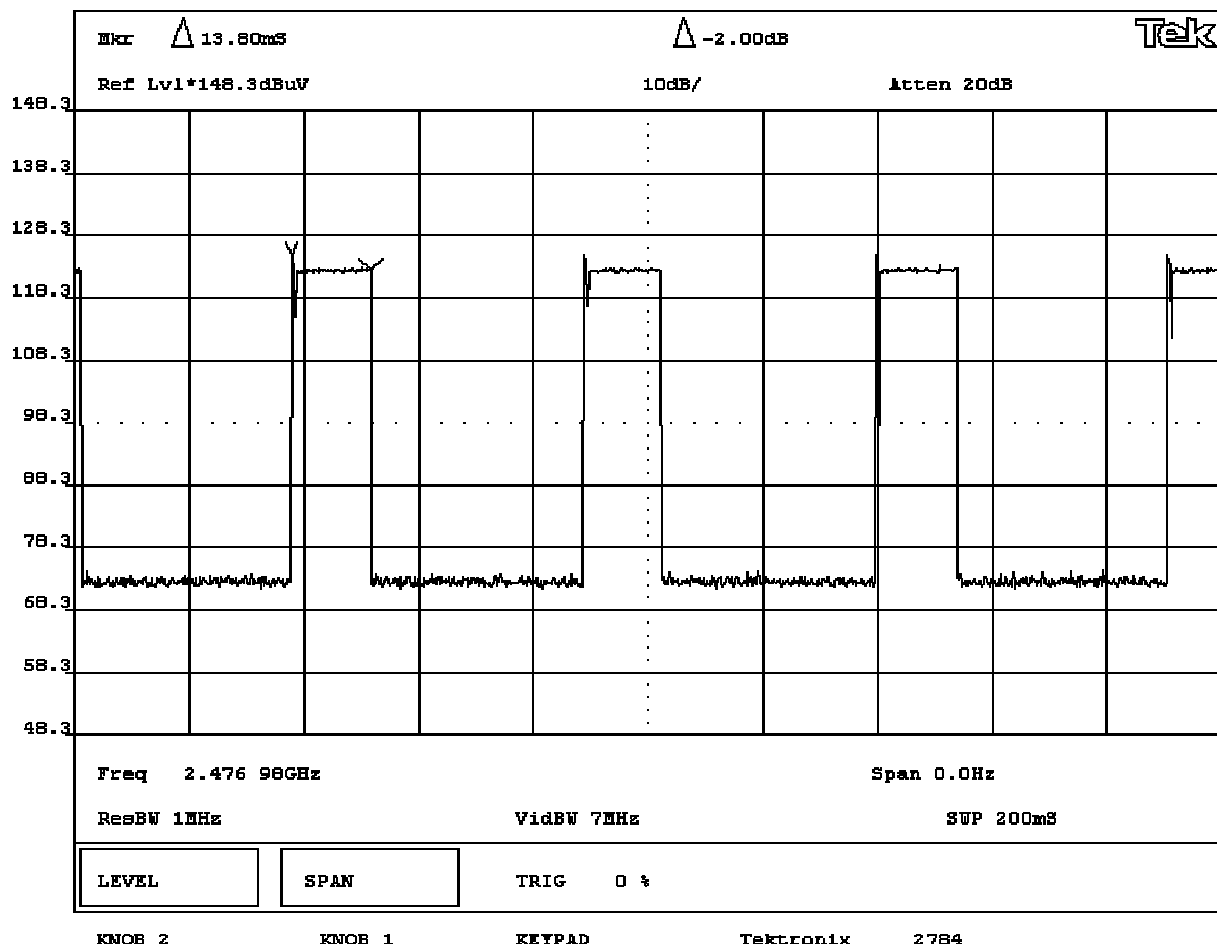
Tested By: 

DESCRIPTION OF TEST

Maximum number of transmissions in any 100ms interval



NORTHWEST EMC				EMISSIONS DATA SHEET				Transmitters Rev d/11/13/02	
EUT: 2400TX				Work Order: RADP0011					
Serial Number: Unknown				Date: 11/25/02					
Customer: Radiopath				Temperature: 23 °C					
Attendees: Matt Monforte				Humidity: 35%					
Customer Ref. No.: N/A				Bar. Pressure: 30.14					
Tested by: Rod Peloquin				Power: 6VDC Battery				Job Site: EV06	
TEST SPECIFICATIONS									
Specification: 47 CFR 15.247(c)				Year: Most Current		Method: FCC 97-114, ANSI C63.4		Year: 1992	
SAMPLE CALCULATIONS									
20 x Log(total on time/100mS) = duty cycle correction factor for radiated spurious emission average measurements.									
20 x Log ((13.8x2)/100mS) = 11.2dB									
COMMENTS									
Maximum high time in any 100mS interval									
EUT OPERATING MODES									
Modulated carrier									
DEVIATIONS FROM TEST STANDARD									
None									
REQUIREMENTS									
N/A									
RESULTS					PULSE WIDTH				
N/A					13.80mS				
SIGNATURE									
 Tested By: _____									
DESCRIPTION OF TEST									
Pulse Width									



KNOB 2

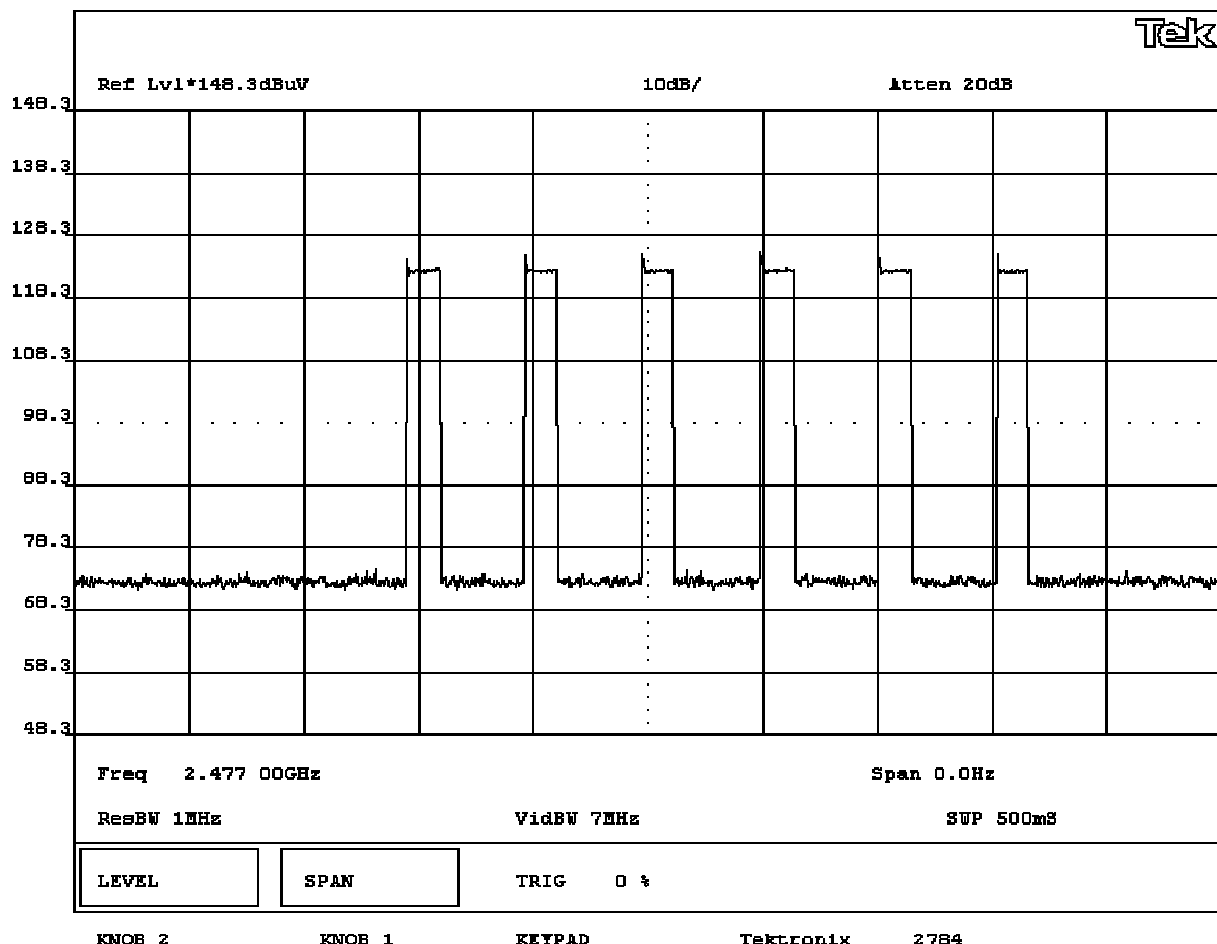
KNOB 1

KEYPAD

Tektronix

2784

NORTHWEST EMC				EMISSIONS DATA SHEET				Transmitters Rev d/11/13/02	
EUT: 2400TX				Work Order: RADP0011					
Serial Number: Unknown				Date: 11/25/02					
Customer: Radiopath				Temperature: 23 °C					
Attendees: Matt Monforte				Humidity: 35%					
Customer Ref. No.: N/A				Bar. Pressure: 30.14					
Tested by: Rod Peloquin				Power: 6VDC Battery				Job Site: EV06	
TEST SPECIFICATIONS									
Specification: 47 CFR 15.247(c)				Year: Most Current		Method: FCC 97-114, ANSI C63.4		Year: 1992	
SAMPLE CALCULATIONS									
20 x Log(total on time/100mS) = duty cycle correction factor for radiated spurious emission average measurements.									
20 x Log ((13.8x2)/100mS) = 11.2dB									
COMMENTS									
Maximum high time in any 100mS interval									
EUT OPERATING MODES									
Modulated carrier									
DEVIATIONS FROM TEST STANDARD									
None									
REQUIREMENTS									
N/A									
RESULTS					Pulse Train				
N/A					N/A				
SIGNATURE									
 Tested By: _____									
DESCRIPTION OF TEST									
Pulse Train									



