



Project: 04CA38689  
File: MC1002  
Date: 1/30/2006  
Model: Tracer 4106  
(2.4 GHz bi-directional transceiver)  
FCC ID: HDCTRC4106L2

## Test Report

On

## Electromagnetic Compatibility Testing

Copyright © 2003 Underwriters Laboratories Inc.

Underwriters Laboratories Inc. authorizes the above-named company to reproduce this Report provided it is reproduced in its entirety.

---

Underwriters Laboratories Inc.  
1285 Walt Whitman Rd.  
Melville, NY 11747

A not-for-profit organization dedicated  
to public safety and committed to  
quality service for over 100 years

Tel: (631) 271-6200 Fax: (631)439-6095

### Test Report Details

Tests Performed By: **Underwriters Laboratories Inc.  
1285 Walt Whitman Rd.  
Melville, NY 11747**

Tests Performed For: **Adtran  
901 Explorer Blvd.  
Huntsville, AL 35806**

Applicant Contact: **Derek Foster**  
Phone: **256-963-8436**  
E-mail: **derek.foster@adtran.com**

Test Report Date: **1/30/2006**

Product Type: **Transmitter**

Model Number: **Tracer 4106**

Sample Serial Number: **Not Provided**

Sample Tag Number: **0606073-001**

Sample Receive Date: **8/19/2004**

Testing Start Date: **12/1/2004**

Date Testing Complete: **1/7/2005**

Underwriters Laboratories Inc. reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. Underwriters Laboratories Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from Underwriters Laboratories Inc. issued reports. This report shall not be used to claim, constitute or imply product certification, approval, or endorsement by NVLAP, A2LA, or any agency of the US government.

This report may contain test results that are not covered by the NVLAP or A2LA accreditation. The scope of accreditation is limited to the specific tests that are listed on the NVLAP and/or A2LA certificates provided at the end of this report.

---

## Report Directory

<b>1.0</b>	<b><i>GENERAL - Product Description</i></b> .....	<b>4</b>
1.1	Device Configuration During Test .....	5
1.1.1	Equipment Used During Test: .....	5
1.1.2	Input/Output Ports: .....	5
1.1.3	EUT Internal Operating Frequencies: .....	6
1.1.4	Power Interface: .....	6
1.2	EUT Operation Modes: .....	6
1.3	EUT Configuration Modes: .....	6
1.4	Block Diagram: .....	7
1.5	Deviations from standard test methods .....	7
1.6	Device Modifications Necessary for Compliance .....	8
1.7	Test Summary .....	8
<b>2.0</b>	<b><i>Conclusion</i></b> : .....	<b>9</b>
<b>3.0</b>	<b><i>FCC Labeling Information</i></b> .....	<b>10</b>
3.1	Identification .....	10
3.2	Compliance information .....	10
3.3	Labeling .....	11
3.4	User information .....	13
<b>4.0</b>	<b><i>Calibration of Equipment Used for Measurement</i></b> .....	<b>13</b>
<b>5.0</b>	<b><i>EMISSIONS TEST REGULATIONS</i></b> .....	<b>14</b>
5.1.1	Conducted Emissions - Conducted Power and Spurious Emissions .....	15
5.1.2	Occupied Bandwidth .....	30
5.1.3	Spectral Density - Digitally Modulated Spread Spectrum .....	38
5.1.4	Bandedge .....	46
5.1.5	Radiated Spurious Emissions .....	54
5.1.6	Radiated Disturbance Emissions - 30 to 1000 MHz Electric Field .....	71
5.1.7	Restricted Bands .....	80
5.1.8	Maximum Permissible Exposure .....	82
	FCC Limits for Occupational/Controlled Exposure .....	82
<b>Appendix A</b>	.....	<b>85</b>
	Accreditations and Authorizations .....	85

## Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
1/30/2006	Original Release	---	---

### 1.0 GENERAL - Product Description

The 12804106L2 (Tracer 4106 Radio) is a digital radio device that accepts four 1.544Mb/sec T1 signals and transports them over a wireless carrier. A pair of these radios forms a wireless transport for T1 digital services in the 2.4GHz Industrial, Scientific, and Medical (ISM) radio band. The 12804106L2 provides the network, antenna, and control/status interface to the customer. The T1 interfaces are network timed. No internal timing is available.

The Tracer 4106 operates within the frequency range of 2400 to 2483.5 MHz . The device works as a digitally modulated spread spectrum device and operates on one of two channels (A or B), point-to-point communication. Each channel can be tuned to one of three center frequencies – Bandplan 1, Bandplan 2, or Banplan 3. The lower channel (Channel A) is centered at 2.416 GHz for Bandplan 1, 2.422 GHz for Bandplan 2, and 2.428 GHz for Bandplan 3. The higher channel (Channel B) is centered at 2.456 GHz for Bandplan 1, 2.462 GHz for Bandplan 2, and 2.468 GHz for Bandplan 3.

## 1.1 Device Configuration During Test

### 1.1.1 Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	Transceiver	Adtran	Tracer 4106	None
ACC	Parabolic Antenna	-	-	Highest gain antenna. 21.3 dBi gain.
SIM	T1 Resistor Terminations	-	-	T1 lines are terminated in characteristic impedance.
SIM	Alarm	-	-	Alarm lines were populated with wires and left open to simulate high impedance termination.

\* Use = EUT - Equipment Under Test, ACC - Accessory (Not Subjected to Test), or SIM - Simulator (Not Subjected to Test)

### 1.1.2 Input/Output Ports:

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
0	Enclosure	N/E	-	-	None
1	Mains	DC	No	No	None
2	Antenna	I/O	Yes	Yes	Low-loss coaxial cable used
3	T1	I/O	Yes	No	Four ports populated with cables and resistor termination.
4	Serial	I/O	Yes	Yes	DB-25 shielded connector.
5	Alarm	I/O	Yes	No	DC output alarm wired and left open to simulate high impedance load.
6	Earth	I/O	Yes	No	Safety Earth stud. Terminated by 12 guage wire.

\*AC = AC Power Port                      DC = DC Power Port                      N/E = Non-Electrical  
 I/O = Signal Input or Output Port (Not Involved in Process Control)  
 PMC = Process Measurement and Control Port

### 1.1.3 EUT Internal Operating Frequencies:

Frequency (MHz)	Description
2.416	Center Frequency of Lower Channel (Channel A), Bandplan 1
2.422	Center Frequency of Lower Channel (Channel A), Bandplan 2
2.428	Center Frequency of Lower Channel (Channel A), Bandplan 3
2.456	Center Frequency of Upper Channel (Channel B), Bandplan 1
2.462	Center Frequency of Upper Channel (Channel B), Bandplan 2
2.468	Center Frequency of Upper Channel (Channel B), Bandplan 3

### 1.1.4 Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	21-60	-	-	DC	1	None
1	48	-	-	DC	1	Benchtop DC supply used for power source.

### 1.2 EUT Operation Modes:

Mode #	Description
1	Transmit at full power on lower channel (Channel A), Bandplan 1.
2	Transmit at full power on higher channel (Channel B), Bandplan 1.
3	Transmit at full power on higher channel (Channel B), Bandplan 3.

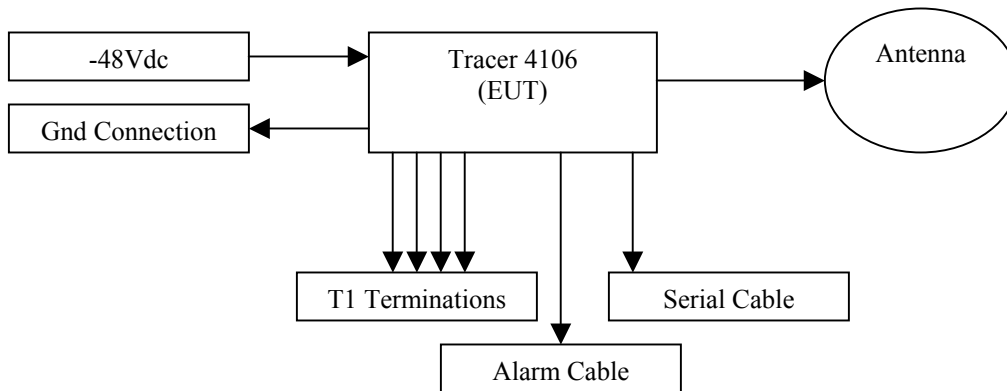
### 1.3 EUT Configuration Modes:

Mode #	Description
1	Transceiver is positioned on a 1m x 1.5m x 0.8m high wooden table. High-gain antenna, T1 terminators, and open alarm cables are attached. Antenna is positioned to propagate wave toward measurement antenna and parallel to the ground plane (not upward).

"The results contained in this report reflect the results for this particular sample. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report"

## 1.4 Block Diagram:

The diagram below illustrates the configuration of the equipment above.



## 1.5 Deviations from standard test methods

Not Applicable

## 1.6 Device Modifications Necessary for Compliance

Not Applicable.

## 1.7 Test Summary

Test Name Test Requirement/Specification	Comply	Does Not Comply	See Remark
Conducted Emissions - Conducted Power and Spurious Emissions 47 CFR Part 15, Subpart C / 47 CFR Part 15, Subpart C - Section 15.247	Y	-	1
Occupied Bandwidth 47 CFR Part 15.247 / ANSI C63.4:2001	Y	-	1
Spectral Density - Digitally Modulated Spread Spectrum 47 CFR Part 15.247 / ANSI C63.4:2001	Y	-	1
Bandedge 47 CFR Part 15 Subpart C / 47 CFR Part 15.247	Y	-	1
Radiated Spurious Emissions 47 CFR Part 15.247 / ANSI C63.42:2001	Y	-	1
Radiated Disturbance Emissions - 30 to 1000 MHz Electric Field 47 CFR Part 15, Subpart B / CISPR 22:1997 Class A	Y	-	1
Restricted Bands 47 CFR Part 15 Subpart C / 47 CFR Part 15.205	Y	-	1
Maximum Permissible Exposure 47 CFR Part 1 Subpart I / 47 CFR Part 1.1307	Y	-	1

### Remarks:

- 1) No Modifications required for compliance.
- 2) Modifications required to comply as described in Section 1.6
- 3) Device contains a detachable antenna with a standard N-female connector. This device must be professionally installed, because the antenna does not contain a unique connector.
- 4) Device maximum conducted power is 100 mW. Output power must be set at end of attaching cable and reduced as necessary to remain compliant to limits in 15.247 when the intended antenna is taken into consideration.
- 5) Device antenna is must be installed with adequate precautions regarding RF exposure. Worst-case spacing to comply with uncontrolled/general exposure limit is 4.6 m.



## 2.0 Conclusion:

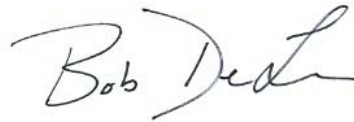
The tests listed in the Summary of Testing section of this report have been performed and the results recorded by Underwriters Laboratories Inc. in accordance with the procedures stated in each test requirement and specification. The test list was determined by the Applicant as being applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

The equipment under test has met the technical requirements as defined under sections 5.0.

Test Start Date: 12/1/2004  
Test Completion Date: 1/7/2005



Michael Antola (Ext.23053)  
Project Engineer  
International EMC Services  
Conformity Assessment Services-3013EMEL



Robert DeLisi (Ext.22452)  
Principal Engineer  
International EMC Services  
PDE Division-3615ESNK

### **3.0 FCC Labeling Information**

#### **3.1 Identification.**

Devices Subject to Verification

In 47 CFR, Part 2, § 2.954:

“Devices subject only to verification shall be uniquely identified by the person responsible for marketing or importing the equipment within the United States. However, the identification shall not be of a format which could be confused with the FCC Identifier required on certified, notified or type accepted equipment. The importer or manufacturer shall maintain adequate identification records to facilitate positive identification for each verified device.”

Devices Subject to Declaration of Conformity

In 47 CFR, Part 2, § 2.1074:

“Devices subject only to a Declaration of Conformity shall be uniquely identified by the responsible party. This identification shall not be of a format which could be confused with the FCC Identifier required on certified, notified, type accepted or type approved equipment. The responsible party shall maintain adequate identification records to facilitate positive identification for each device.”

#### **3.2 Compliance information**

§ 2.1077 Compliance information.

(a) If a product must be tested and authorized under a Declaration of Conformity, a compliance information statement shall be supplied with the product at the time of marketing or importation, containing the following information:

- (1) Identification of the product, e.g., name and model number;
- (2) A statement, similar to that contained in § 15.19(a)(3) of this chapter, that the product complies with part 15 of this chapters; and
- (3) The identification, by name, address and telephone number, of the responsible party, as defined in §

2.909.

The responsible party for a Declaration of Conformity must be located within the United States.

(c) The compliance information statement shall be included in the user’s manual or as a separate sheet.

§ 15.19(a)(3):

“ All other devices shall bear the following statement in a conspicuous location on the device:  
This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:  
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.”

### **3.3 Labeling.**

#### **Labeling Certification or Verification**

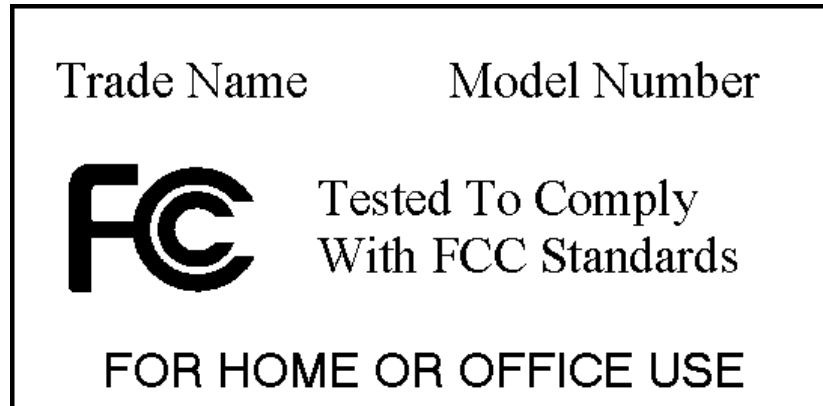
In addition to the requirements in Part 2 of this CFR 47 (See **1.6.1 Identification** above), a device subject to certification or verification shall be labeled as follows:

- (1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:  
This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.
- (2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:  
This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.
- (3) All other devices shall bear the following statement in a conspicuous location on the device:  
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:  
(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- (4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.
- (5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

#### **Declaration of Conformity Labeling**

In addition to the requirements in Part 2 of CFR 47 (See **1.6.1 Identification** above), a device subject to authorization under a Declaration of Conformity shall be labeled as follows:

- (1) The label shall be located in a conspicuous location on the device and shall contain the unique identification described in Section 2.1074 of this chapter and the following logo:
  - (i) If the product is authorized based on testing of the product or system:



Alternate label format for small devices:



***Tested To Comply  
With FCC Standards  
FOR HOME OR OFFICE USE***

The text shown in ***bold-face italics*** may be placed in a prominent location in the instruction manual or pamphlet supplied to the user.

- (2) Label text and information should be in a size of type large enough to be readily legible, consistent with the dimensions of the equipment and the label. However, the type size for the text is not required to be larger than eight point.
- (3) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (b)(1) of this section on it, such as for a CPU board or a plug-in circuit board peripheral device, the text associated with the logo may be placed in a prominent location in the instruction manual or pamphlet supplied to the user. However, the unique identification (trade name and model number) and the logo must be displayed on the device.
- (4) The label shall not be a stick-on, paper label. The label on these products shall be permanently affixed to the product and shall be readily visible to the purchaser at the time of purchase, as described in Section 2.925(d) of this chapter. "Permanently affixed" means that the label is etched, engraved, stamped, silk-screened, indelibly printed, or otherwise permanently marked on a permanently attached part of the equipment or on a nameplate of metal, plastic, or other material fastened to the equipment by welding, riveting, or a permanent adhesive. The label must be designed to last the expected lifetime of the equipment in the environment in which the equipment may be operated and must not be readily detachable.

### 3.4 User information.

In 47 CFR, Part 15, § 15.21 Information to user:

“The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.”

In 47 CFR, Part 15, § 15.105 Information to the user:

Class A Devices

“(a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

*NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.*”

Class B Devices

“(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

*NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:*

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

“(d) For systems incorporating several digital devices, the statement shown in paragraph (a) or (b) of this section needs to be contained only in the instruction manual for the main control unit.”

### 4.0 Calibration of Equipment Used for Measurement

All test equipment and test accessories are calibrated on a regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less.

All test equipment calibrations are traceable to the National Institute of Standards and Technology (NIST); therefore, all test data recorded in this report is traceable to NIST.

## 5.0 EMISSIONS TEST REGULATIONS

The emissions tests were performed according to following regulations:

----- United States -----

FCC Part 15, Subpart B, 15.109 and  
Subpart C, 15.209 and Section 15.247

Code of Federal Regulations, Part 15, Subpart B  
and C, Radio Frequency Devices

----- Canada -----

RSS-210, Issue 6, September 2005

Low Power License-Exempt Radiocommunication  
Devices (All Frequency Bands)

RSS-GEN, Issue 1, September 2005

General Requirements and Information for the  
Certification of Radiocommunication Equipment

### 5.1.1 Conducted Emissions - Conducted Power and Spurious Emissions

**Test Requirement:** 47 CFR Part 15, Subpart C

**Test Specification:** 47 CFR Part 15, Subpart C - Section 15.247

**Test Procedure:**

The test was performed in accordance with the Test Requirement and Specification and configured as noted in the Test Setup. The EUT was placed inside the anechoic chamber with a fresh battery installed or operating at nominal voltage. Measurement was performed by connecting the output of the device to the input of the spectrum analyzer using a calibrated attenuator to reduce the input signal. An appropriate factor was added to spectrum analyzer reading for the attenuator. All peak emissions were verified to be below the limits below.

Conducted Disturbance Limits for Spread Spectrum Transmitters - Section 15.247

Fundamental Frequency (MHz)	Hopping Channels	Permissible Fundamental Output Power		Permissible Spurious Emissions	
		(milliwatts)	(dBm)	(milliwatts)	(dBm)
902 – 928	25 to 49	250	24	2.5	4
	50 or more	1000	30	10	10
	Digital Modulation	1000	30	10	10
2400 – 2483	15 to 74	125	21	1.25	1
	75 or more	1000	30	10	10
	Digital Modulation	1000	30	10	10
5725 – 5850	75 or more	1000	30	10	10
	Digital Modulation	1000	30	10	10

Other than fixed point-to-point applications, power adjustment for antenna gain are as follows:

- Gain of 6 dBi or less                      No reduction is required
- Gain greater than 6 dBi                 Reduce the maximum output power by 1 dB for each 1 dB of antenna gain above 6 dBi

**Test Notes:**

This device is considered a fixed point-to-point device per 15.247(b)(i) and are required to reduce output power by 1 dB for each 3 dB of antenna gain exceeding 6 dB of gain.

For this device, we are using a 21.3 dBi antenna so the Permissible Fundamental Output Power Limit will be adjusted to 25dBm (316 milliwatts) and the Permissible Spurious Emissions Limit will be adjusted to 5dBm (3 milliwatts).

**Test Setup:** Only the following ports were tested. See EUT Information for details.

Port #	Port Name	EUT Operation Mode	EUT Configuration	Power Interface
2	Antenna	1	1	1
2	Antenna	2	1	1
2	Antenna	3	1	1

### Results

The system met the requirements for conducted emissions. Data Pages follow.

Temperature:	20.5 °C	20.0 °C
Humidity:	48.0 %RH	40.0 %RH
Pressure:	992 mbar	998 mbar
Date test performed:	01 December 2004	09 May 2005

#### Test equipment used for Conducted Power & Spurious Emissions

<b>ESI26</b> Range: 1-25GHz	<b>Rohde &amp; Schwarz</b> Last Calibration Date: 07 September 2004	<b>EMI Receiver</b> Calibration Due Date: 07 September 2005	<b>Equipment No.: ME5B-081</b>
<b>E7402A</b> Range: 30MHz-3GHz	<b>Agilent Technologies</b> Last Calibration Date: 17 August 2004	<b>EMI Spectrum Analyzer</b> Calibration Due Date: 17 August 2005	<b>Equipment No.: ME5B-123</b>
<b>NRVD</b> Range: 1-3GHz	<b>Rohde &amp; Schwarz</b> Last Calibration Date: 18 January 2005	<b>Power Meter</b> Calibration Due Date: 31 January 2006	<b>Equipment No.: ME5A-080</b>
<b>NRV-Z51</b> Range: 1-3GHz	<b>Rohde &amp; Schwarz</b> Last Calibration Date: 18 January 2005	<b>Power Meter Sensor</b> Calibration Due Date: 31 January 2006	<b>Equipment No.: ME5B-134</b>

#### Test Accessories for Conducted Power & Spurious Emissions

<b>48-20-43</b> Range: 1-25GHz	<b>Weinschel Corp</b> Last Calibration Date: 15 November 2004	<b>20dB Attenuator</b> Calibration Due Date: 15 November 2005	<b>Equipment No.: ME7A-685</b>
<b>99760-00</b>	<b>Cole -Parmer</b> Last Calibration Date: 18 June 2004	<b>Hygrometer/Temp/Baro meter</b> Ranges Temp: 0°C-55°C Humidity: 25% to 95 %RH Pressure: 795 to 1050 mbar Calibration Due Date: 18 June 2005	<b>Equipment No.: ME4-268</b>



---

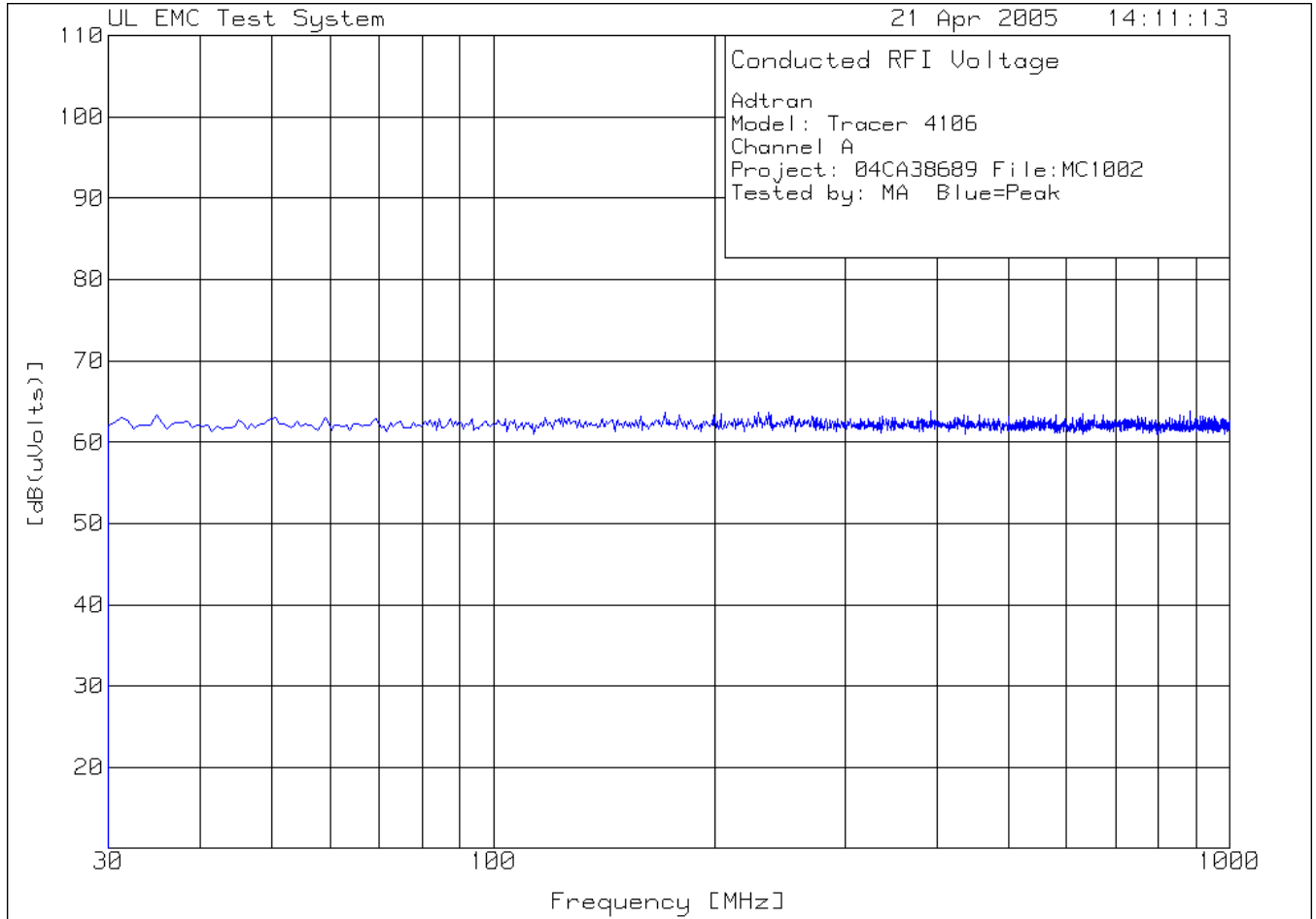
**Test Results Summary:**

Conducted Emissions - Conducted Power

The following measurements were performed with the output of the EUT connected to the input of the power meter. A 50-ohm, 20 dB attenuator is located between the power meter and the EUT output connector. Both Channel A and Channel B measurements are performed.

No.	Test Frequency [MHz]	Pwr Mtr Reading [dB (m) ]	Attenuator Factor [dB]	Power Level [dBm]	Power Level [Watts]	Power Limit [Watts]
=====						
---- Channel A, Bandplan 1-----						
1	2416.708	1.53	18.43	19.96	0.099	0.316
---- Channel B, Bandplan 1-----						
2	2457.729	1.43	18.43	19.86	0.097	0.316
---- Channel B, Bandplan 3-----						
3	2468.1	1.48	18.3	19.78	0.095	0.316

Conducted Emissions – Conducted Power & Spurious Emissions (Channel A, Bandplan 1)



Adtran

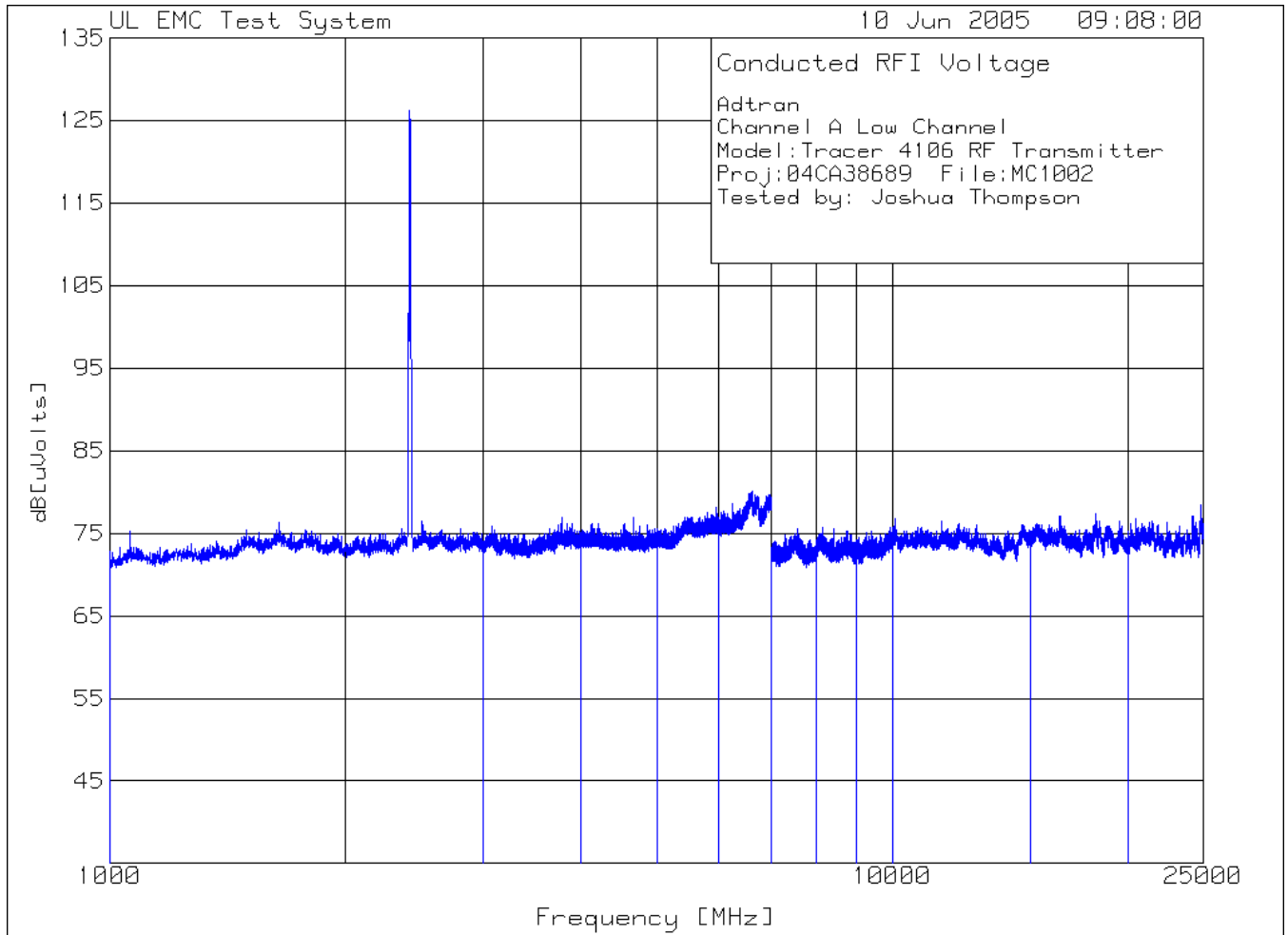
Model: Tracer 4106  
 Channel A  
 Project: 04CA38689 File:MC1002  
 Tested by: MA Blue=Peak

No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Conv. Factor [dB]	Pwr Level [dBm]	Limit: 1
Range: 1 30 - 1000MHz							
1	34.8409	44.01 pk	19.4	0	-107	-43.59	5
				Margin [dB]			-48.59
2	50.5739	43.48 pk	19.6	0	-107	-43.92	5
				Margin [dB]			-48.92
3	203.6681	43.98 pk	19.5	0	-107	-43.52	5
				Margin [dB]			-48.52
4	393.0692	44.26 pk	19.6	0	-107	-43.14	5
				Margin [dB]			-48.14
5	581.2601	43.78 pk	19.6	0	-107	-43.62	5
				Margin [dB]			-48.62
6	883.8178	44.15 pk	19.6	0	-107	-43.25	5
				Margin [dB]			-48.25

LIMIT 1: Permissible Spurious Emissions

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - denotes average log detection  
 ave - denotes average detection  
 tm - Trace Math Result

NOTE: RBW = 100kHz for all Conducted Spurious Tests



Adtran  
 Channel A  
 Model:Tracer 4106 RF Transmitter  
 Proj:04CA38689 File:MC1002  
 Tested by: Joshua Thompson