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:

Single

Operating Modes Investigated:

Typical

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

6VDC Battery

Software\Firmware Applied During Test

Exercise software	Standard Production Software	Version	1.5
Description			
The system was tested using standard operating production software to place the device into a special test mode to exercise the functions of the device during the testing.			

Equipment Modifications

No EMI suppression devices were added or modified. The EUT was tested as delivered.

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT - Meter Transmitter	Radiopath	2400TX	Unknown

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
N/A	N/A	N/A	N/A	N/A	N/A

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	03/08/2001	24 mo

Test Description

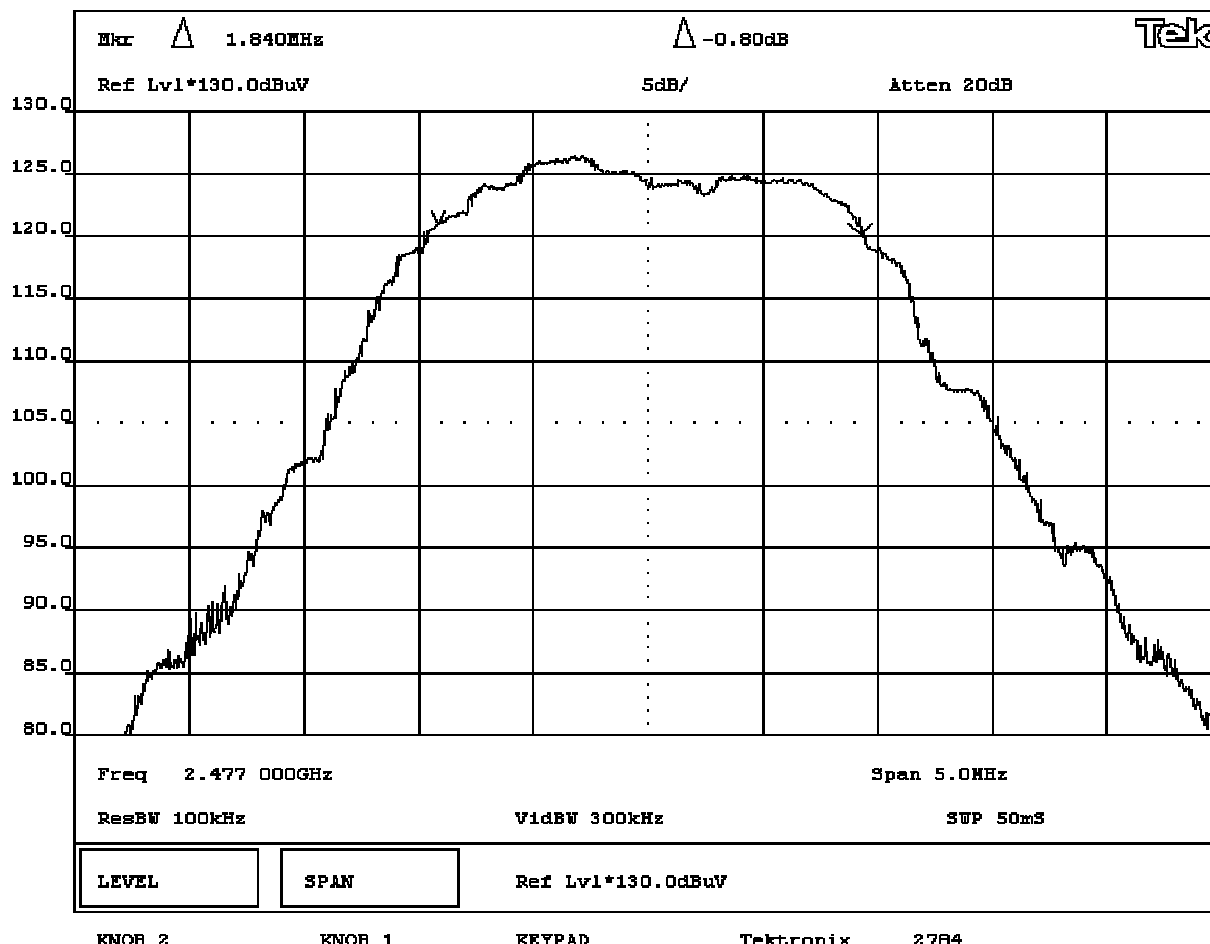
Requirement: Per 47 CFR 15.247(a)(2), the 6 dB bandwidth of a direct sequence channel must be at least 500kHz. The measurement is made with the spectrum analyzer's resolution bandwidth set to 100kHz, and the video bandwidth set to greater than or equal to the resolution bandwidth.

Configuration: The occupied bandwidth was measured with the EUT set to the transmit frequency. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate using direct sequence modulation.

Completed by:



NORTHWEST EMC				EMISSIONS DATA SHEET				Transmitters Rev d/11/13/02	
EUT: 2400TX				Work Order: RADP0011					
Serial Number: Unknown				Date: 11/25/02					
Customer: Radiopath				Temperature: 23 °C					
Attendees: Matt Monforte				Humidity: 35%					
Customer Ref. No.: N/A				Bar. Pressure: 30.14					
Tested by: Rod Peloquin		Power: 6VDC Battery		Job Site: EV06					
TEST SPECIFICATIONS									
Specification: 47 CFR 15.247(a)(2)		Year: Most Current		Method: FCC 97-114, ANSI C63.4		Year: 1992			
SAMPLE CALCULATIONS									
COMMENTS									
N/A									
EUT OPERATING MODES									
Modulated by PRBS at maximum data rate									
DEVIATIONS FROM TEST STANDARD									
None									
REQUIREMENTS									
The minimum 6dB bandwidth is 500KHz									
RESULTS					BANDWIDTH				
Pass					1.840MHz				
SIGNATURE									
 Tested By: _____									
DESCRIPTION OF TEST									
Occupied Bandwidth									



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:

Single

Operating Modes Investigated:

Typical

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

6VDC Battery

Software\Firmware Applied During Test

Exercise software	Standard Production Software	Version	1.5
Description			
The system was tested using standard operating production software to place the device into a special test mode to exercise the functions of the device during the testing.			

Equipment Modifications

No EMI suppression devices were added or modified. The EUT was tested as delivered.

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT - Meter Transmitter	Radiopath	2400TX	Unknown

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
N/A	N/A	N/A	N/A	N/A	N/A

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett-Packard	8593E	AAN	01/13/2003	12 mo

Test Description

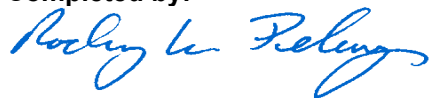
Requirement: Per 47 CFR 15.247(b)(3), the maximum peak output power must not exceed 1 Watt. The measurement is made using either a peak power meter, or a spectrum analyzer using the following settings:

- Resolution bandwidth set to greater than the 6 dB bandwidth of the modulated carrier, and
- The video bandwidth set to greater than or equal to the resolution bandwidth.

Configuration: The peak output power was measured with the EUT set to the single transmit frequency. The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was transmitting at its maximum data rate.