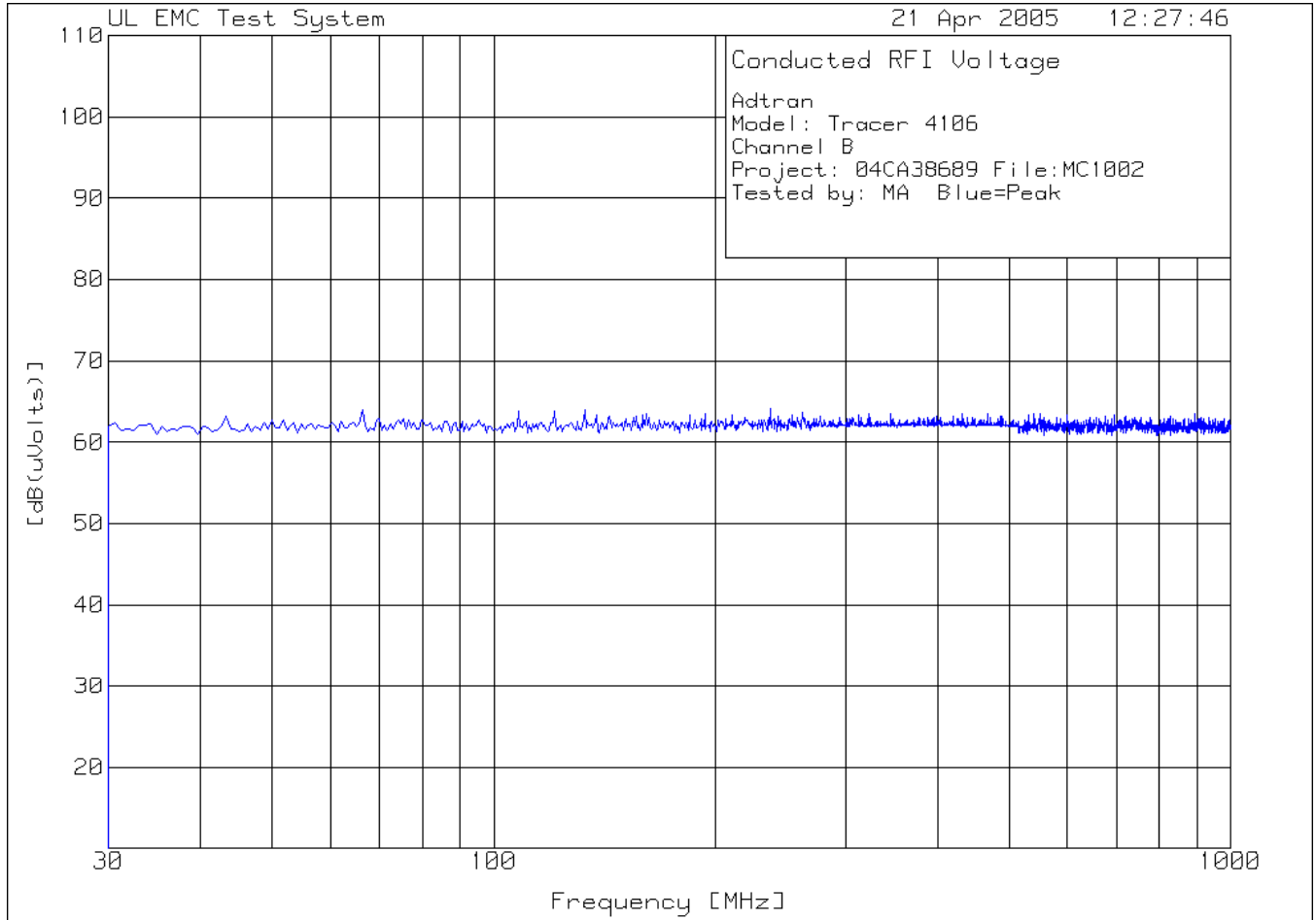
No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Conv. Factor [dB]	Pwr Level [dBm]	Limit: 1
Range:3 4000 - 5000MHz -----							
2	4825.413	60.49 pk	20.1	0	-107	-27.59	5
		Height:101 Horz		Margin [dB]			-32.59
Range:6 7000 - 8000MHz -----							
3	7243.622	56.79 pk	20.1	0	-107	-31.89	5
		Height:101 Horz		Margin [dB]			-36.89
Range:8 9000 - 10000MHz -----							
4	9658.829	57.37 pk	20.1	0	-107	-30.47	5
		Height:101 Horz		Margin [dB]			-35.47
Range:8 10000 - 15000MHz -----							
5	11955.978	58.19 pk	20.2	0	-107	-29.39	5
		Height:101 Horz		Margin [dB]			-34.39
6	14534.767	58.71 pk	20.2	0	-107	-29.91	5
		Height:101 Horz		Margin [dB]			-34.91
Range:8 15000 - 20000MHz -----							
7	16883.442	58.3 pk	20.3	0	-107	-29.6	5
		Height:101 Horz		Margin [dB]			-34.6
8	19292.146	58.48 pk	20.3	0	-107	-29.78	5
		Height:101 Horz		Margin [dB]			-34.78
Range:8 20000 - 25000MHz -----							
9	21820.91	59.88 pk	20.3	0	-107	-27.18	5
		Height:101 Horz		Margin [dB]			-33.18
10	24112.056	59.74 pk	20.4	0	-107	-27.14	5
		Height:101 Horz		Margin [dB]			-32.14

LIMIT 1: Permissible Spurious Emissions

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - denotes average log detection  
 ave - denotes average detection  
 tm - Trace Math Result

NOTE: RBW = 100kHz for all Conducted Spurious Tests

Conducted Emissions - Conducted Power and Spurious Emissions (Channel B, Bandplan 1)



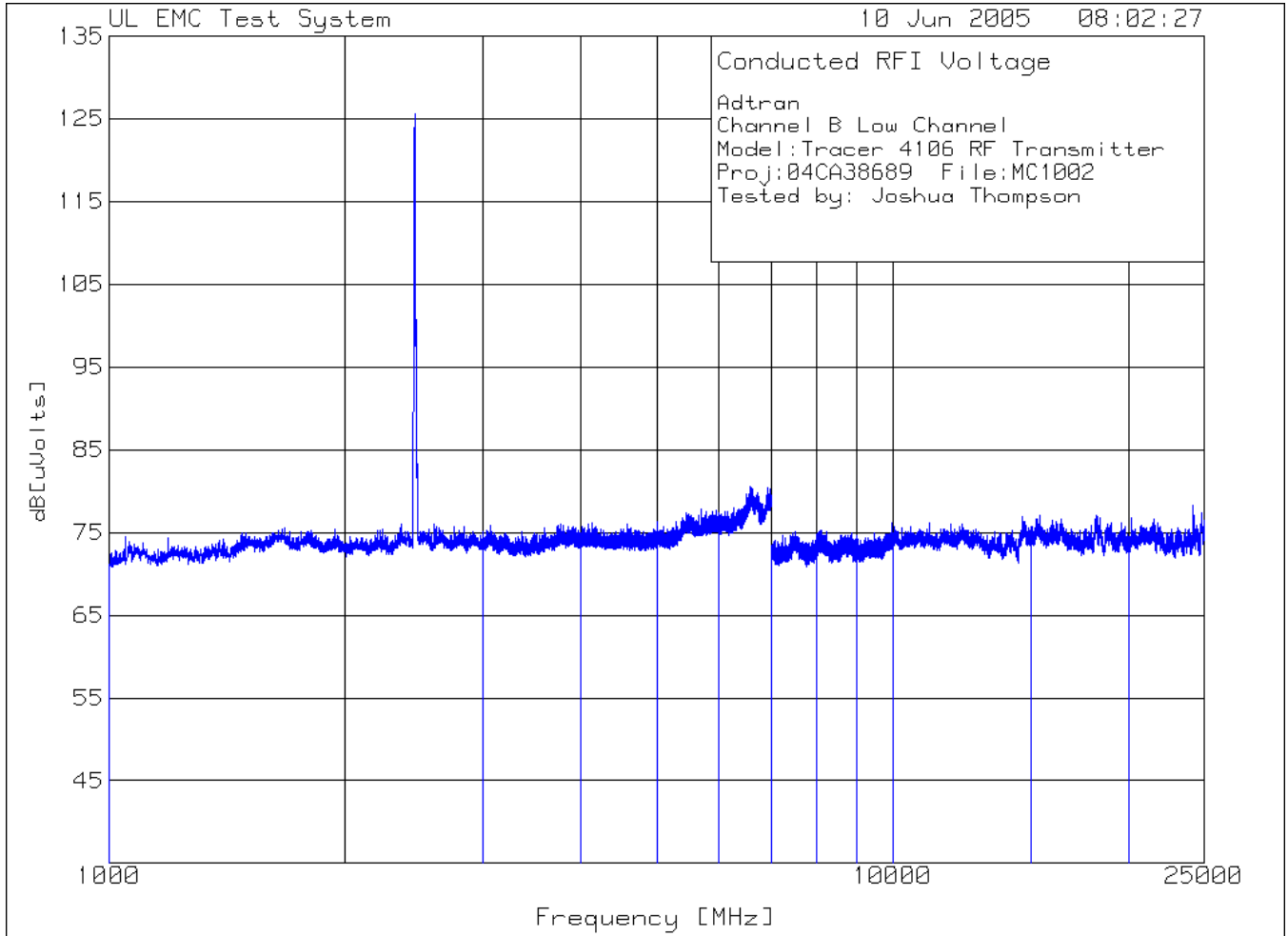
Adtran  
 Model: Tracer 4106  
 Channel B  
 Project: 04CA38689 File:MC1002  
 Tested by: MA Blue=Peak

No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Conv. Factor [dB]	Pwr Level [dBm]	Limit: 1
Range: 1 30 - 1000MHz -----							
1	43.3125	43.72 pk	19.5	0	-107	-43.78	5
				Margin [dB]			-48.78
2	66.3069	44.35 pk	19.6	0	-107	-43.05	5
				Margin [dB]			-48.05
3	132.8696	44.31 pk	19.6	0	-107	-43.09	5
				Margin [dB]			-48.09
4	120.7673	44.42 pk	19.4	0	-107	-43.18	5
				Margin [dB]			-48.18
5	236.9495	44.49 pk	19.6	0	-107	-42.91	5
				Margin [dB]			-47.91
6	550.3992	44.07 pk	19.5	0	-107	-43.43	5
				Margin [dB]			-48.43

LIMIT 1: Permissible Spurious Emissions

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - denotes average log detection  
 ave - denotes average detection  
 tm - Trace Math Result

NOTE: RBW = 100kHz for all Conducted Spurious Tests





Adtran  
 Channel B  
 Model:Tracer 4106 RF Transmitter  
 Proj:04CA38689 File:MC1002  
 Tested by: Joshua Thompson

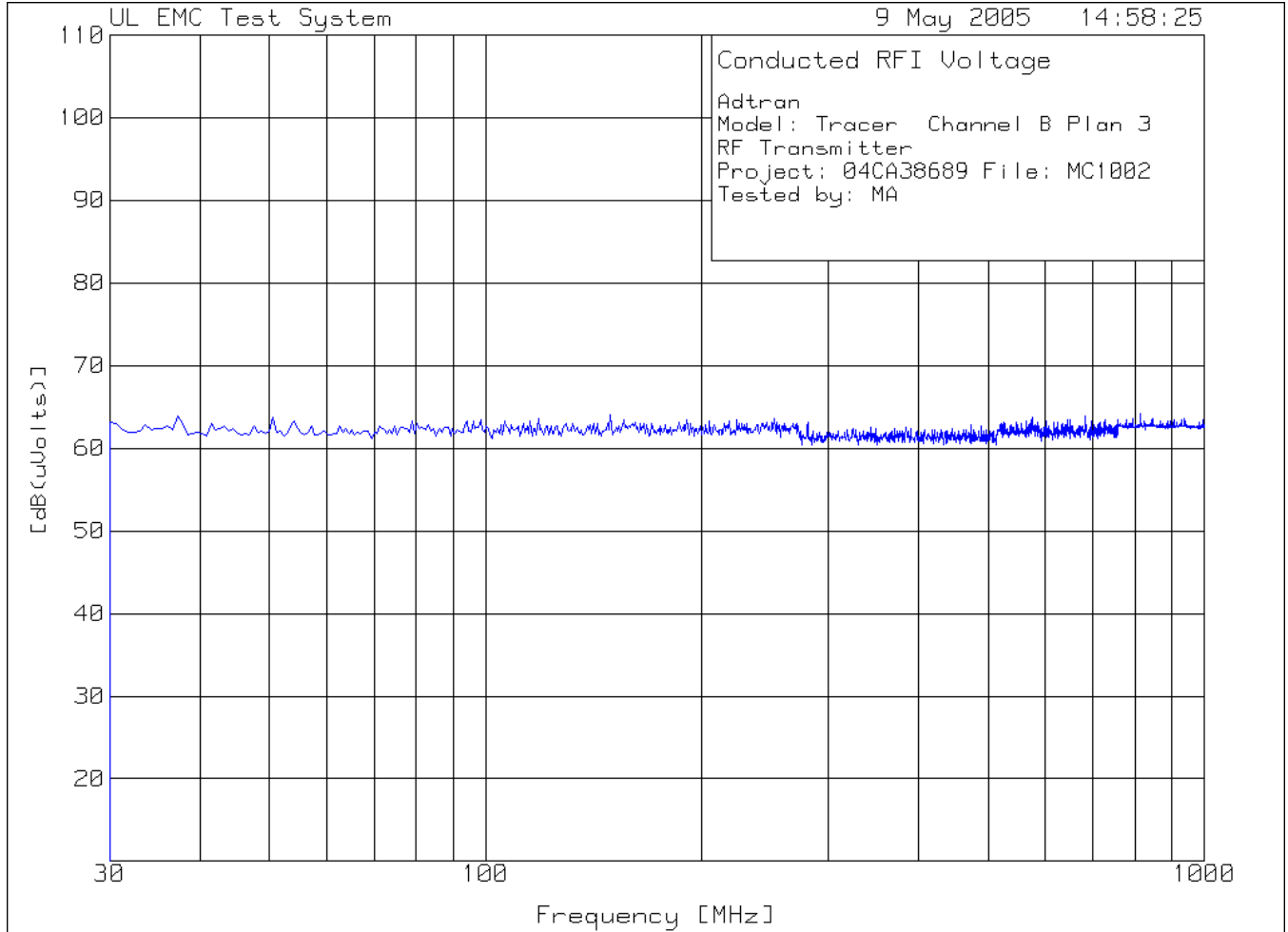
No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Conv. Factor [dB]	Pwr Level [dBm]	Limit:1
Range:3 4000 - 5000MHz -----							
2	4899.95	61.04 pk	20.1	0	-107	-26.14	5
		Height:101	Horz	Margin [dB]			-31.14
Range:6 7000 - 8000MHz -----							
3	7356.678	56.76 pk	20.1	0	-107	-31.86	5
		Height:101	Horz	Margin [dB]			-36.86
Range:8 9000 - 10000MHz -----							
4	9831.416	58.08 pk	20.1	0	-107	-29.18	5
		Height:101	Horz	Margin [dB]			-34.18
Range:8 10000 - 15000MHz -----							
5	12208.604	59.1 pk	20.2	0	-107	-28.3	5
		Height:101	Horz	Margin [dB]			-34.3
6	14757.379	59.44 pk	20.2	0	-107	-28.64	5
		Height:101	Horz	Margin [dB]			-33.64
Range:8 15000 - 20000MHz -----							
7	17238.619	58.04 pk	20.3	0	-107	-29.34	5
		Height:101	Horz	Margin [dB]			-34.34
8	19634.817	59.95 pk	20.3	0	-107	-27.25	5
		Height:101	Horz	Margin [dB]			-32.25
Range:8 20000 - 25000MHz -----							
9	22103.552	58.81 pk	20.3	0	-107	-28.11	5
		Height:101	Horz	Margin [dB]			-33.11
10	24074.537	58.02 pk	20.4	0	-107	-29.42	5
		Height:101	Horz	Margin [dB]			-34.42

LIMIT 1: Permissible Spurious Emissions

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - denotes average log detection  
 ave - denotes average detection  
 tm - Trace Math Result

NOTE: RBW = 100kHz for all Conducted Spurious Tests

Conducted Emissions - Conducted Power and Spurious Emissions (Channel B, Bandplan 3)



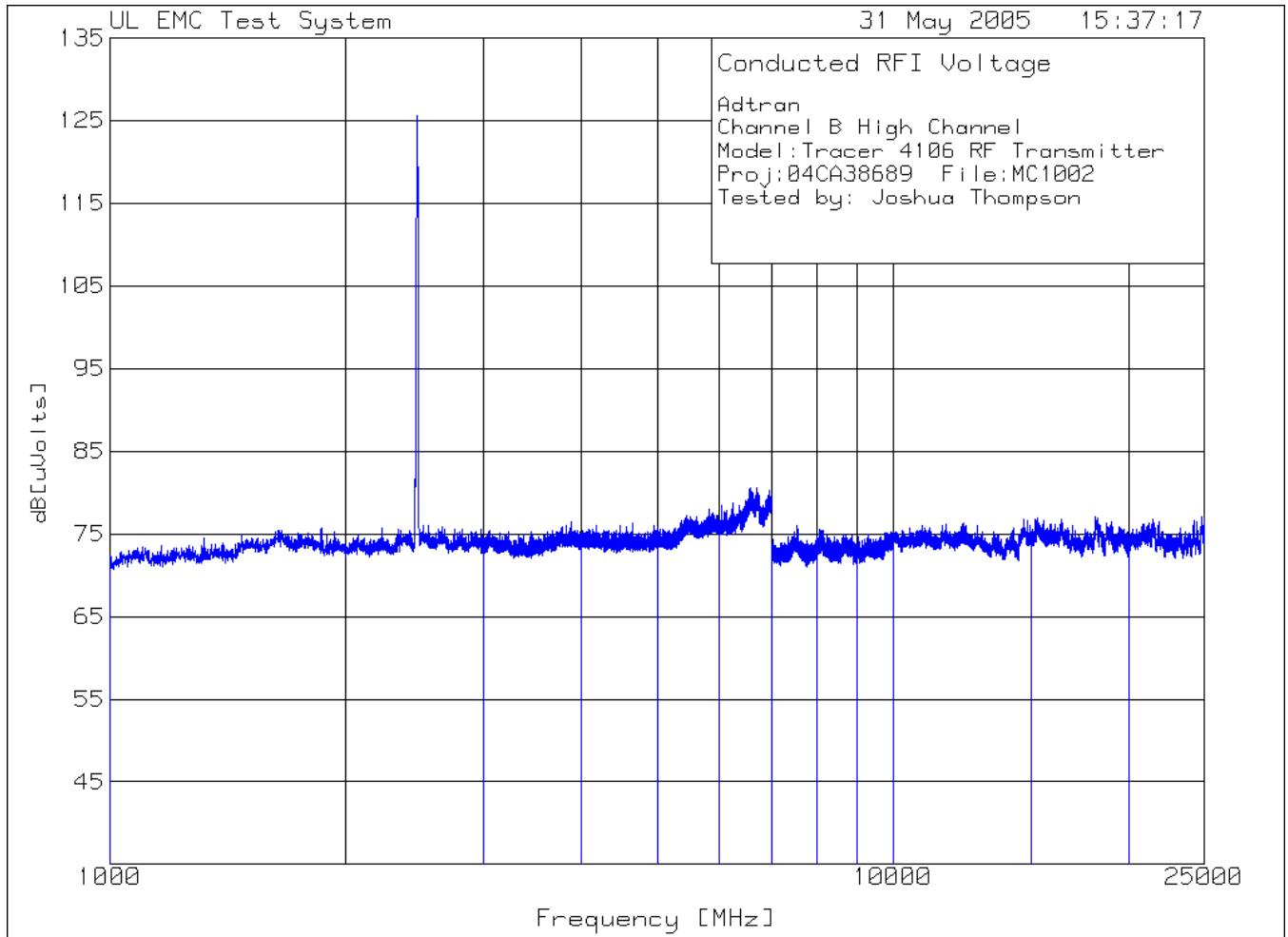
Adtran  
 Model: Tracer Channel B Plan 3  
 RF Transmitter  
 Project: 04CA38689 File: MC1002  
 Tested by: MA

No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Conv. Factor [dB]	Pwr Level [dBm]	Limit: 1
Range: 1 30 - 1000MHz -----							
1	37.2614	44.36 pk	19.5	0	-107	-43.14	5
				Margin [dB]			-48.14
2	50.5739	44.13 pk	19.6	0	-107	-43.27	5
				Margin [dB]			-48.27
3	98.378	44.03 pk	19.4	0	-107	-43.57	5
				Margin [dB]			-48.57
4	149.2077	44.48 pk	19.6	0	-107	-42.92	5
				Margin [dB]			-47.92
5	683.5246	44.25 pk	19.6	0	-107	-43.15	5
				Margin [dB]			-48.15
6	814.2296	44.57 pk	19.6	0	-107	-42.83	5
				Margin [dB]			-47.83

LIMIT 1: Permissible Spurious Emissions

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - denotes average log detection  
 ave - denotes average detection  
 tm - Trace Math Result

NOTE: RBW = 100kHz for all Conducted Spurious Tests



Adtran  
 Channel B High Channel  
 Model:Tracer 4106 RF Transmitter  
 Proj:04CA38689 File:MC1002  
 Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Conv. Factor [dB]	Pwr Level [dBm]	Limit:1
Range:3 4000 - 5000MHz -----							
2	4945.973	75.95 pk	0	0	-107	-31.05	5
		Height:101	Horz	Margin [dB]			-38.05
Range:6 7000 - 8000MHz -----							
3	7400.7	73.76 pk	0	0	-107	-33.24	5
		Height:101	Horz	Margin [dB]			-38.24
Range:8 9000 - 10000MHz -----							
4	9876.938	74.91 pk	0	0	-107	-32.09	5
		Height:101	Horz	Margin [dB]			-37.09
Range:8 10000 - 15000MHz -----							
5	12293.647	76.3 pk	0	0	-107	-30.7	5
		Height:101	Horz	Margin [dB]			-35.7
6	14772.386	75.69 pk	0	0	-107	-31.31	5
		Height:101	Horz	Margin [dB]			-36.31
Range:8 15000 - 20000MHz -----							
7	17273.637	74.81 pk	0	0	-107	-32.19	5
		Height:101	Horz	Margin [dB]			-37.19
8	19714.857	75.59 pk	0	0	-107	-31.41	5
		Height:101	Horz	Margin [dB]			-36.41
Range:8 20000 - 25000MHz -----							
9	22186.093	74.54 pk	0	0	-107	-32.46	5
		Height:101	Horz	Margin [dB]			-37.46
10	24719.86	75.04 pk	0	0	-107	-31.96	5
		Height:101	Horz	Margin [dB]			-36.96

LIMIT 1: Permissible Spurious Emissions

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - denotes average log detection  
 ave - denotes average detection  
 tm - Trace Math Result

NOTE: RBW = 100kHz for all Conducted Spurious Tests

### 5.1.2 Occupied Bandwidth

**Test Requirement:** 47 CFR Part 15.247

**Test Specification:** ANSI C63.4:2001

**Test Procedure:**

The EUT was tested per ANSI C63.4:2001 as a conducted measurement. The output of the transmitter was connected to the input of the measurement spectrum analyzer via a calibrated attenuator.

The spectrum analyzer Resolution Bandwidth was set to 100 kHz for the measurement. The Video Bandwidth was set to 300 kHz. A plot of the spectrum analyzer display screen is produced with marker points displaying the center frequency and the left and right side points that are 6 dB below the field strength at the center frequency.

Limits - FCC Part 15.247 - Digitally Modulated Spread Spectrum

6dB Occupied Bandwidth
> 500 kHz

**Test Deviations:**

None

### Results

The system met the requirements for occupied bandwidth. Data Pages follow.

Temperature:	19.0 °C	20.0 °C
Humidity:	43.0 %RH	40.0 %RH
Pressure:	1022 mbar	998 mbar
Date test performed:	01 December 2004	09 May 2005

**Test Setup:** Only the following ports were tested. See EUT Information for details.

Port #	Port Name	EUT Operation Mode	EUT Configuration	Power Interface
2	Antenna	1	1	1
2	Antenna	2	1	1
2	Antenna	3	1	1

**Test Results Summary:**

EUT Operation Mode	Pass/Fail (P/F)	Comment #
1	P	6dB Bandwidth = 6.504MHz
1	P	20dB Bandwidth = 10.628MHz
2	P	6dB Bandwidth = 6.862MHz
2	P	20dB Bandwidth = 10.578MHz
3	P	6dB Bandwidth = 6.465MHz
3	P	20dB Bandwidth = 10.636MHz

**Test equipment used for Occupied Bandwidth**  
**E7402A**

**Agilent Technologies**

**EMI Spectrum Analyzer**

**Equipment No.: ME5B-123**

Range: 2.4 - 2.483GHz  
**ATA157**  
 Range: 2.4 - 2.483GHz  
**48-20-43**  
 Range: 2.4 - 2.483GHz  
**99760-00**

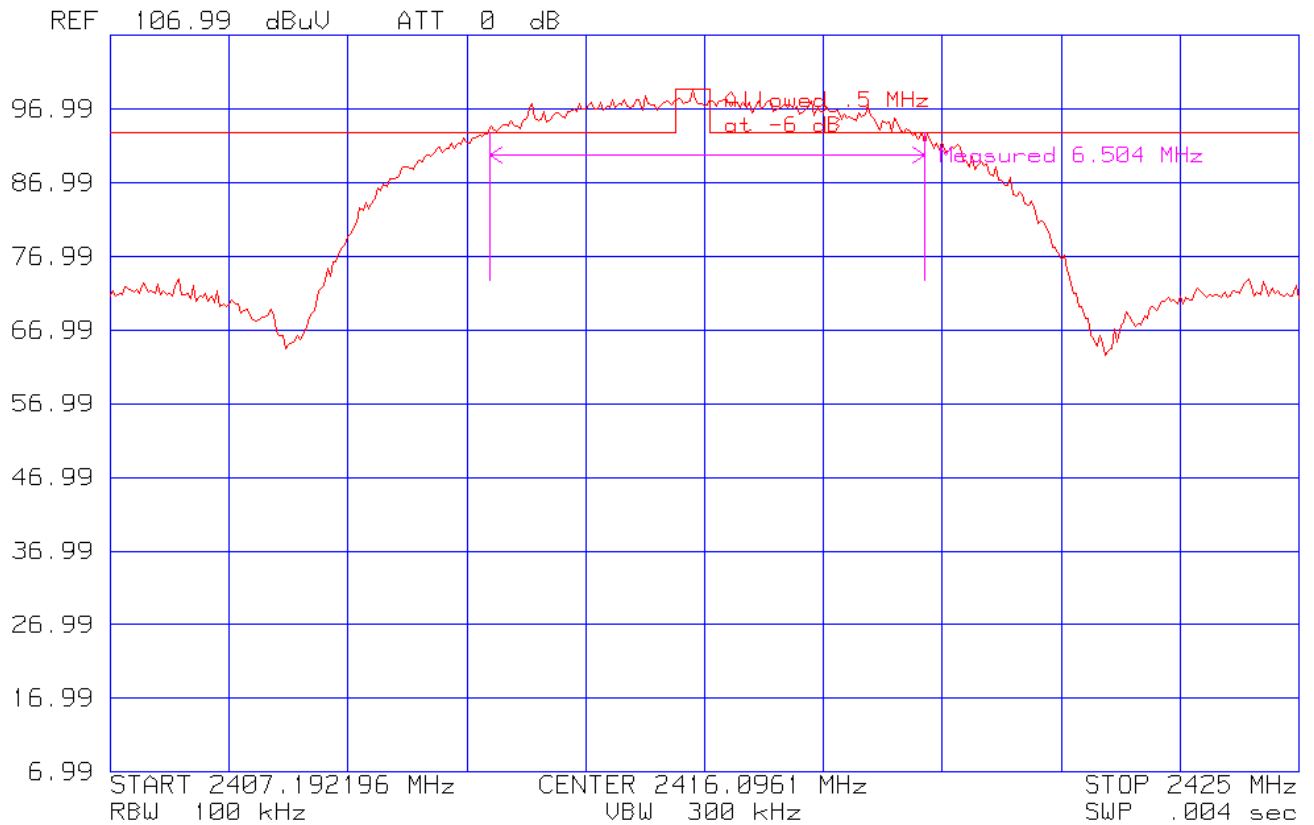
Last Calibration Date: 17 August 2004  
**Weinschel Corp 10dB Attenuator**  
 Last Calibration Date: 11 October 2004  
**Weinschel Corp 20dB Attenuator**  
 Last Calibration Date: 15 November 2004  
**Cole -Parmer Hygrometer/Temp/Barometer**  
 Ranges

**Resolution BW: 100kHz**  
**Video BW: 300kHz**

Calibration Due Date: 17 August 2005  
**Equipment No.: ATA157**  
 Calibration Due Date: 11 October 2005  
**Equipment No.: ME7A-685**  
 Calibration Due Date: 15 November 2005  
**Equipment No.: ME4-268**  
 Temp: 0°C-55°C  
 Humidity: 25% to 95 %RH  
 Pressure: 795 to 1050 mbar  
 Calibration Due Date: 18 June 2005

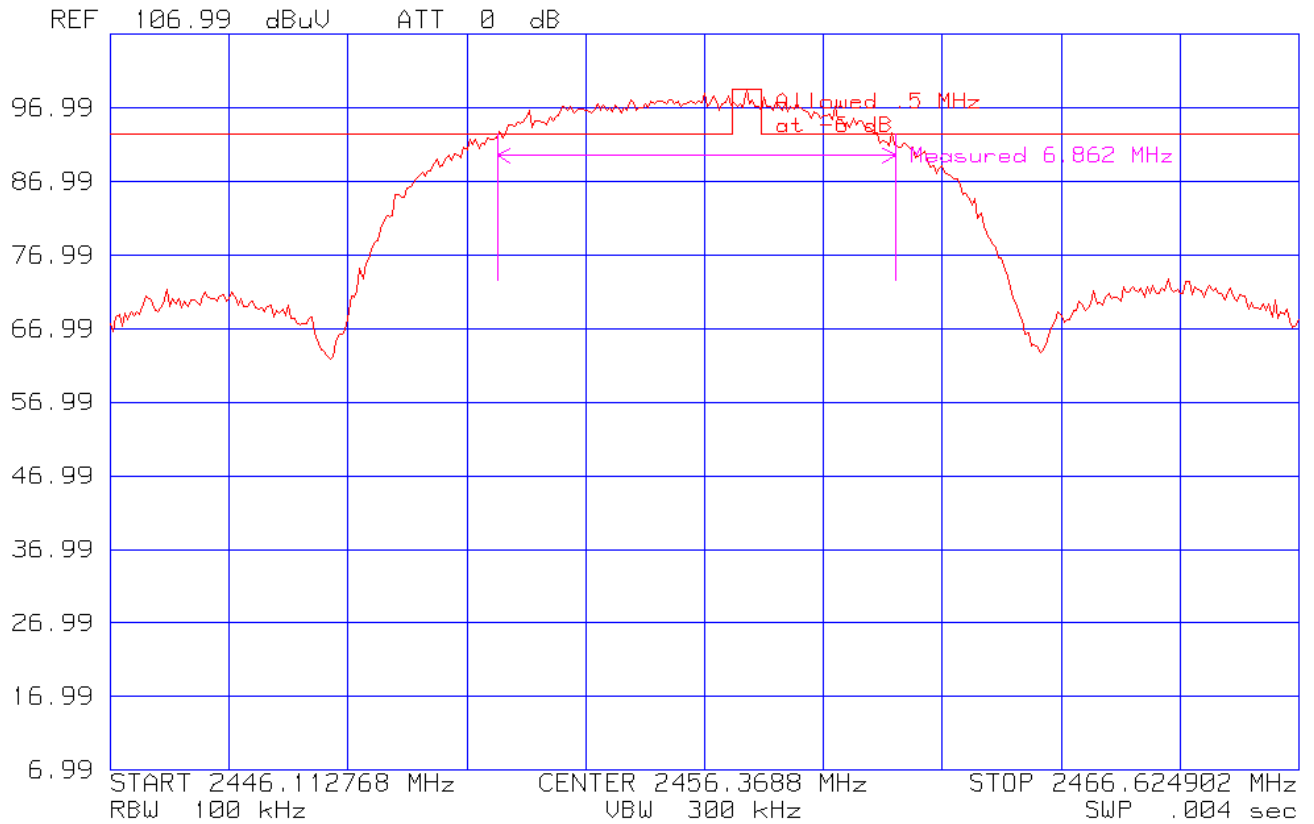
Last Calibration Date: 18 June 2004

6dB Occupied Bandwidth (Channel A, Bandplan 1)