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

Completed by:



NORTHWEST

EMC

EMISSIONS DATA SHEET

Output Power

Transmitters

Rev

df11/15/02

EUT:	2400TX	Work Order:	RADP0016
Serial Number:	Unknown	Date:	02/26/03
Customer:	Radiopath	Temperature:	18 °C
Attendees:	None	Humidity:	26%
Customer Ref. No.:	N/A	Bar. Pressure:	30.05
Tested by:	Rod Peloquin	Power:	6VDC Battery
		Job Site:	EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(b)(3)	Year:	Most Current	Method:	FCC 97-114, ANSI C63.4	Year:	1992
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SAMPLE CALCULATIONS

COMMENTS

N/A

EUT OPERATING MODES

Transmitting continuous at maximum data rate

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Power shall not exceed 1W

RESULTS

AMPLITUDE

Pass

200mW

SIGNATURE

Tested By: 

DESCRIPTION OF TEST

Output Power

14:30:52 FEB 25, 2003

MKR 2.47700 GHz

REF 250.0 mW

#AT 20 dB

199.99 mW

No user
Menu

PEAK

LIN

OFFST

21.6

dB

MA SB

SC FC

CORR

SRQ 140

CENTER 2.47700 GHz

SPAN 10.00 MHz

#RES BW 3.0 MHz

#VBW 3 MHz

SWP 20.0 msec

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:

Single

Operating Modes Investigated:

Typical

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

6VDC Battery

Software\Firmware Applied During Test

Exercise software	Standard Production Software	Version	1.5
Description			
The system was tested using standard operating production software to place the device into a special test mode to exercise the functions of the device during the testing.			

Equipment Modifications

No EMI suppression devices were added or modified. The EUT was tested as delivered.

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT – Utility Meter Transmitter	Radiopath	2400TX	Unknown

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
N/A	N/A	N/A	N/A	N/A	N/A

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

Measurement Equipment

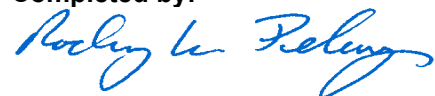
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	03/08/2001	24 mo

Test Description

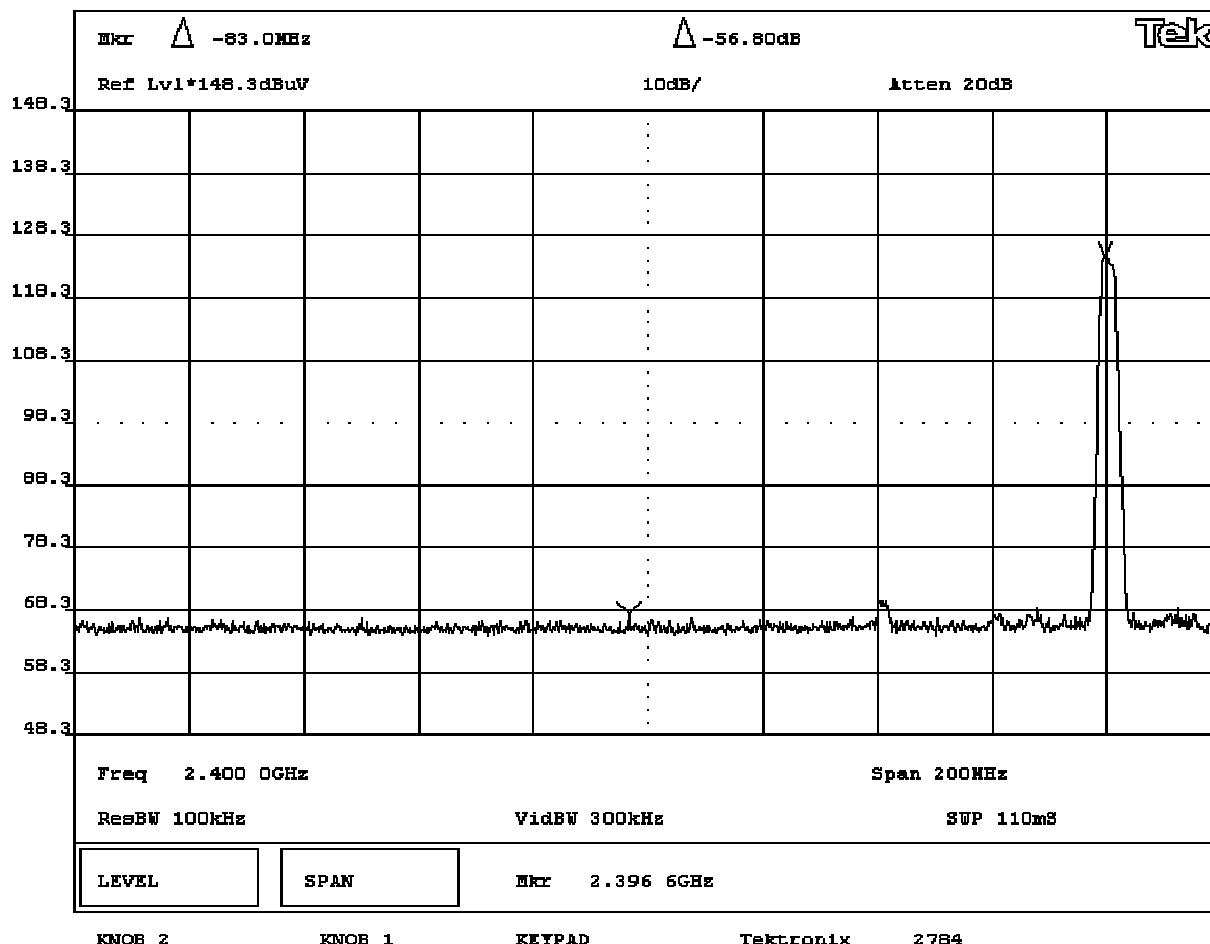
Requirement: Per 47 CFR 15.247(c), in any 100 kHz bandwidth outside the authorized band, the maximum level of radio frequency power must be at least 20dB down from the highest emission level within the authorized band. The measurement is made with the spectrum analyzer's resolution bandwidth set to 100 kHz, and the video bandwidth set to greater than or equal to the resolution bandwidth.

Configuration: The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to the transmit frequency. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate using direct sequence modulation.

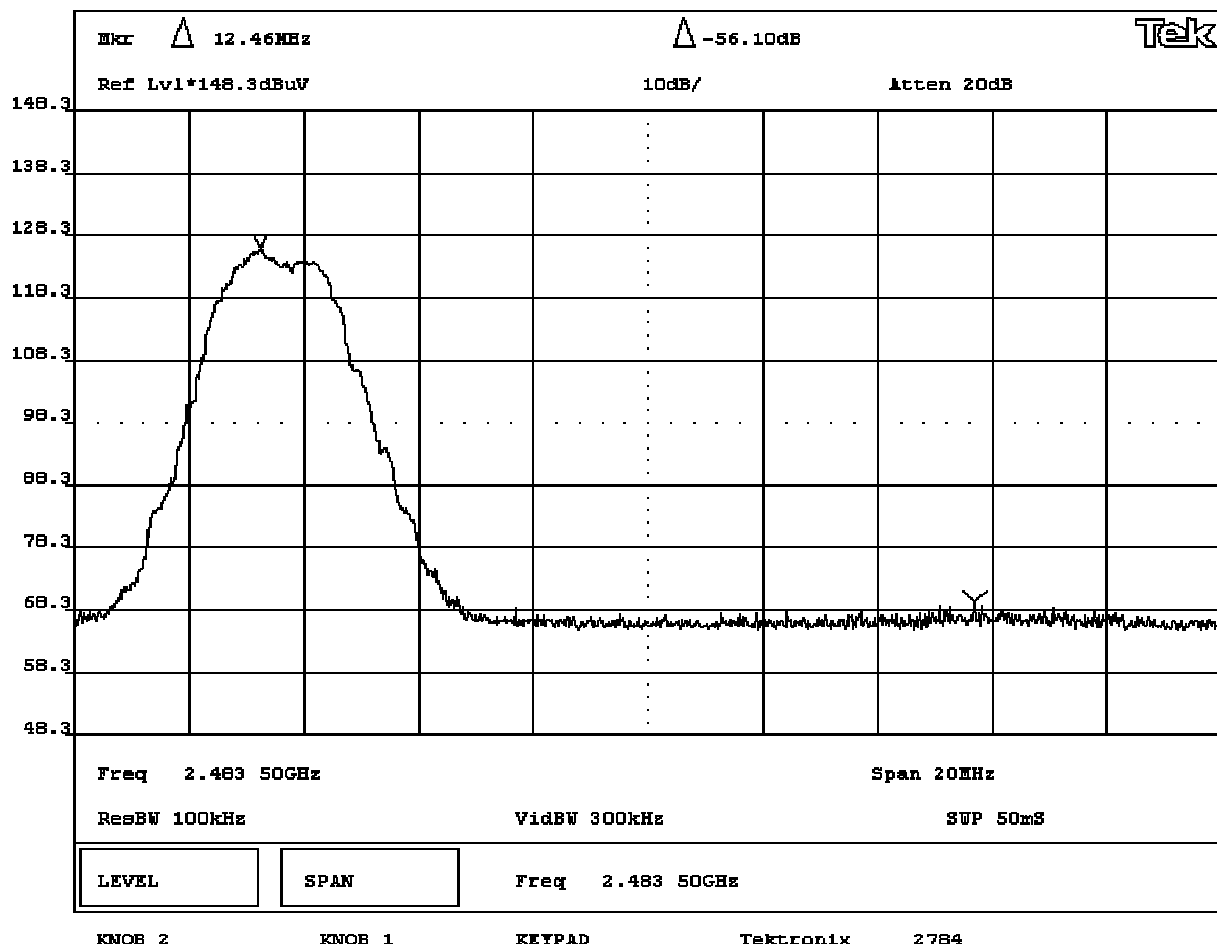
Completed by:



NORTHWEST EMC				EMISSIONS DATA SHEET				Transmitters Rev d/11/13/02	
EUT: 2400TX				Work Order: RADP0011					
Serial Number: Unknown				Date: 11/25/02					
Customer: Radiopath				Temperature: 23 °C					
Attendees: Matt Monforte				Humidity: 35%					
Customer Ref. No.: N/A				Bar. Pressure: 30.14					
Tested by: Rod Peloquin		Power: 6VDC Battery		Job Site: EV06					
TEST SPECIFICATIONS									
Specification: 47 CFR 15.247(c)		Year: Most Current		Method: FCC 97-114, ANSI C63.4		Year: 1992			
SAMPLE CALCULATIONS									
COMMENTS									
N/A									
EUT OPERATING MODES									
Modulated by PRBS at maximum data rate									
DEVIATIONS FROM TEST STANDARD									
None									
REQUIREMENTS									
Maximum level of any spurious emission at the edge of the authorized band is 20 dB down from the fundamental									
RESULTS									
AMPLITUDE									
Pass -56.8dB									
SIGNATURE									
 Tested By: _____									
DESCRIPTION OF TEST									
Band Edge Compliance - Lower Band Edge									



NORTHWEST EMC				EMISSIONS DATA SHEET				Transmitters Rev d/11/13/02	
EUT: 2400TX				Work Order: RADP0011					
Serial Number: Unknown				Date: 11/25/02					
Customer: Radiopath				Temperature: 23 °C					
Attendees: Matt Monforte				Humidity: 35%					
Customer Ref. No.: N/A				Bar. Pressure: 30.14					
Tested by: Rod Peloquin		Power: 6VDC Battery		Job Site: EV06					
TEST SPECIFICATIONS									
Specification: 47 CFR 15.247(c)		Year: Most Current		Method: FCC 97-114, ANSI C63.4		Year: 1992			
SAMPLE CALCULATIONS									
COMMENTS									
N/A									
EUT OPERATING MODES									
Modulated by PRBS at maximum data rate									
DEVIATIONS FROM TEST STANDARD									
None									
REQUIREMENTS									
Maximum level of any spurious emission at the edge of the authorized band is 20 dB down from the fundamental									
RESULTS									
Pass				AMPLITUDE -56.1dB					
SIGNATURE									
 Tested By: _____									
DESCRIPTION OF TEST									
Band Edge Compliance - Upper Band Edge									



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:

Single

Operating Modes Investigated:

Typical

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

6VDC Battery

Frequency Range Investigated

Start Frequency	0 MHz	Stop Frequency	25 GHz
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Software\Firmware Applied During Test

Exercise software	Standard Production Software	Version	1.5
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Description

The system was tested using standard operating production software to place the device into a special test mode to exercise the functions of the device during the testing.

Equipment Modifications

No EMI suppression devices were added or modified. The EUT was tested as delivered.

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT - Meter Transmitter	Radiopath	2400TX	Unknown

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
N/A	N/A	N/A	N/A	N/A	N/A

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	03/08/2001	24 mo

Test Description

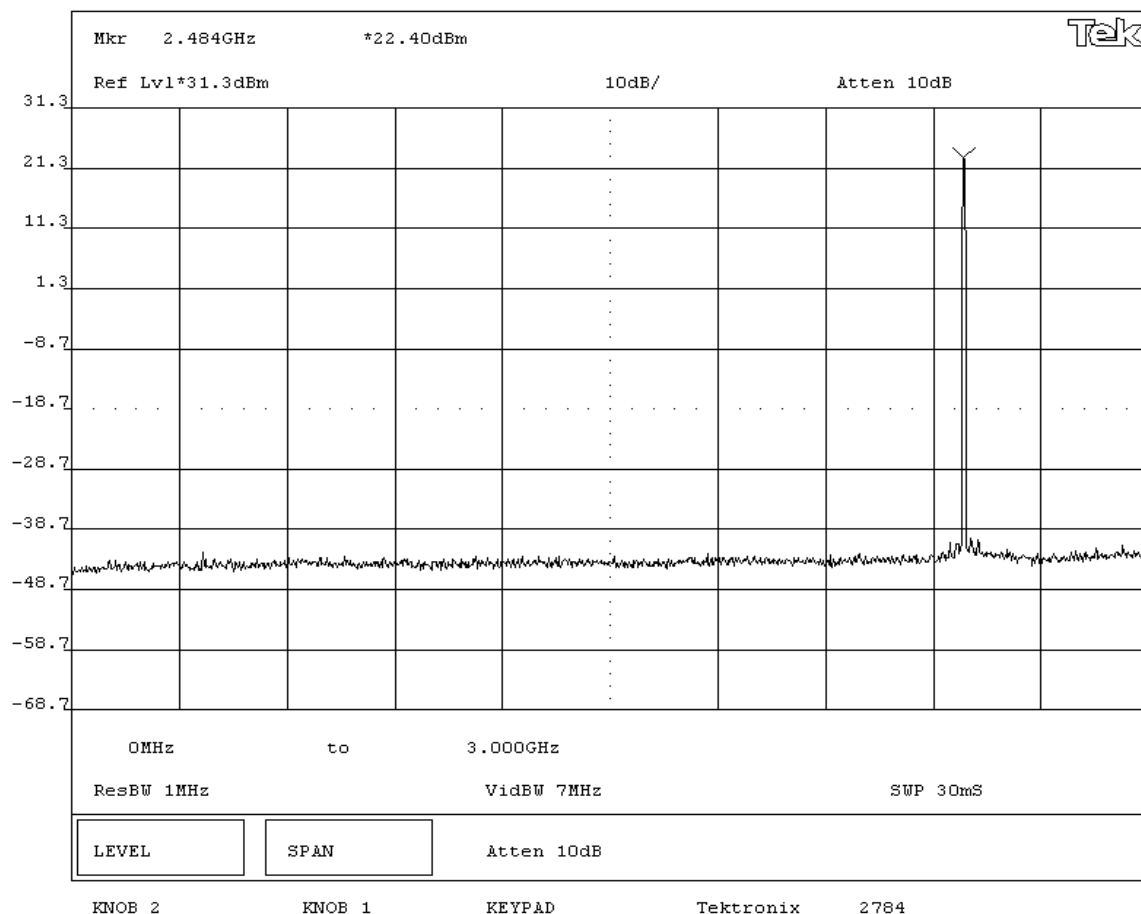
Requirement: Per 47 CFR 15.247(c), in any 100 kHz bandwidth outside the authorized band, the maximum level of radio frequency power must be at least 20dB down from the highest emission level within the authorized band. The measurement is made with the spectrum analyzer's resolution bandwidth set to 100 kHz, and the video bandwidth set to greater than or equal to the resolution bandwidth.

Configuration: The spurious RF conducted emissions were measured with the EUT set to the transmit frequency. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate using direct sequence modulation. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

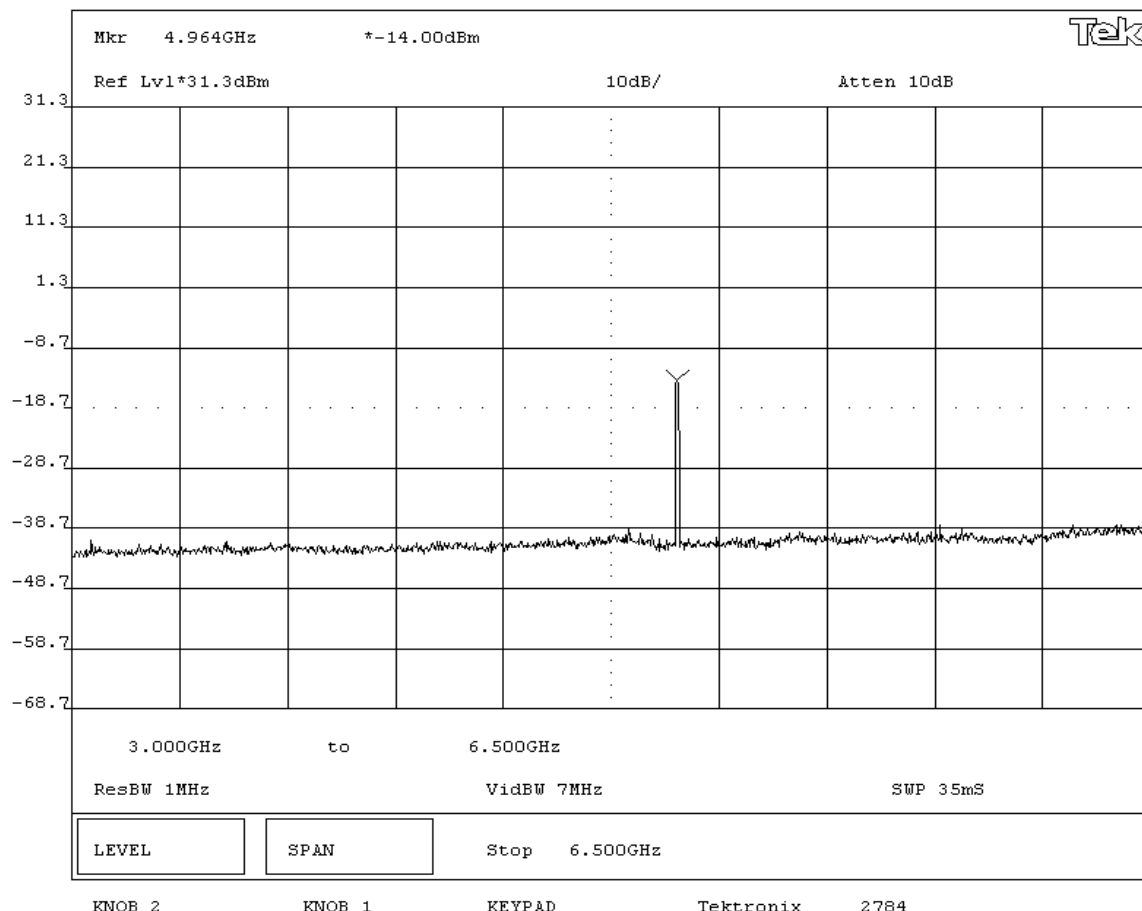
Completed by:



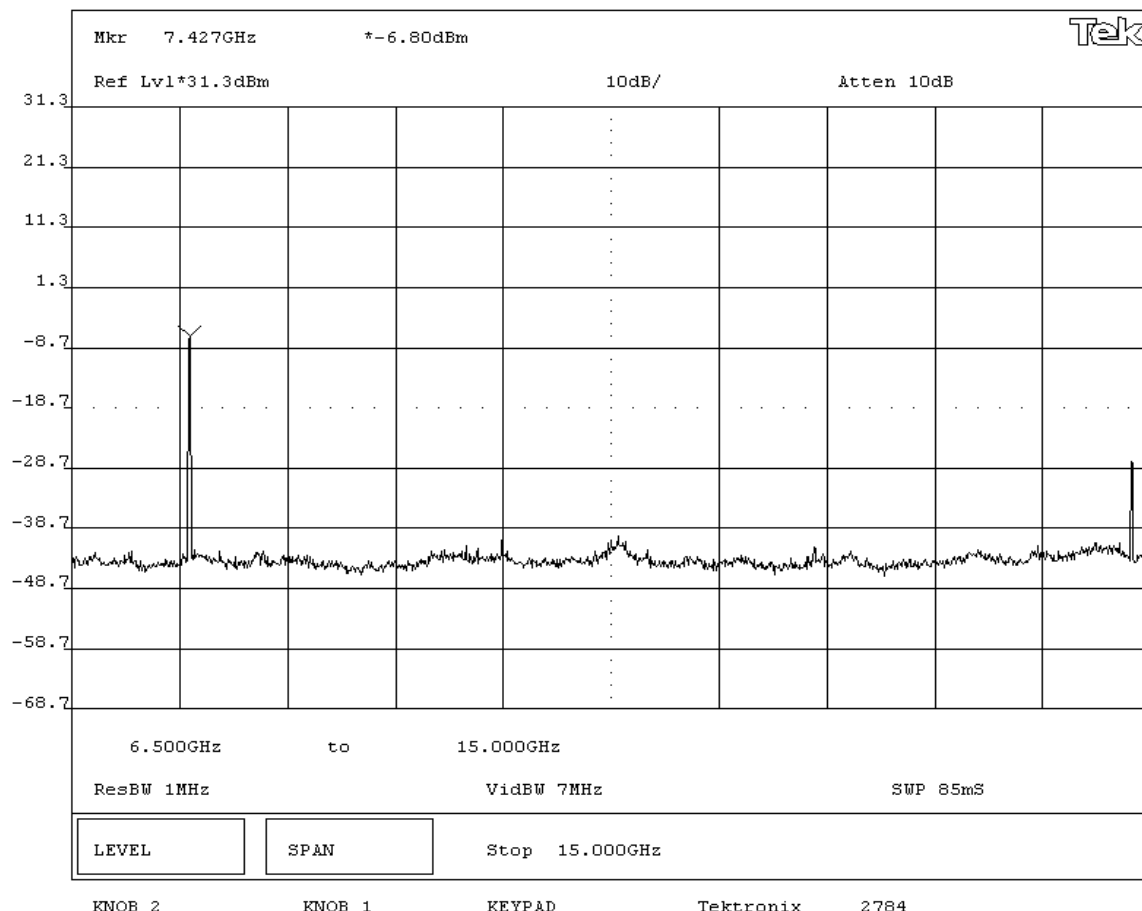
NORTHWEST EMC				EMISSIONS DATA SHEET				Rev BETA 01/30/01	
EUT: 2400TX				Work Order: RADP0004					
Serial Number: Unknown				Date: 07/16/02					
Customer: Radiopath				Temperature: 24 degrees C					
Attendees: Jon Marshall				Tested by: Greg Kiemel				Humidity: 53% RH	
Customer Ref. No.: N/A				Power: Battery Only				Job Site: SU01	
TEST SPECIFICATIONS									
Specification: 47 CFR 15.247(c)				Year: Most Current		Method: DA 00-705, ANSI C63.4		Year: 1992	
SAMPLE CALCULATIONS									
COMMENTS									
N/A									
EUT OPERATING MODES									
Single Channel Operation. Transmitting continuous at maximum data rate and power									
DEVIATIONS FROM TEST STANDARD									
None									
REQUIREMENTS									
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental									
RESULTS									
Pass									
SIGNATURE									
 Tested By: _____									
DESCRIPTION OF TEST									
Antenna Conducted Spurious Emissions - Single Channel 0MHz-3GHz									



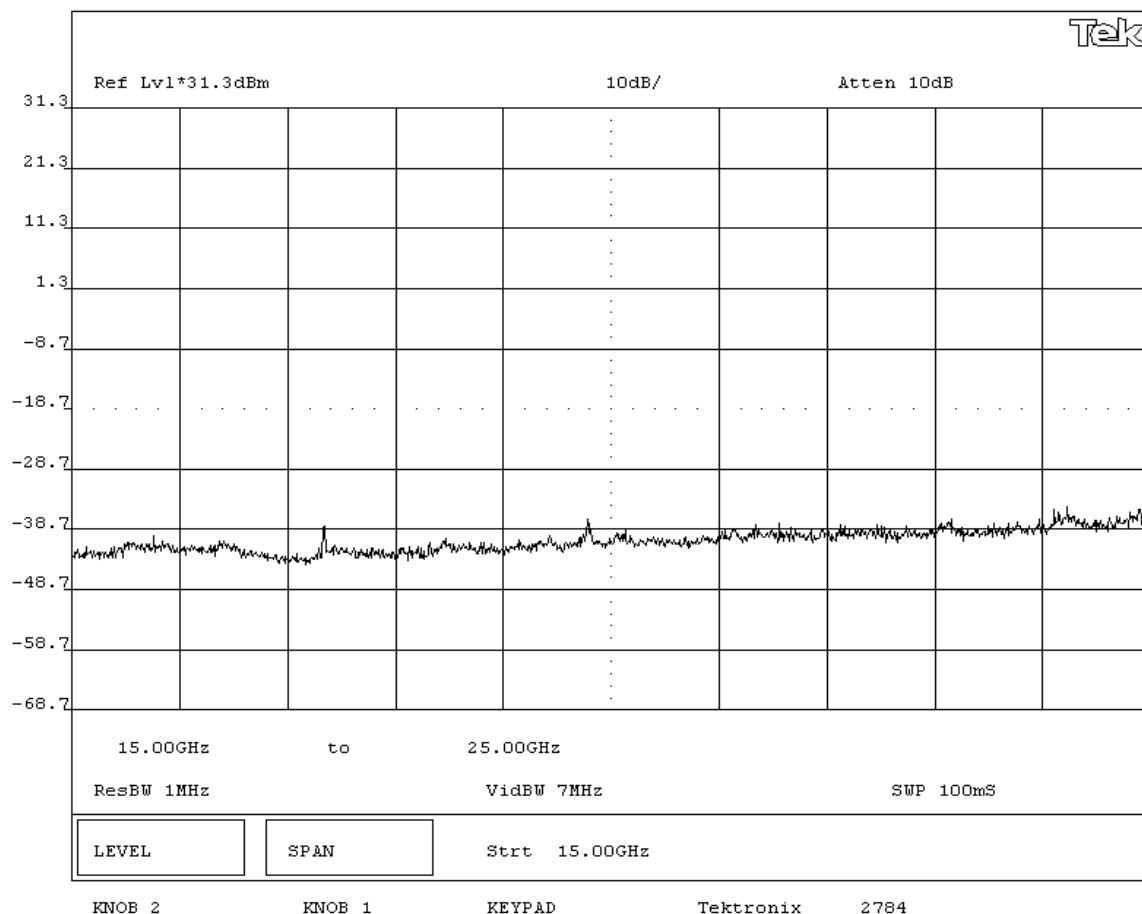
NORTHWEST EMC				EMISSIONS DATA SHEET				Rev BETA 01/30/01	
EUT: 2400TX				Work Order: RADP0004					
Serial Number: Unknown				Date: 07/16/02					
Customer: Radiopath				Temperature: 24 degrees C					
Attendees: Jon Marshall				Tested by: Greg Kiemel				Humidity: 53% RH	
Customer Ref. No.: N/A				Power: Battery Only				Job Site: SU01	
TEST SPECIFICATIONS									
Specification: 47 CFR 15.247(c)				Year: Most Current		Method: DA 00-705, ANSI C63.4		Year: 1992	
SAMPLE CALCULATIONS									
COMMENTS									
N/A									
EUT OPERATING MODES									
Single Channel Operation. Transmitting continous at maximum data rate and power									
DEVIATIONS FROM TEST STANDARD									
None									
REQUIREMENTS									
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental									
RESULTS									
Pass									
SIGNATURE									
 Tested By: _____									
DESCRIPTION OF TEST									
Antenna Conducted Spurious Emissions - Single Channel 3GHz-6.5GHz									