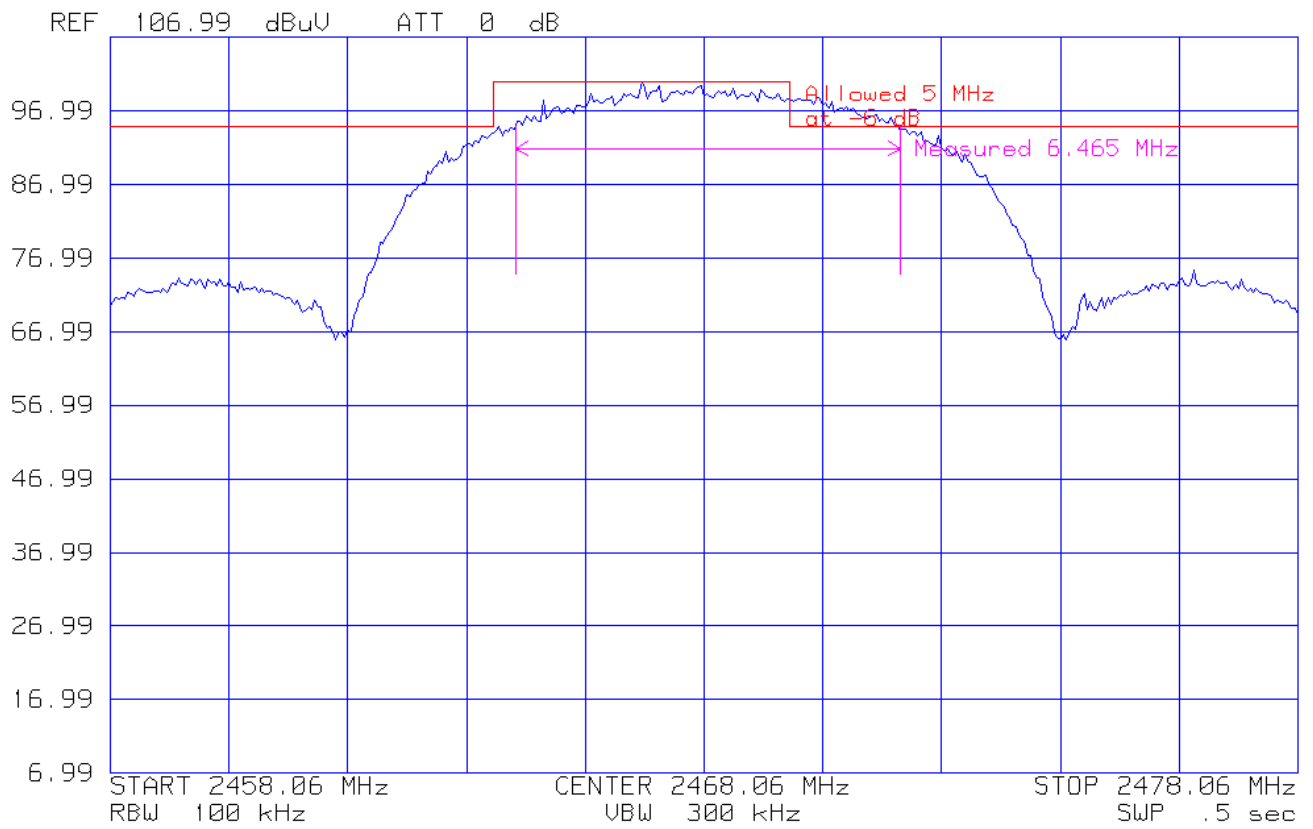




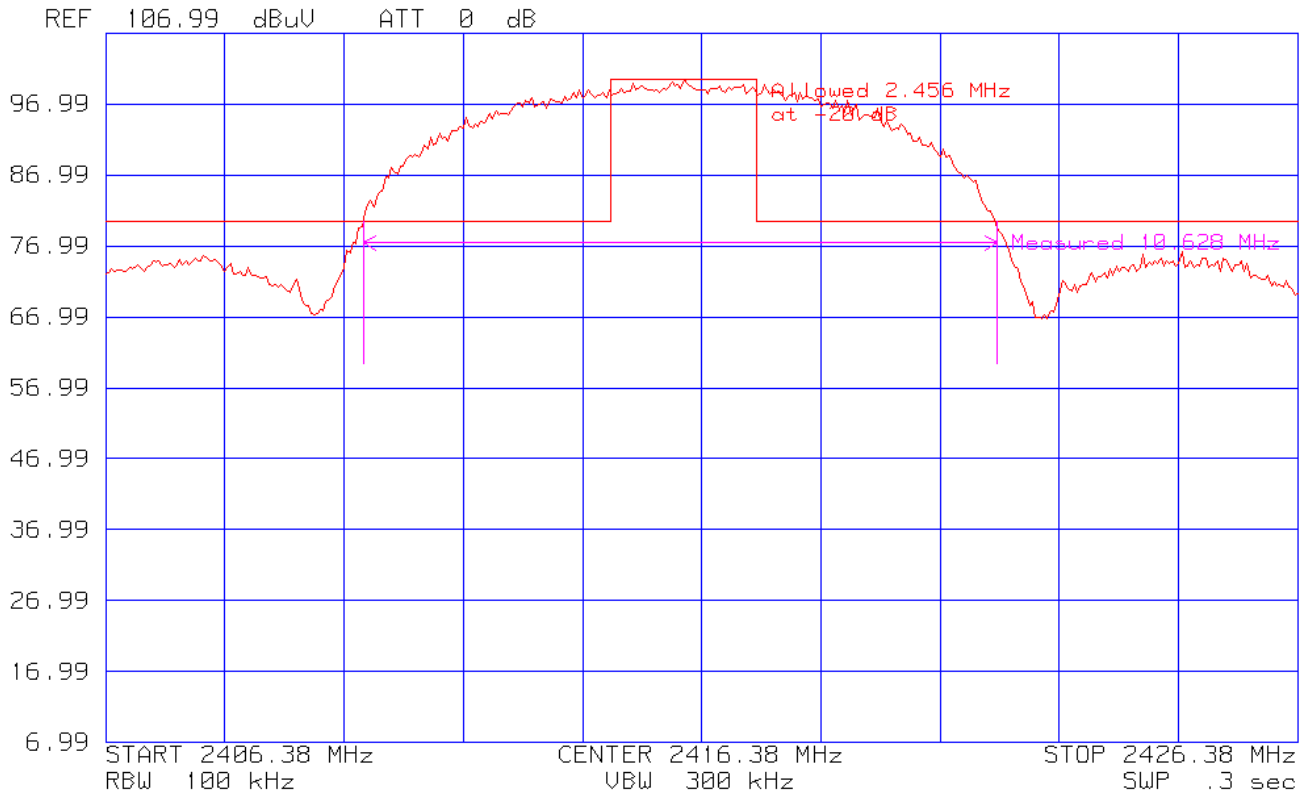
6dB Occupied Bandwidth (Channel B, Bandplan 1)



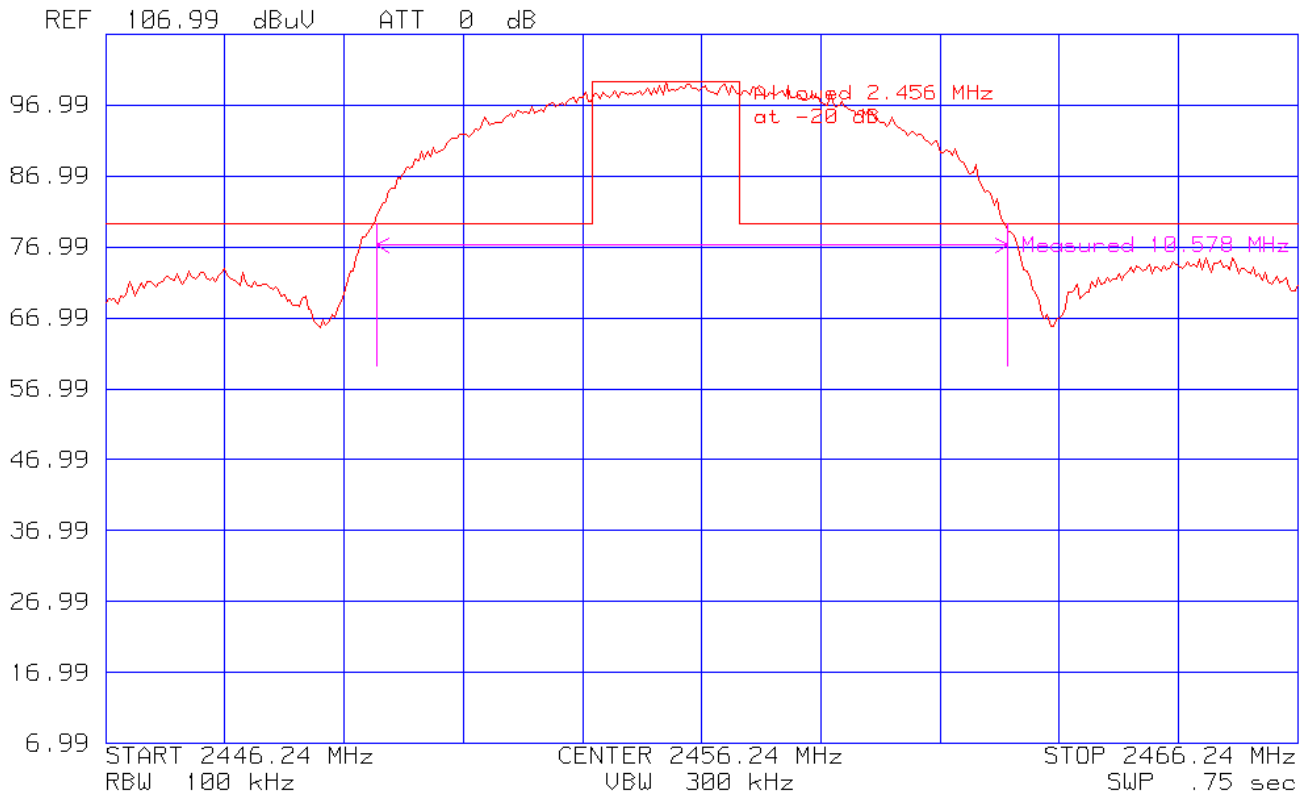
6dB Occupied Bandwidth (Channel B, Bandplan 3)



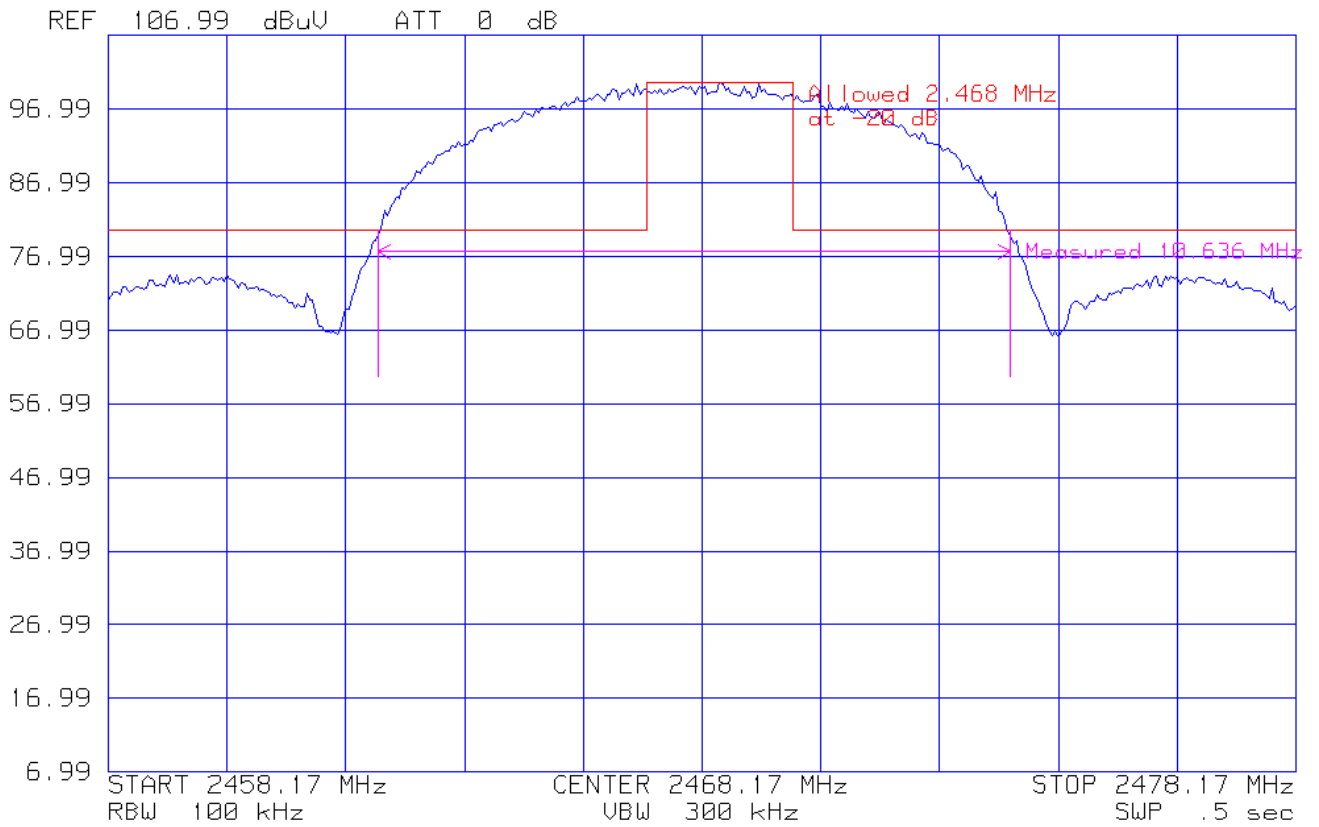
20dB Occupied Bandwidth (Channel A, Bandplan 1)



20dB Occupied Bandwidth (Channel B, Bandplan 1)



20dB Occupied Bandwidth (Channel B, Bandplan 3)



### 5.1.3 Spectral Density - Digitally Modulated Spread Spectrum

**Test Requirement:** 47 CFR Part 15.247

**Test Specification:** ANSI C63.4:2001

**Test Procedure:**

Testing is performed with a measurement spectrum analyzer connected directly from the output stage of the antenna port to the spectrum analyzer. An impedance matching network is installed if needed.

The spectrum analyzer Resolution Bandwidth was set to 3 kHz and Video Bandwidth 30 kHz or greater for the measurement. A plot of the spectrum analyzer display screen is produced with marker points displaying the highest peak emission. This is verified to be less than 8 dBm.

Limits - FCC Part 15.247(d)
Spectral Density
< 8dBm / 3 kHz

**Test Deviations:**

None

**Test Setup:** Only the following ports were tested. See EUT Information for details.

Port #	Port Name	EUT Operation Mode	EUT Configuration	Power Interface
2	Antenna	1	1	1
2	Antenna	2	1	1
2	Antenna	3	1	1

### Results

The system met the requirements for radiated emissions. Data Pages follow.

Temperature:	19.0 °C	20.0 °C
Humidity:	43.0 %RH	40.0 %RH
Pressure:	1022 mbar	998 mbar
Date test performed:	01 December 2004	09 May 2005

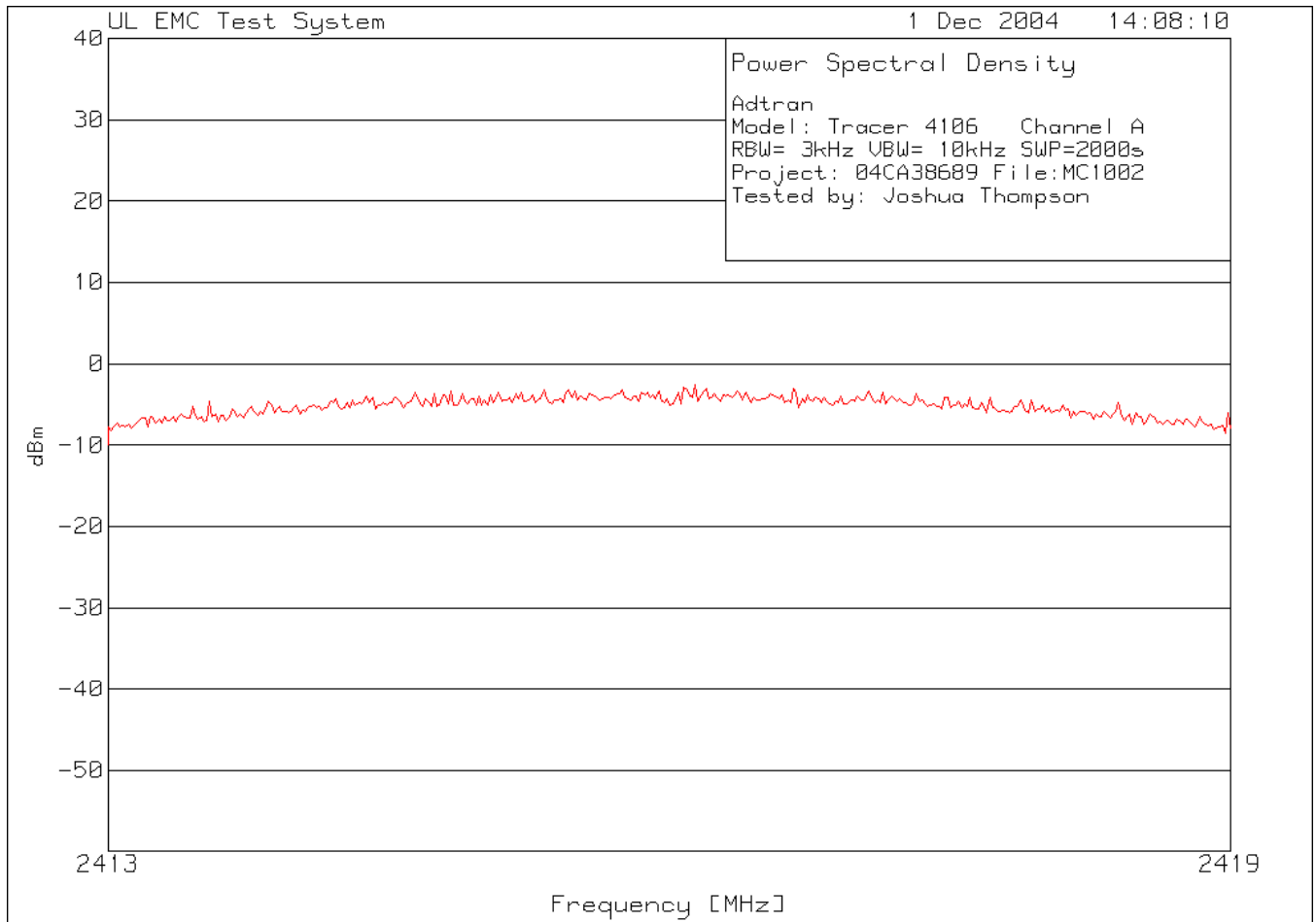
**Test Results Summary:**

EUT Operation Mode	Pass/Fail (P/F)	Comment #
1	P	PSD = -2.6dBm / 3kHz RBW
2	P	PSD = -2.98dBm / 3kHz RBW
3	P	PSD = -3.02dBm / 3kHz RBW

**Test equipment used for Spectral Density E7402A**

<b>Agilent Technologies</b>	<b>EMI Spectrum Analyzer</b>	<b>Equipment No.: ME5B-123</b>
Range: 2.4 - 2.483GHz <b>48-20-43</b>	Last Calibration Date: 17 August 2004 <b>Weinschel Corp</b>	<b>Resolution BW: 3kHz</b> <b>Video BW: 10kHz</b> Calibration Due Date: 17 August 2005
Range: 2.4 - 2.483GHz <b>99760-00</b>	Last Calibration Date: 15 November 2004 <b>Cole -Parmer</b>	<b>20dB Attenuator</b> <b>Equipment No.: ME7A-685</b> Calibration Due Date: 15 November 2005
	<b>Hygrometer/Temp/Barometer</b> Ranges	<b>Equipment No.: ME4-268</b> Temp: 0°C-55°C Humidity: 25% to 95 %RH Pressure: 795 to 1050 mbar Calibration Due Date: 18 June 2005
	Last Calibration Date: 18 June 2004	

Spectral Density (Channel A, Bandplan 1)





---

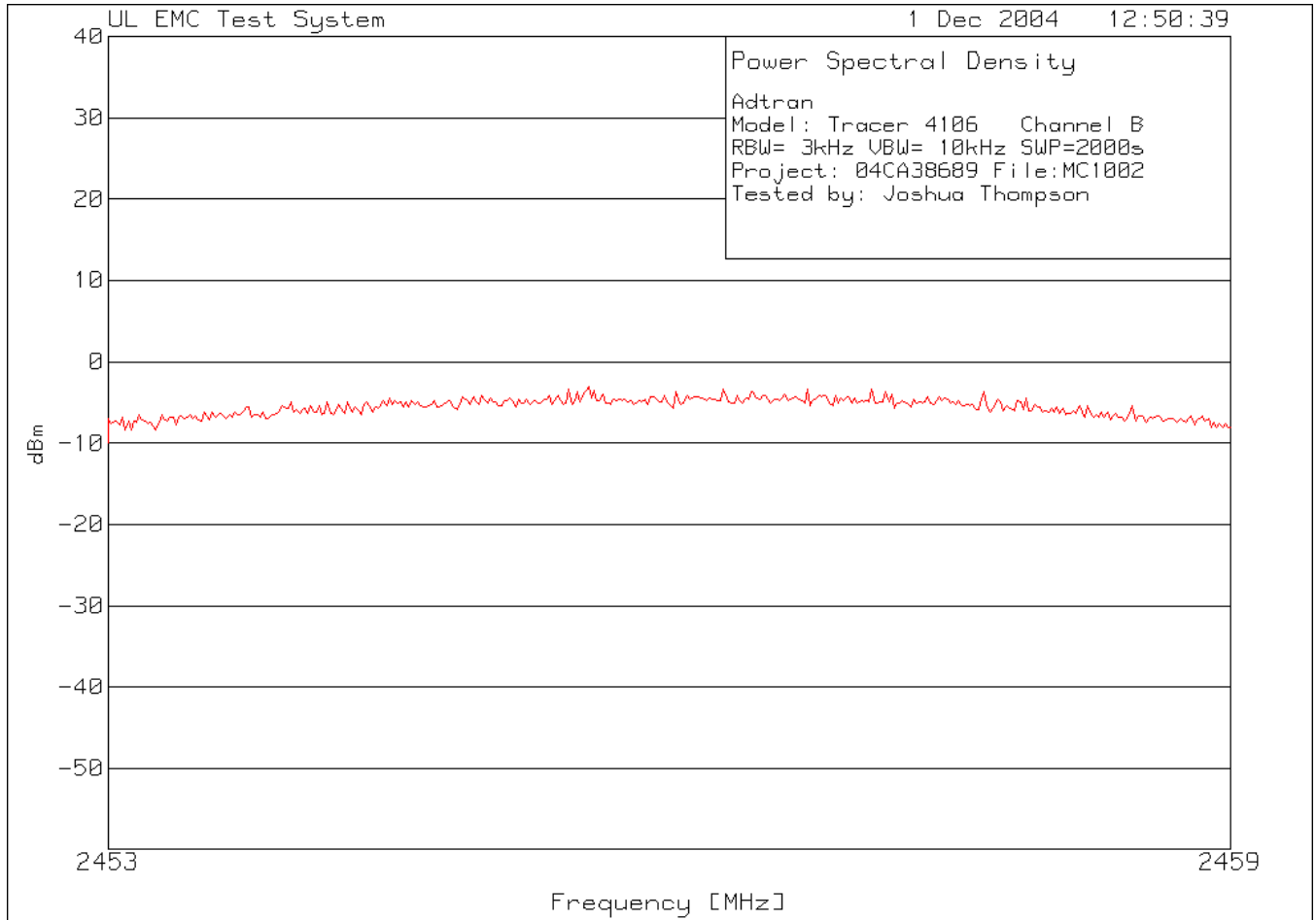
Adtran  
Model: Tracer 4106 Channel A  
RBW= 3kHz VBW= 10kHz SWP=2000s  
Project: 04CA38689 File:MC1002  
Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Conv. Factor [dB]	Level [dBm]	Limit [dBm/3kHz BW]
=====						
Range 1	2413 - 2419MHz	-----				
1	2416.135	85.8 pk	18.6	-107	-2.6	8
				Margin [dB]		-10.6

LIMIT 1: Spectral Density

pk - Peak detector  
qp - Quasi-Peak detector  
av - Average detector  
avlg - denotes average log detection  
ave - denotes average detection  
tm - Trace Math Result

Spectral Density (Channel B, Bandplan 1)



Adtran

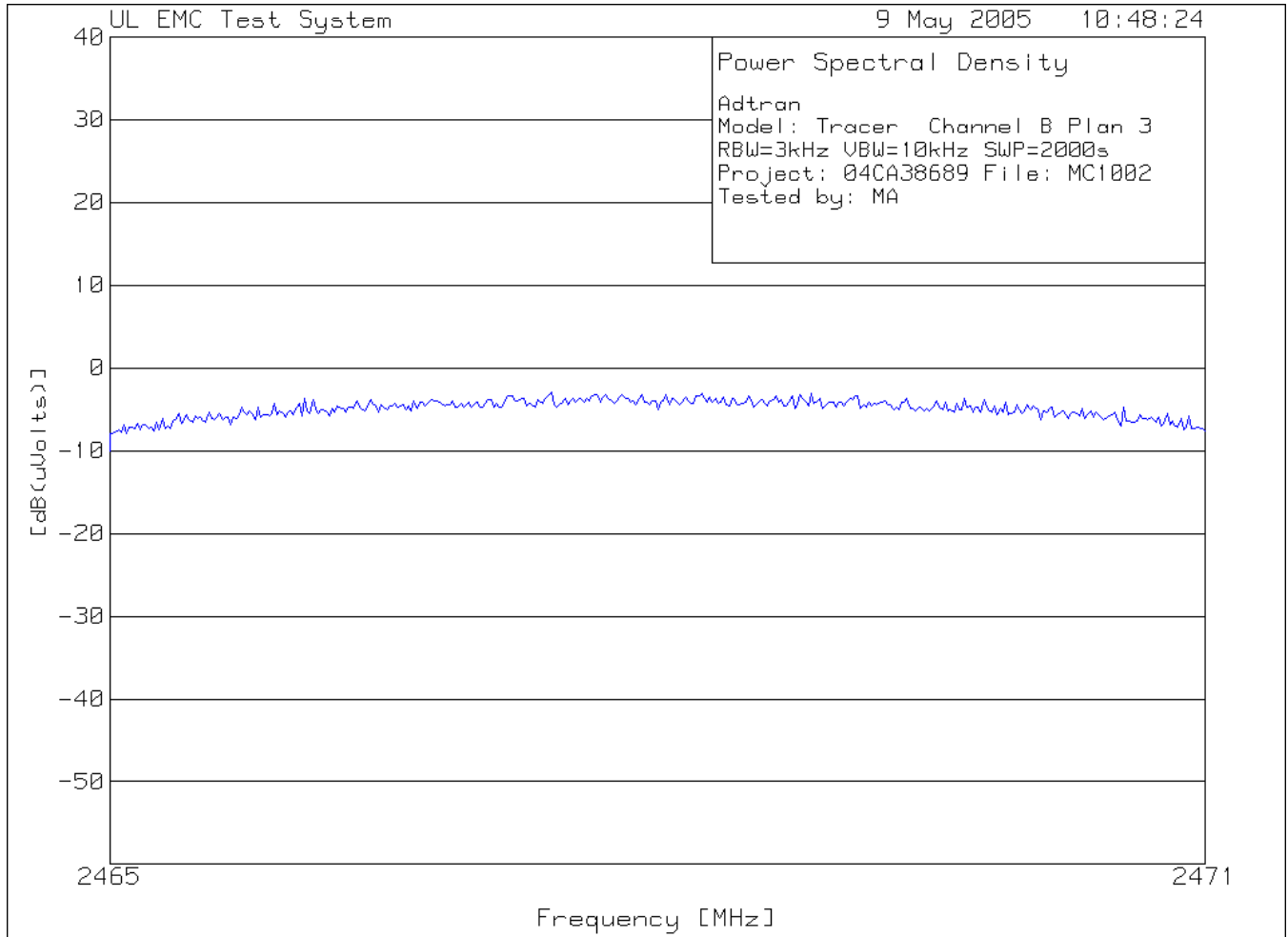
Model: Tracer 4106 Channel B  
RBW= 3kHz VBW= 10kHz SWP=2000s  
Project: 04CA38689 File:MC1002  
Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Conv. Factor [dB]	Level [dBm]	Limit [dBm/3kHz BW]
=====						
Range 1	2453 - 2459MHz	-----				
1	2455.565	85.32 pk	18.7	-107	-2.98	8
				Margin [dB]		-10.98

LIMIT 1: Spectral Density

pk - Peak detector  
qp - Quasi-Peak detector  
av - Average detector  
avlg - denotes average log detection  
ave - denotes average detection  
tm - Trace Math Result

Spectral Density (Channel B, Bandplan 3)



---

Adtran  
Model: Tracer Channel B Plan 3  
RBW=3kHz VBW=10kHz SWP=2000s  
Project: 04CA38689 File: MC1002  
Tested by: MA

No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Conv. Factor [dB]	Level [dBm]	Limit [dBm/3kHz BW]
=====						
Range 1	2465 - 2471MHz	-----				
1	2468.24	85.68 pk	18.3	-107	-3.02	8
				Margin [dB]		-11.02

LIMIT 1: Spectral Density

pk - Peak detector  
qp - Quasi-Peak detector  
av - Average detector  
avlg - denotes average log detection  
ave - denotes average detection  
tm - Trace Math Result

### 5.1.4 Bandedge

**Test Requirement:** 47 CFR Part 15 Subpart C

**Test Specification:** 47 CFR Part 15.247

**Test Procedure:**

All testing was performed as a conducted measurement. The output of the EUT is connected to the input of a spectrum analyzer. A 50-ohm, 30 dB (nominal) attenuator is used to reduce the signal.

The spectrum analyzer Resolution Bandwidth and Video Bandwidth were set to 1 MHz for the measurement. A plot of the spectrum analyzer display screen is produced with marker points displaying the intended signal along with the -20 dB frequency and the signal strength at the band edges.

Limits - FCC Part 15.247

Bandedge frequencies	Criteria
2400 (Lower Edge)	Outside occupied BW (low channel)
2483.5 (Upper Edge)	Outside occupied BW (high channel)

**Test Deviations:**

None

**Test Setup:** Only the following ports were tested. See EUT Information for details.

Port #	Port Name	EUT Operation Mode	EUT Configuration	Power Interface
2	Antenna	1	1	1
2	Antenna	2	1	1
2	Antenna	3	1	1

**Results**

The system met the bandedge requirements. Data Pages follow.