NORTHWEST EMC				EMISSIONS DATA SHEET				Rev BETA 01/30/01	
EUT: 2400TX				Work Order: RADP0004					
Serial Number: Unknown				Date: 07/16/02					
Customer: Radiopath				Temperature: 24 degrees C					
Attendees: Jon Marshall				Tested by: Greg Kiemel				Humidity: 53% RH	
Customer Ref. No.: N/A				Power: Battery Only				Job Site: SU01	
TEST SPECIFICATIONS									
Specification: 47 CFR 15.247(c)				Year: Most Current		Method: DA 00-705, ANSI C63.4		Year: 1992	
SAMPLE CALCULATIONS									
COMMENTS									
N/A									
EUT OPERATING MODES									
Single Channel Operation. Transmitting continous at maximum data rate and power									
DEVIATIONS FROM TEST STANDARD									
None									
REQUIREMENTS									
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental									
RESULTS									
Pass									
SIGNATURE									
 Tested By: _____									
DESCRIPTION OF TEST									
Antenna Conducted Spurious Emissions - Single Channel 6.5GHz-15GHz									



NORTHWEST EMC		EMISSIONS DATA SHEET		Rev BETA 01/30/01	
EUT: 2400TX			Work Order: RADP0004		
Serial Number: Unknown			Date: 07/16/02		
Customer: Radiopath			Temperature: 24 degrees C		
Attendees: Jon Marshall		Tested by: Greg Kiemel		Humidity: 53% RH	
Customer Ref. No.: N/A		Power: Battery Only		Job Site: SU01	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(c)		Year: Most Current		Method: DA 00-705, ANSI C63.4	
				Year: 1992	
SAMPLE CALCULATIONS					
COMMENTS					
N/A					
EUT OPERATING MODES					
Single Channel Operation. Transmitting continous at maximum data rate and power					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental					
RESULTS					
Pass					
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Antenna Conducted Spurious Emissions - Single Channel 15GHz-25GHz					



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:

Single

Operating Modes Investigated:

Typical

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

6VDC Battery

Software\Firmware Applied During Test

Exercise software	Standard Production Software	Version	1.5
Description			
The system was tested using standard operating production software to place the device into a special test mode to exercise the functions of the device during the testing.			

Equipment Modifications

No EMI suppression devices were added or modified. The EUT was tested as delivered.

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT - Meter Transmitter	Radiopath	2400TX	Unknown

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
N/A	N/A	N/A	N/A	N/A	N/A

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett Packard	8593E	AAP	10/23/2002	12 mo

Test Description

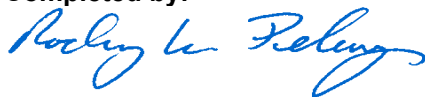
Requirement: Per 47 CFR 15.247(d), the peak power spectral density conducted from the antenna port of a direct sequence transmitter must not be greater than +8 dBm in any 3 kHz band during any time interval of continuous transmission.

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

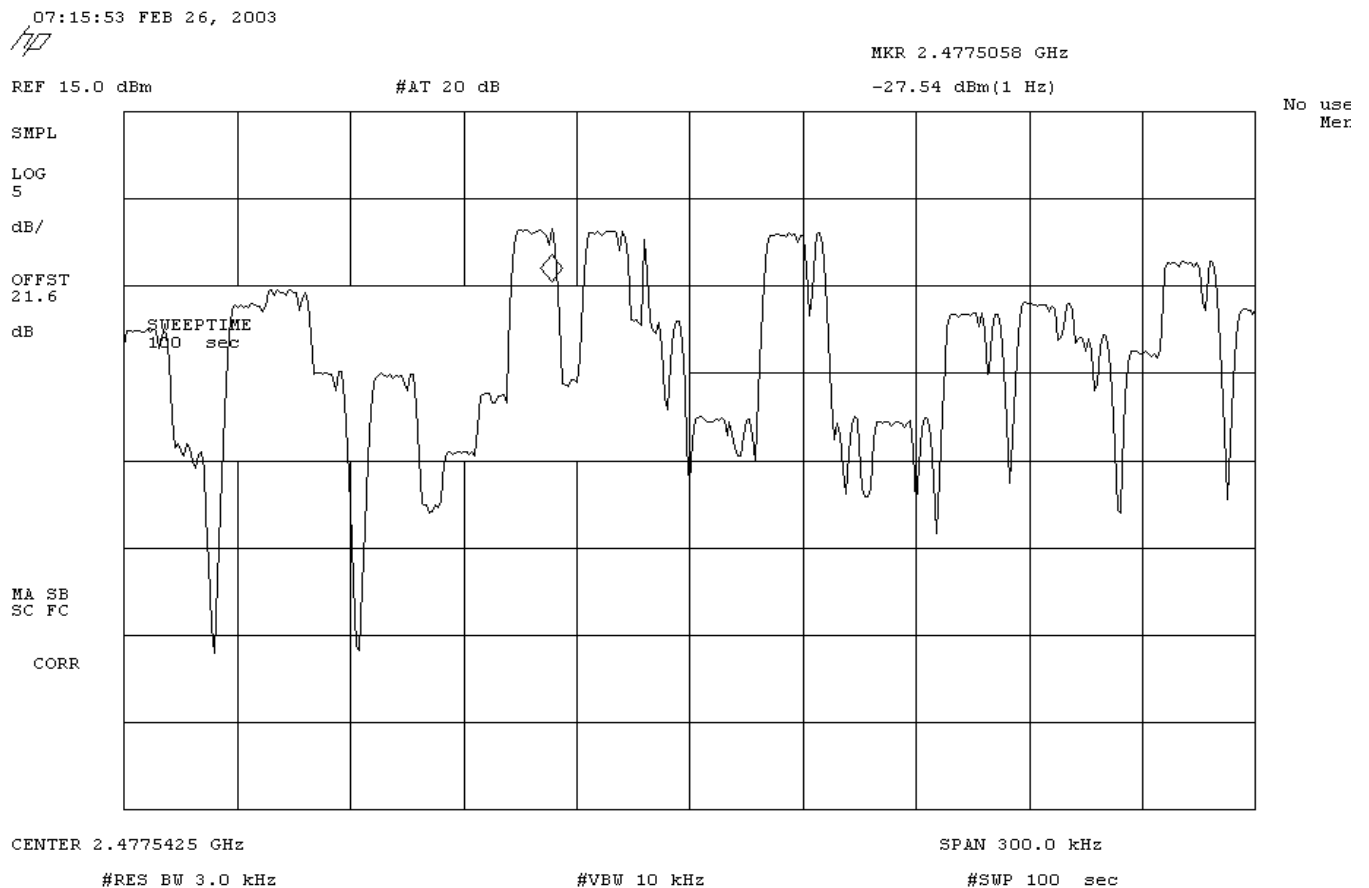
The emission peak(s) were located and zoom in on within the passband. The resolution bandwidth was set to 3 kHz, the video bandwidth was set to greater than or equal to the resolution bandwidth. The sweep speed was set equal to the span divided by 3 kHz (sweep = $(SPAN/3 \text{ kHz})$). For example,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

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

Completed by:



EMISSIONS DATA SHEET				Transmitters	
Power Spectral Density				Rev df11/15/02	
NORTHWEST EMC					
EUT: 2400TX		Work Order: RADP0016			
Serial Number: Unknown		Date: 02/26/03			
Customer: Radiopath		Temperature: 18 °C			
Attendees: None		Humidity: 26%			
Customer Ref. No.: N/A		Bar. Pressure: 30.05			
Tested by: Rod Peloquin		Power: 6VDC Battery		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(d)		Year: Most Current		Method: FCC 97-114, ANSI C63.4	
				Year: 1992	
SAMPLE CALCULATIONS					
Meter reading on spectrum analyzer is internally compensated for cable loss and external attenuation.					
Power Spectral Density per 3kHz bandwidth = Power Spectral Density per 1 Hz bandwidth + Bandwidth Correction Factor.					
Bandwidth Correction Factor = $10 \cdot \log(3 \text{ kHz} / 1 \text{ Hz}) = 34.8 \text{ dB}$					
COMMENTS					
N/A					
EUT OPERATING MODES					
Transmitting continuous at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
REQUIREMENTS					
RESULTS			AMPLITUDE		
Pass			7.26dBm		
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Power Spectral Density					



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:

Single

Operating Modes Investigated:

Typical

Antennas Investigated:

Integral

Data Rates Investigated:

Maximum

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

6VDC Battery

Frequency Range Investigated

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

Exercise software	Standard Production Software	Version	1.5
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Description

The system was tested using standard operating production software to place the device into a special test mode to exercise the functions of the device during the testing.