Temperature:	19.0 °C	20.0 °C
Humidity:	43.0 %RH	40.0 %RH
Pressure:	1022 mbar	998 mbar
Date test performed:	01 December 2004	09 May 2005

**Test Results Summary:**

EUT Operation Mode	Pass/Fail (P/F)	Comment #
1	P	None
2	P	None
3	P	None

**Test equipment used for Bandedge**

**E7402A**

**Agilent Technologies**

**EMI Spectrum Analyzer**

**Equipment No.: ME5B-123**

Range: 2.39 - 2.494GHz

Last Calibration Date: 17 August 2004

**Resolution BW: 1MHz**

**Video BW: 1MHz**

Calibration Due Date: 17 August 2005

**48-20-43**

**Weinschel Corp**

**20dB Attenuator**

**Equipment No.: ME7A-685**

Range: 2.39 - 2.494GHz

Last Calibration Date: 15 November 2004

Calibration Due Date: 15 November 2005

**99760-00**

**Cole -Parmer**

**Hygrometer/Temp/Barometer Ranges**

**Equipment No.: ME4-268**

Temp: 0°C-55°C

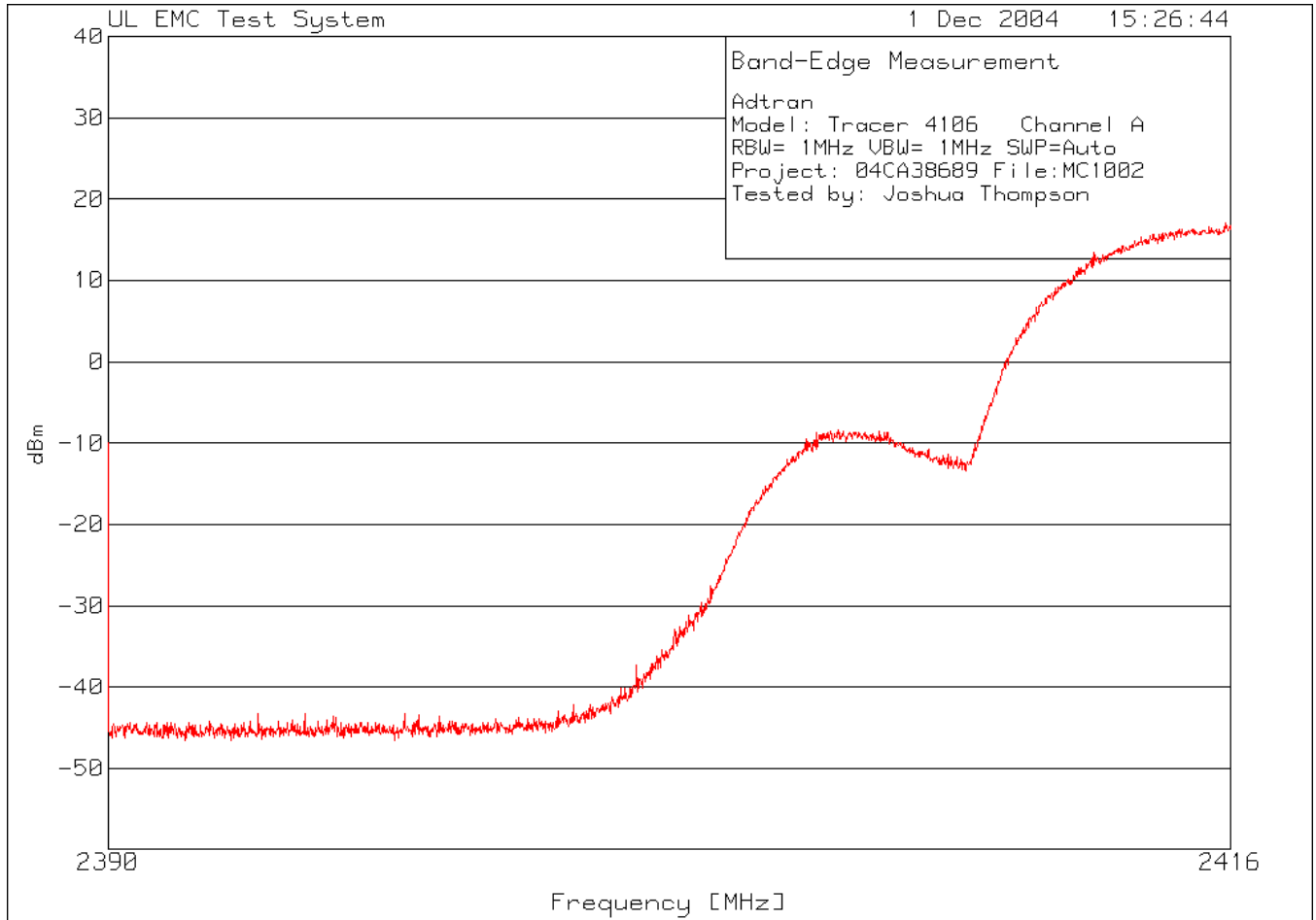
Humidity: 25% to 95 %RH

Pressure: 795 to 1050 mbar

Last Calibration Date: 18 June 2004

Calibration Due Date: 18 June 2005

Bandedge (Channel A, Bandplan 1)





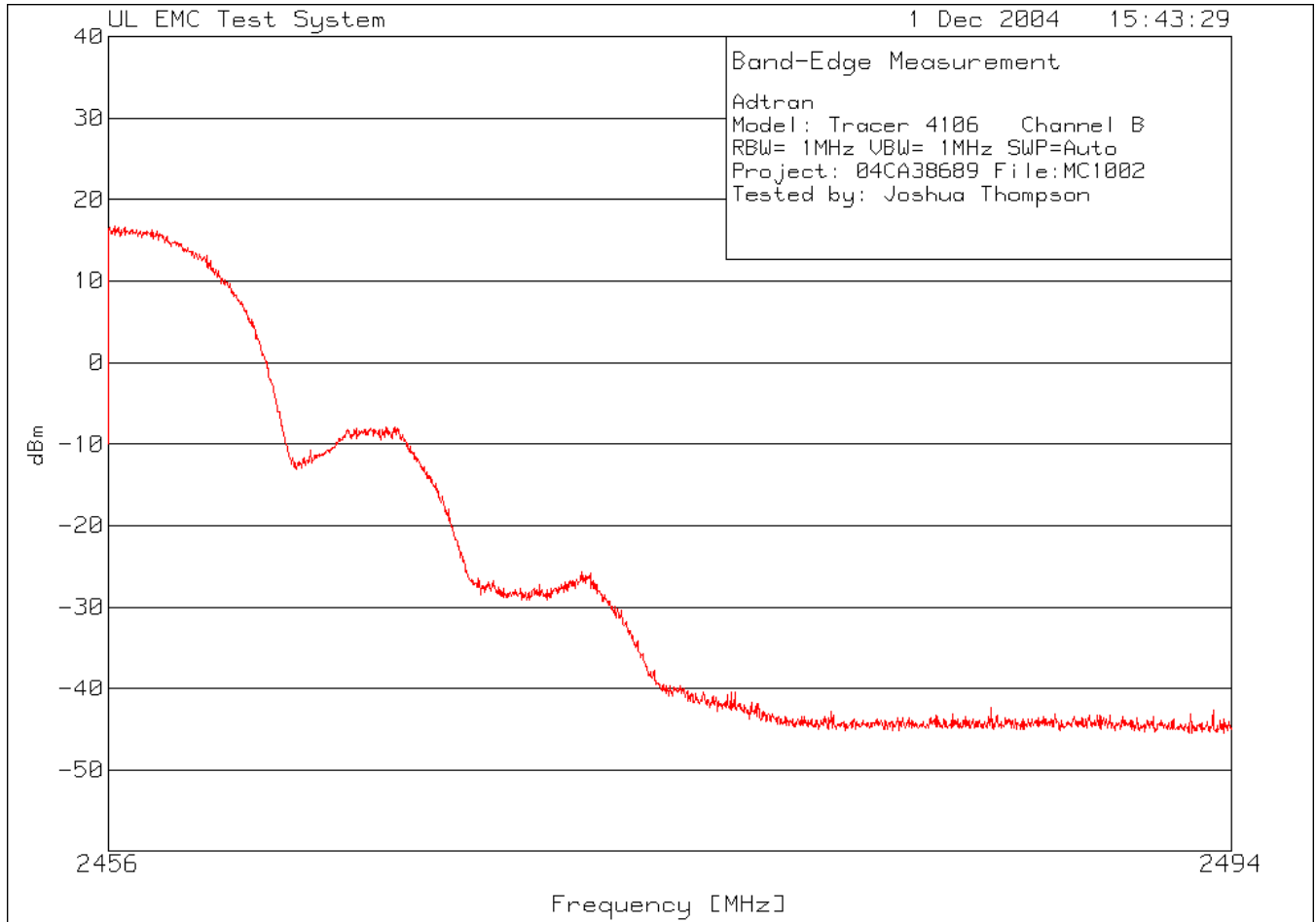
Adtran  
Model: Tracer 4106 Channel A  
RBW= 1MHz VBW= 1MHz SWP=Auto  
Project: 04CA38689 File:MC1002  
Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dBm
=====					
Range 1 2390 - 2416MHz -----					
Lower Bandedge Frequency (2400 MHz)					
1	2400.381	45.3 pk	18.8	-107	-42.9
				Margin [dB]	
-20db Down Frequency					
2	2406.885	80.09 pk	18.6	-107	-8.31
				Margin [dB]	
Peak Measurement Frequency					
3	2415.87	105.52 pk	18.6	-107	17.12
				Margin [dB]	

LIMIT 1: NONE  
LIMIT 2: NONE  
LIMIT 3: NONE  
LIMIT 4: NONE  
LIMIT 5: NONE  
LIMIT 6: NONE

pk - Peak detector  
qp - Quasi-Peak detector  
av - Average detector  
avlg - denotes average log detection  
ave - denotes average detection  
tm - Trace Math Result

Bandedge (Channel B, Bandplan 1)



Adtran

Model: Tracer 4106 Channel B  
RBW= 1MHz VBW= 1MHz SWP=Auto  
Project: 04CA38689 File:MC1002  
Tested by: Joshua Thompson

No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dBm
-----	----------------------	-------------------------	-----------------------	------------------------	-----------

=====  
Range 1 2456 - 2494MHz -----

Upper Bandedge Frequency (2483.5 MHz)

1	2483.498	44.32 pk	18.7	-107	-43.98
				Margin [dB]	

-20dB Down Frequency

2	2465.316	80.41 pk	18.7	-107	-7.89
				Margin [dB]	

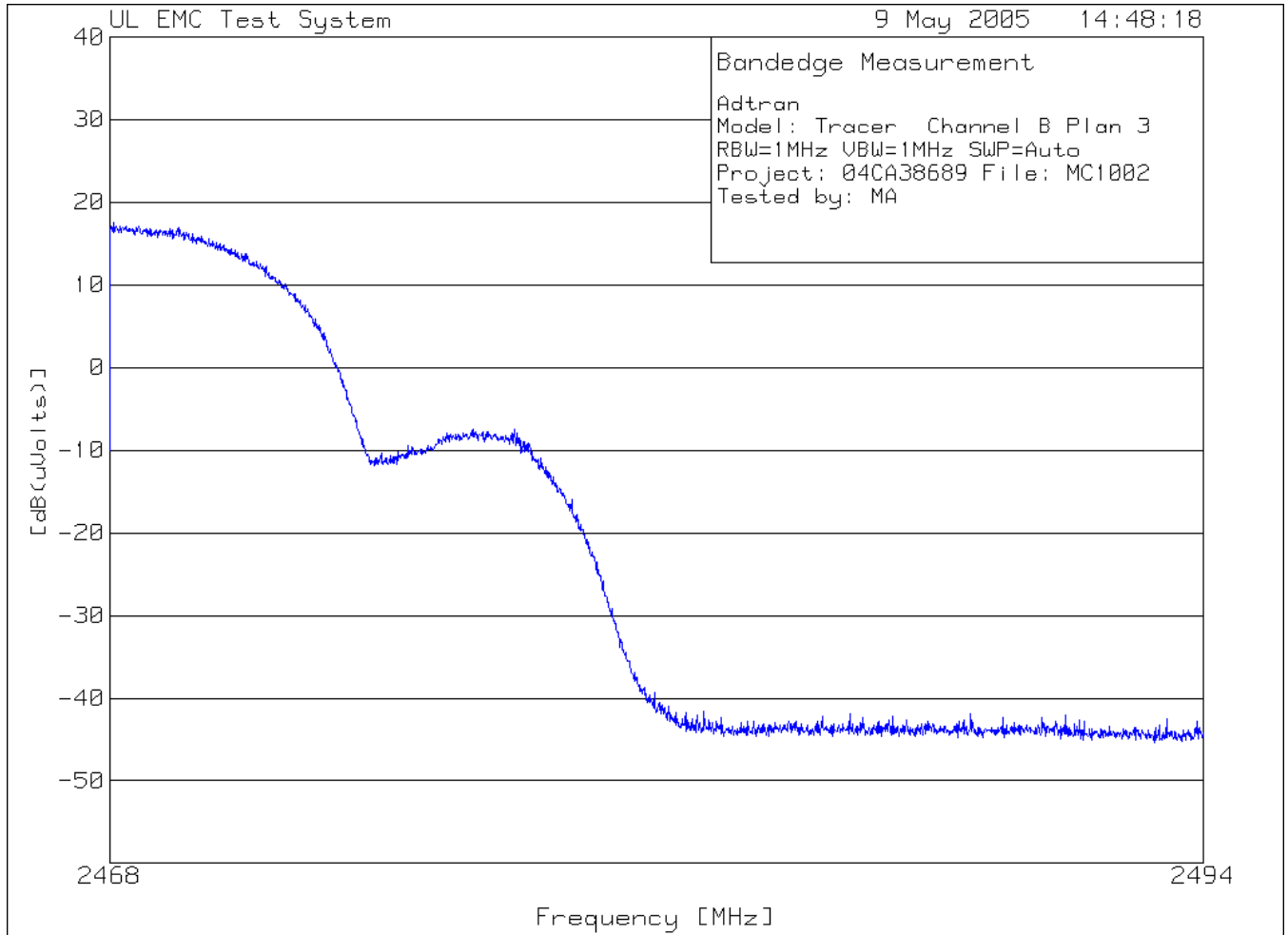
Peak Measurement Frequency

3	2456.19	105.04 pk	18.7	-107	16.74
				Margin [dB]	

LIMIT 1: NONE  
LIMIT 2: NONE  
LIMIT 3: NONE  
LIMIT 4: NONE  
LIMIT 5: NONE  
LIMIT 6: NONE

pk - Peak detector  
qp - Quasi-Peak detector  
av - Average detector  
avlg - denotes average log detection  
ave - denotes average detection  
tm - Trace Math Result

Bandedge (Channel B, Bandplan 3)



Adtran  
Model: Tracer Channel B Plan 3  
RBW=1MHz VBW=1MHz SWP=Auto  
Project: 04CA38689 File: MC1002  
Tested by: MA

No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB (uVolts)]	Limit
-----	----------------------	-------------------------	-----------------------	------------------------	---------------------	-------

=====  
Range 1 2468 - 2494MHz -----

Peak Measurement Frequency						
1	2468.097	106.28 pk	18.3	-107	17.58	Margin [dB]
-20dB Down Frequency						
2	2477.586	80.67 pk	18.8	-107	-7.53	Margin [dB]
Upper Bandedge Frequency						
3	2483.095	46.66 pk	18.7	-107	-41.64	Margin [dB]

LIMIT 1: NONE  
LIMIT 2: NONE  
LIMIT 3: NONE  
LIMIT 4: NONE  
LIMIT 5: NONE  
LIMIT 6: NONE

pk - Peak detector  
qp - Quasi-Peak detector  
av - Average detector  
avlg - denotes average log detection  
ave - denotes average detection  
tm - Trace Math Result

## 5.1.5 Radiated Spurious Emissions

**Test Requirement:** 47 CFR Part 15.247

**Test Specification:** ANSI C63.42:2001

**Test Procedure:**

The test was performed in accordance with the Test Requirement and Specification and configured as noted in the Test Setup. The EUT was placed inside the anechoic chamber. A peak measurement was first made by scanning the entire test frequency range and maximizing the EUT emissions by rotating the EUT and raising the antenna height from 1 to 4 meters above the ground reference plane. Then, a measurement was taken for all peak emissions to verify each were below the Test Limits.

Radiated Disturbance Limits for Manually Operated Transmitters - Section 15.247  
at a measurement distance of 3 meters

Power of Fundamental		Field Strength of Spurious*	
(mW)	(dBm)	(mW)	(dBm)
1000	30	10	10

\* Spurious emissions inside restricted band must comply with general limits of 54 dBuV/m (average) at 3 meters. Harmonics at 2, 3, 5, 6, 8, and 9 times the transmit frequencies lie either wholly or partially within restricted bands. Harmonics at 4, 7, and 10 times the fundamental frequency do not lie within restricted bands. All spurious emissions are compared with general limits for convenience.

**Test Deviations:**

None

**Test Setup:** Only the following ports were tested. See EUT Information for details.

Port #	Port Name	EUT Operation Mode	EUT Configuration	Power Interface
0	Enclosure	1	1	1
0	Enclosure	2	1	1
0	Enclosure	3	1	1

Measurements were made in a 10-meter semi-anechoic chamber that complies to ANSI C63.4. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

### Results

The system met the requirements for radiated emissions. Data Pages follow.