Equipment Modifications

The following modifications were required to meet radiated emission limits:

- Cumming Microwave C-RAM MT-26/PSA 0.250" thick carbon loaded foam sheet with foil backing was added on component side of enclosure.

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT - Meter Transmitter	Radiopath	2400TX	#32

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Utility-Meter	no	1.2	no	EUT	unterminated

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	01/07/2003	12 mo
Quasi-Peak Adapter	Hewlett Packard	85650A	AQF	01/07/2003	12 mo
Antenna, Biconilog	EMCO	3141	AXE	12/31/2001	36 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	01/06/2003	12 mo
Antenna, Horn	EMCO	3115	AHC	08/12/2002	12 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APJ	01/06/2003	12 mo
Antenna, Horn	EMCO	3160-09	AHG	01/15/2000	39 mo
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	01/17/2000	39 mo
High Pass Filter	RLC Electronics	F-100-4000-5-R	HFF	02/04/2002	12 mo

Test Description

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

Configuration: The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for single transmit frequency. 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 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.

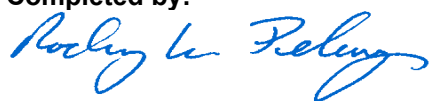
Since the EUT has a factory-set transmit duty cycle, average emission measurements were further reduced by a duty cycle correction factor per 15.35(c). The duty cycle correction factor of -11.2 dB was added to the average readings taken above 1. Please see the Dwell Time section of this measurement report for further details concerning the measured duty cycle.

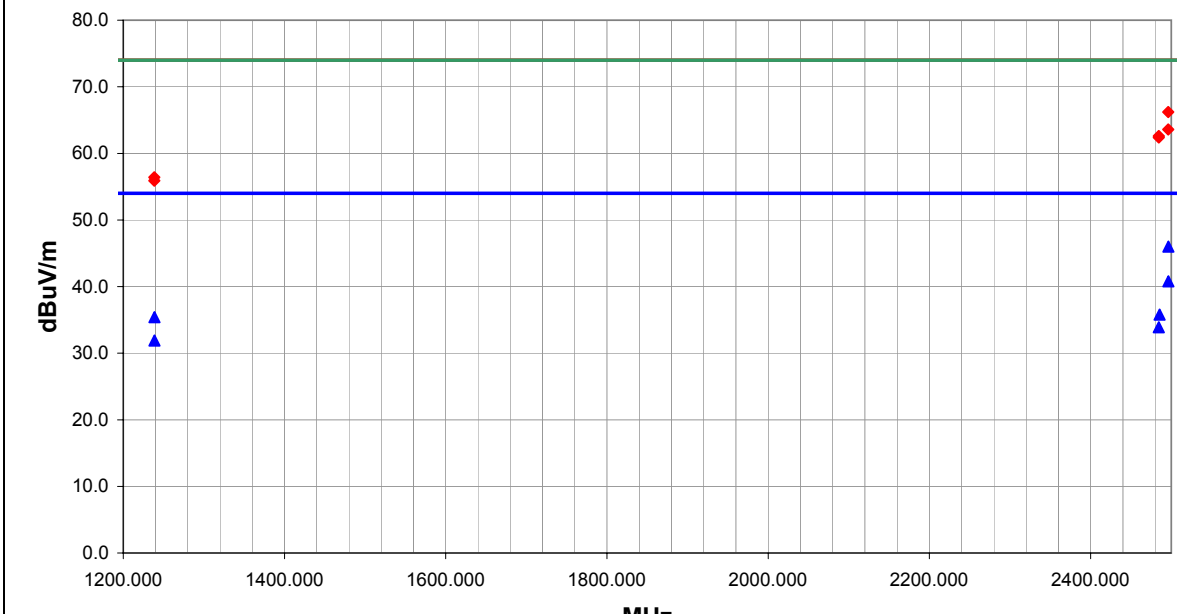
The data in this report supports FCC Class B verification of the EUT as a digital device.

Bandwidths Used for Measurements

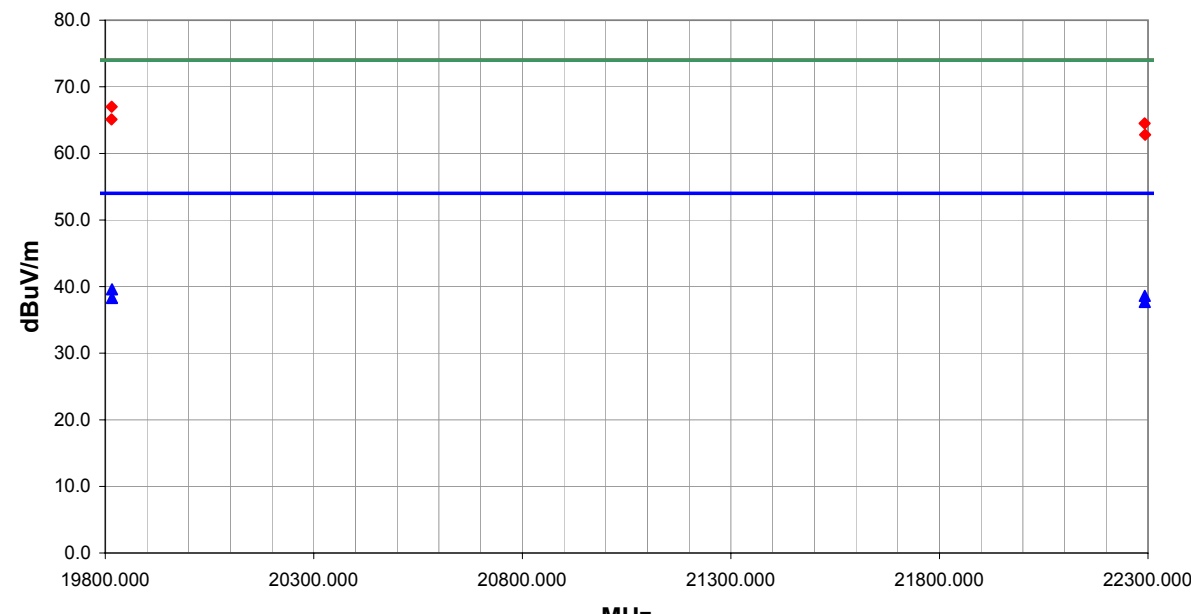
Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 – 0.15	1.0	0.2	0.2
0.15 – 30.0	10.0	9.0	9.0
30.0 – 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0
<i>Measurements were made using the bandwidths and detectors specified. No video filter was used.</i>			

Completed by:



NORTHWEST EMC										OATS DATA SHEET				REV d3.02 10/23/2002	
EUT: 2400TX										Work Order: RADP0016					
Serial Number: #32										Date: 02/26/03					
Customer: Radiopath										Temperature: 66 °F					
Attendees: None										Humidity: 26%					
Cust. Ref. No.: N/A										Barometric Pressure: 30.05					
Tested by: Rod Peloquin					Power: 6VDC Battery					Job Site: EV01					
TEST SPECIFICATIONS															
Specification: FCC Part 15.247 (c)										Year: 2001					
Method: ANSI C63.4										Year: 1992					
SAMPLE CALCULATIONS															
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation															
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator															
COMMENTS															
N/A															
EUT OPERATING MODES															
Transmitting continuous at maximum data rate															
DEVIATIONS FROM TEST STANDARD															
No deviations.															
RESULTS															
Pass												Run #			
												4			
Other															
										 Tested By:					
															
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)			
2496.362	36.1	1.1	349.0	1.3	11.2	20.0	H-Horn	AV	0.0	46.0	54.0	-8.0			
2496.362	30.9	1.1	205.0	1.0	11.2	20.0	V-Horn	AV	0.0	40.8	54.0	-13.2			
2485.492	26.0	1.0	266.0	1.2	11.2	20.0	V-Horn	AV	0.0	35.8	54.0	-18.2			
1238.606	33.1	-6.5	85.0	1.2	11.2	20.0	H-Horn	AV	0.0	35.4	54.0	-18.6			
2484.500	24.1	1.0	349.0	2.3	11.2	20.0	H-Horn	AV	0.0	33.9	54.0	-20.1			
1238.606	29.8	-6.5	222.0	1.0	11.4	20.0	V-Horn	AV	0.0	31.9	54.0	-22.1			
2496.150	45.1	1.1	349.0	1.3	0.0	20.0	H-Horn	PK	0.0	66.2	74.0	-7.8			
2496.270	42.5	1.1	205.0	1.0	0.0	20.0	V-Horn	PK	0.0	63.6	74.0	-10.4			
2484.508	41.6	1.0	266.0	1.2	0.0	20.0	V-Horn	PK	0.0	62.6	74.0	-11.4			
2484.508	41.4	1.0	349.0	2.3	0.0	20.0	H-Horn	PK	0.0	62.4	74.0	-11.6			
1238.438	42.9	-6.5	85.0	1.2	0.0	20.0	H-Horn	PK	0.0	56.4	74.0	-17.6			
1238.438	42.4	-6.5	222.0	1.0	0.0	20.0	V-Horn	PK	0.0	55.9	74.0	-18.1			

NORTHWEST EMC										OATS DATA SHEET				REV d3.02 10/23/2002	
EUT: 2400TX										Work Order: RADP0016					
Serial Number: #32										Date: 02/26/03					
Customer: Radiopath										Temperature: 66 °F					
Attendees: None										Humidity: 26%					
Cust. Ref. No.: N/A										Barometric Pressure: 30.05					
Tested by: Rod Peloquin					Power: 6VDC Battery					Job Site: EV06					
TEST SPECIFICATIONS															
Specification: FCC Part 15.247 (c)										Year: 2001					
Method: ANSI C63.4										Year: 1992					
SAMPLE CALCULATIONS															
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation															
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator															
COMMENTS															
N/A															
EUT OPERATING MODES															
Transmitting continuous at maximum data rate															
DEVIATIONS FROM TEST STANDARD															
No deviations.															
RESULTS															
Pass												Run #		6	
Other					 Tested By: _____										
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)			
12383.780	45.4	7.8	226.0	1.4	11.2	0.0	H-Horn	AV	0.0	42.0	54.0	-12.0			
12383.780	43.8	7.8	290.0	1.4	11.2	0.0	V-Horn	AV	0.0	40.4	54.0	-13.6			
12384.630	61.8	7.8	226.0	1.4	0.0	0.0	H-Horn	PK	0.0	69.6	74.0	-4.4			
12384.630	59.8	7.8	290.0	1.4	0.0	0.0	V-Horn	PK	0.0	67.6	74.0	-6.4			

NORTHWEST EMC										OATS DATA SHEET				REV d3.02 10/23/2002	
EUT: 2400TX										Work Order: RADP0016					
Serial Number: #32										Date: 02/26/03					
Customer: Radiopath										Temperature: 66 °F					
Attendees: None										Humidity: 26%					
Cust. Ref. No.: N/A										Barometric Pressure: 30.05					
Tested by: Rod Peloquin					Power: 6VDC Battery					Job Site: EV06					
TEST SPECIFICATIONS															
Specification: FCC Part 15.247 (c)										Year: 2001					
Method: ANSI C63.4										Year: 1992					
SAMPLE CALCULATIONS															
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation															
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator															
COMMENTS															
N/A															
EUT OPERATING MODES															
Transmitting continuous at maximum data rate															
DEVIATIONS FROM TEST STANDARD															
No deviations.															
RESULTS															
Pass												Run #		4	
Other										 Tested By:					
															
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)			
19816.270	40.7	10.1	248.0	1.0	11.2	0.0	√-High Horr	AV	0.0	39.6	54.0	-14.4			
22292.460	38.7	11.1	320.0	1.2	11.2	0.0	√-High Horr	AV	0.0	38.6	54.0	-15.4			
19816.270	39.4	10.1	334.0	1.3	11.2	0.0	√-High Horr	AV	0.0	38.3	54.0	-15.7			
22292.460	37.8	11.1	202.0	1.1	11.2	0.0	√-High Horr	AV	0.0	37.7	54.0	-16.3			
19815.200	56.9	10.1	248.0	1.0	0.0	0.0	√-High Horr	PK	0.0	67.0	74.0	-7.0			
19815.070	55.0	10.1	334.0	1.3	0.0	0.0	√-High Horr	PK	0.0	65.1	74.0	-8.9			
22292.000	53.4	11.1	320.0	1.2	0.0	0.0	√-High Horr	PK	0.0	64.5	74.0	-9.5			
22293.000	51.7	11.1	202.0	1.1	0.0	0.0	√-High Horr	PK	0.0	62.8	74.0	-11.2			

NORTHWEST

REV
d13.02
10/23/2002

EMC

OATS DATA SHEET

EUT:	2400TX	Work Order:	RADP0016
Serial Number:	#32	Date:	03/02/03
Customer:	Radiopath	Temperature:	63 °F
Attendees:	None	Humidity:	35%
Cust. Ref. No.:	N/A	Barometric Pressure	30.14
Tested by:	Greg Kiemel	Power:	6VDC Battery
		Job Site:	EV06

TEST SPECIFICATIONS

Specification:	FCC Part 15.247 (c)	Year:	2001
Method:	ANSI C63.4	Year:	1992

SAMPLE CALCULATIONS

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

COMMENTS

Cuming Microwave C-RAM MT-26/PSA 0.250" thick carbon loaded foam sheet with foil backing on component side of enclosure.

EUT OPERATING MODES

Transmitting continuous at maximum data rate

DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS

Run #	10
Pass	

Other

Tested By:

dBuV/m

80.0

70.0

60.0

50.0

40.0

30.0

20.0

10.0

0.0

4900.000

5400.000

5900.000

6400.000

6900.000

7400.000

MHz

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4953.884	57.7	6.4	14.0	1.2	11.2	0.0	V-Horn	AV	0.0	52.9	54.0	-1.1	"Transmit antenna vertical"
4953.884	56.0	6.4	266.0	1.3	11.2	0.0	H-Horn	AV	0.0	51.2	54.0	-2.8	"Transmit antenna horizontal"
4953.884	52.2	6.4	204.0	1.3	11.2	0.0	V-Horn	AV	0.0	47.4	54.0	-6.6	"Transmit antenna horizontal"
4953.884	47.7	6.4	349.0	1.3	11.2	0.0	H-Horn	AV	0.0	42.9	54.0	-11.1	"Transmit antenna vertical"
7430.631	37.7	11.4	133.0	1.9	11.2	0.0	H-Horn	AV	0.0	37.9	54.0	-16.1	"Transmit antenna horizontal"
7430.631	37.4	11.4	180.0	1.6	11.2	0.0	V-Horn	AV	0.0	37.6	54.0	-16.4	"Transmit antenna horizontal"
7430.631	36.3	11.4	94.0	2.3	11.2	0.0	V-Horn	AV	0.0	36.5	54.0	-17.5	"Transmit antenna vertical"
7430.631	33.0	11.4	355.0	1.3	11.2	0.0	H-Horn	AV	0.0	33.2	54.0	-20.8	"Transmit antenna vertical"
4953.884	66.8	6.4	14.0	1.2	0.0	0.0	V-Horn	PK	0.0	73.2	74.0	-0.8	"Transmit antenna vertical"
4953.884	64.7	6.4	266.0	1.3	0.0	0.0	H-Horn	PK	0.0	71.1	74.0	-2.9	"Transmit antenna horizontal"
4953.884	63.0	6.4	204.0	1.3	0.0	0.0	V-Horn	PK	0.0	69.4	74.0	-4.6	"Transmit antenna horizontal"
4953.884	56.8	6.4	349.0	1.3	0.0	0.0	H-Horn	PK	0.0	63.2	74.0	-10.8	"Transmit antenna vertical"
7430.631	51.5	11.4	133.0	1.9	0.0	0.0	H-Horn	PK	0.0	62.9	74.0	-11.1	"Transmit antenna horizontal"
7430.631	50.6	11.4	180.0	1.6	0.0	0.0	V-Horn	PK	0.0	62.0	74.0	-12.0	"Transmit antenna horizontal"
7430.631	49.5	11.4	94.0	2.3	0.0	0.0	V-Horn	PK	0.0	60.9	74.0	-13.1	"Transmit antenna vertical"
7430.631	46.4	11.4	355.0	1.3	0.0	0.0	H-Horn	PK	0.0	57.8	74.0	-16.2	"Transmit antenna vertical"