Temperature:	20.0 °C	21.5 °C
Humidity:	44.0 %RH	42.0 %RH
Pressure:	1019 mbar	1013 mbar
Date test performed:	07 January 2005	26 May 2005

#### Test Results Summary:

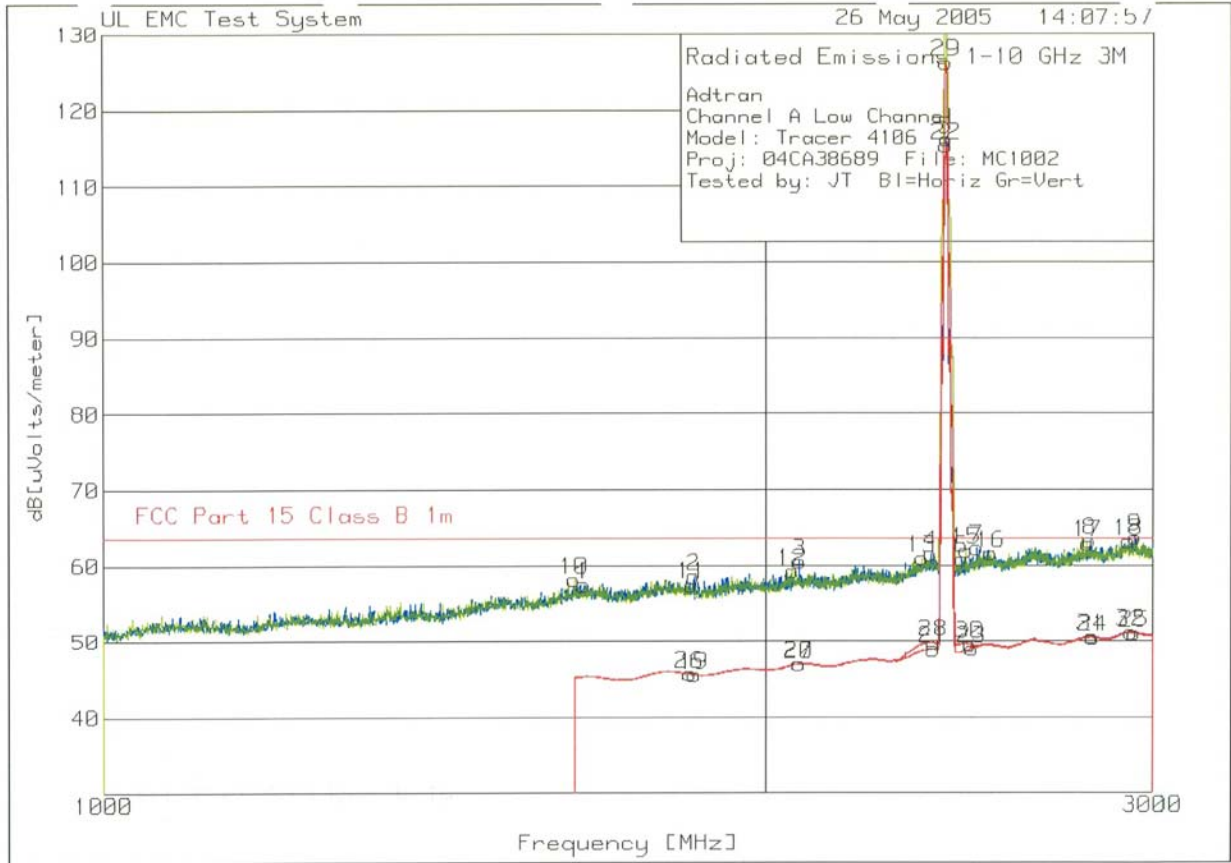
EUT Operation Mode	Pass/Fail (P/F)	Comment #
1	P	None
2	P	None
3	P	None

#### Test equipment used for Radiated Emissions

<b>ESI26</b>	<b>Rohde &amp; Schwarz</b>	<b>EMI Receiver</b>	<b>Equipment No.: ME5B-081</b>
			<b>Resolution BW: 1MHz</b>
			<b>Video BW: 1MHz</b>
Range: 1-25GHz	Last Calibration Date: 07 September 2004		Calibration Due Date: 07 September 2005

#### Test Accessories for Radiated Emissions

<b>RGA-180</b>	<b>EMCO</b>	<b>Horn Antenna</b>	<b>Equipment No.: ME5-565</b>
Range: 1-18GHz	Last Calibration Date: 07 July 2004		Calibration Due Date: 07 July 2005
<b>8449B</b>	<b>Hewlett Packard</b>	<b>1-26GHz Pre-Amp</b>	<b>Equipment No.: ME5-914</b>
Range: 1-18GHz	Last Calibration Date: 21 January 2004		Calibration Due Date: 21 January 2005
<b>99760-00</b>	<b>Cole -Parmer</b>	<b>Hygrometer/Temp/Baro meter</b>	<b>Equipment No.: ME4-268</b>
		Ranges	Temp: 0°C-55°C
			Humidity: 25% to 95 %RH
			Pressure: 795 to 1050 mbar
	Last Calibration Date: 18 June 2004		Calibration Due Date: 18 June 2005
<b>18-40GHz Antenna System</b>	<b>ETS 3160-09 (S/N 1238) &amp; ETS 3160-010 (S/N 1190) Horn Antennas</b>		<b>Equipment No.: AT0044</b>
Range: 18-25GHz	Last Calibration Date: 05 August 2004		Calibration Due Date: 05 August 2005



Note: Measurements from 1-3 GHz were performed at 1 meter distance. Three meter limit is adjusted upward by 9.54 dB (1/r). These measurements were performed with the receiver located inside the measurement chamber.

For the scan in red from 1.7GHz to 3 GHz, the RBW = 1MHz and the VBW = 10Hz.



Adtran  
 Channel A Low Channel  
 Model: Tracer 4106  
 Proj: 04CA38689 File: MC1002  
 Tested by: JT Bl=Horiz Gr=Vert

No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3
Horizontal 30 - 200MHz -----								
1	1652.884	26.25 pk	5.4	25.8	57.45	63.5	-	-
	Azimuth:271	Height:101	Horz	Margin [dB]		-6.05	-	-
2	1854.285	26.15 pk	5.7	26.7	58.55	63.5	-	-
	Azimuth:148	Height:101	Horz	Margin [dB]		-4.95	-	-
3	2071.691	26.93 pk	6	27.6	60.53	63.5	-	-
	Azimuth:53	Height:101	Horz	Margin [dB]		-2.97	-	-
4	2378.46	26.74 pk	6.5	28.3	61.54	63.5	-	-
	Azimuth:17	Height:101	Horz	Margin [dB]		-1.96	-	-
6	2456.486	25.75 pk	6.6	28.5	60.85	63.5	-	-
	Azimuth:254	Height:123	Horz	Margin [dB]		-2.65	-	-
7	2495.165	27.01 pk	6.7	28.6	62.31	63.5	-	-
	Azimuth:344	Height:123	Horz	Margin [dB]		-1.19	-	-
8	2809.27	26.55 pk	7.2	29.5	63.25	63.5	-	-
	Azimuth:212	Height:101	Horz	Margin [dB]		-.25	-	-
9	2945.315	26.48 pk	7.3	29.9	63.68	63.5	-	-
	Azimuth:212	Height:101	Horz	Margin [dB]		.18	-	-
Vertical 30 - 200MHz -----								
10	1636.212	27 pk	5.4	25.7	58.1	63.5	-	-
	Azimuth:8	Height:123	Vert	Margin [dB]		-5.4	-	-
11	1849.617	24.99 pk	5.7	26.7	57.39	63.5	-	-
	Azimuth:95	Height:101	Vert	Margin [dB]		-6.11	-	-
12	2056.352	25.73 pk	6	27.5	59.23	63.5	-	-
	Azimuth:2	Height:123	Vert	Margin [dB]		-4.27	-	-
13	2355.785	26.22 pk	6.4	28.3	60.92	63.5	-	-
	Azimuth:352	Height:101	Vert	Margin [dB]		-2.58	-	-
15	2468.49	26.88 pk	6.6	28.5	61.98	63.5	-	-
	Azimuth:253	Height:101	Vert	Margin [dB]		-1.52	-	-
16	2533.845	26.18 pk	6.7	28.7	61.58	63.5	-	-
	Azimuth:306	Height:101	Vert	Margin [dB]		-1.92	-	-
17	2801.934	26.21 pk	7.2	29.5	62.91	63.5	-	-
	Azimuth:53	Height:101	Vert	Margin [dB]		-.59	-	-
18	2924.642	25.97 pk	7.3	29.9	63.17	63.5	-	-
	Azimuth:343	Height:123	Vert	Margin [dB]		-.33	-	-

File Number: MC1002  
Project Number: 04CA38689  
Model Number: Tracer 4106

Issued: 1/30/2006  
FCC ID: HDCTRC4106L2

---

LIMIT 1: FCC Part 15 Class B 1m  
LIMIT 2: NONE  
LIMIT 3: NONE  
LIMIT 4: NONE  
LIMIT 5: NONE  
LIMIT 6: NONE

pk - Peak detector  
qp - Quasi-Peak detector  
av - Average detector  
avlg - denotes average log detection  
ave - denotes average detection  
tm - Trace Math Result

Adtran  
 Channel A Low Channel  
 Model: Tracer 4106  
 Proj: 04CA38689 File: MC1002  
 Tested by: JT Bl=Horiz Gr=Vert

Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
Horizontal 1000 - 3000MHz								
1854.285	12.54	ave 5.7	26.7	44.94	63.5	-	-	-
Azimuth: 360 Height:124 Horz					Margin [dB]:	-18.56	-	-
2071.691	12.01	ave 6	27.6	45.61	63.5	-	-	-
Azimuth: 360 Height:124 Horz					Margin [dB]:	-17.89	-	-
2378.46	12.16	ave 6.5	28.3	46.96	63.5	-	-	-
Azimuth: 360 Height:124 Horz					Margin [dB]:	-16.54	-	-
2456.486	12.17	ave 6.6	28.5	47.27	63.5	-	-	-
Azimuth: 360 Height:124 Horz					Margin [dB]:	-16.23	-	-
2495.165	12.58	ave 6.7	28.6	47.88	63.5	-	-	-
Azimuth: 360 Height:124 Horz					Margin [dB]:	-15.62	-	-
2809.27	12.61	ave 7.2	29.5	49.31	63.5	-	-	-
Azimuth: 360 Height:124 Horz					Margin [dB]:	-14.19	-	-
2945.315	12.36	ave 7.3	29.9	49.56	63.5	-	-	-
Azimuth: 360 Height:124 Horz					Margin [dB]:	-13.94	-	-
Verical 1000 - 3000MHz								
1636.212	12.13	ave 5.4	25.7	43.23	63.5	-	-	-
Azimuth: 360 Height:101 Horz					Margin [dB]:	-20.27	-	-
1849.617	12.49	ave 5.7	26.7	44.89	63.5	-	-	-
Azimuth: 360 Height:101 Horz					Margin [dB]:	-18.61	-	-
2056.352	12.22	ave 6	27.5	45.72	63.5	-	-	-
Azimuth: 360 Height:101 Horz					Margin [dB]:	-17.78	-	-
2355.785	12.49	ave 6.4	28.3	47.19	63.5	-	-	-
Azimuth: 360 Height:101 Horz					Margin [dB]:	-16.31	-	-
2468.49	12.62	ave 6.6	28.5	47.72	63.5	-	-	-
Azimuth: 360 Height:101 Horz					Margin [dB]:	-15.78	-	-
2533.845	12.65	ave 6.7	28.7	48.05	63.5	-	-	-
Azimuth: 360 Height:101 Horz					Margin [dB]:	-15.45	-	-

File Number: MC1002  
Project Number: 04CA38689  
Model Number: Tracer 4106

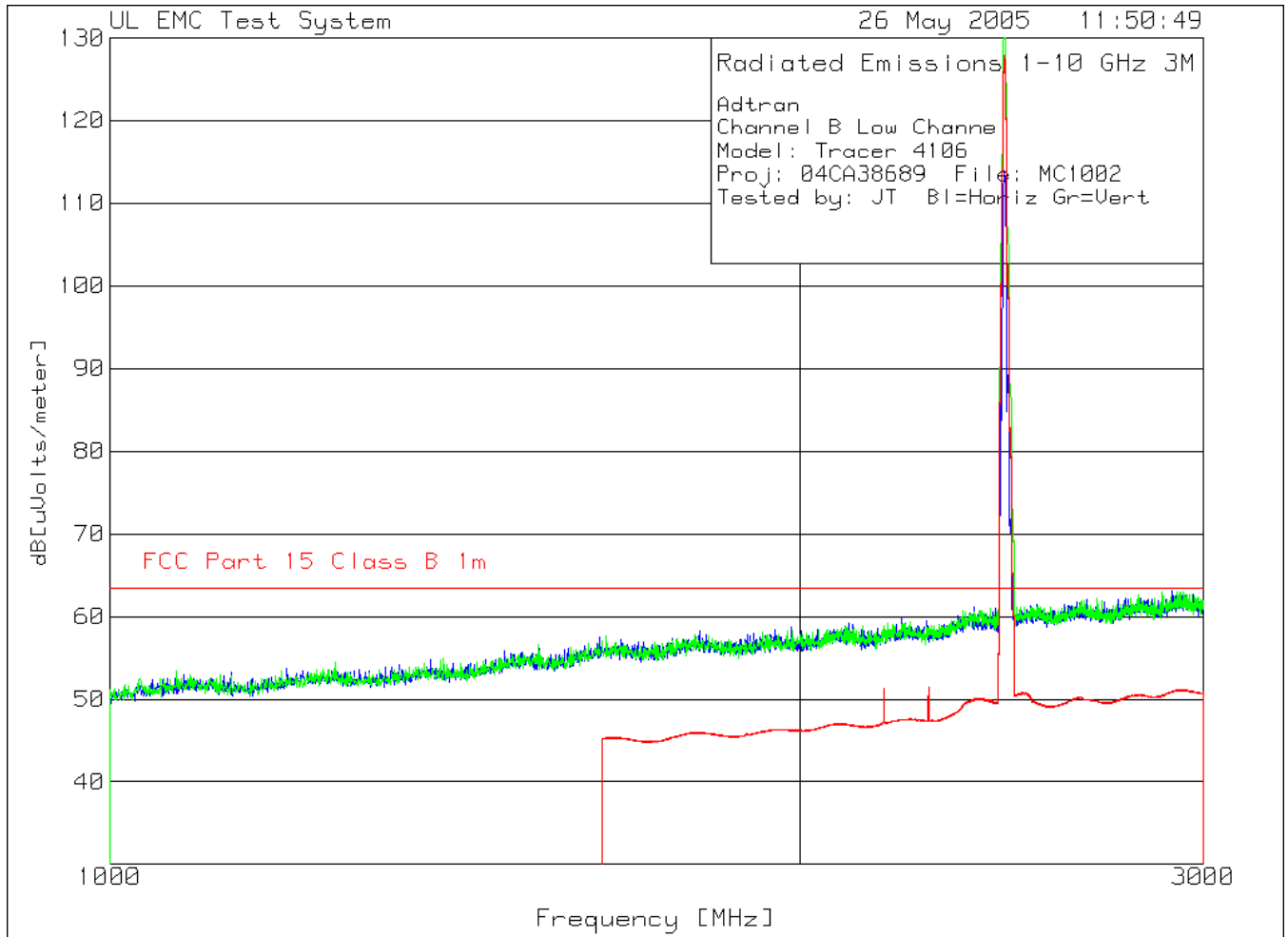
Issued: 1/30/2006  
FCC ID: HDCTRC4106L2

---

2801.934	12.65 ave	7.2	29.5	49.35	63.5	-	-	-
Azimuth: 360 Height:101 Horz			Margin [dB]:			-14.15	-	-
2924.642	12.4 ave	7.3	29.9	49.6	63.5	-	-	-
Azimuth: 360 Height:101 Horz			Margin [dB]:			-13.9	-	-

LIMIT 1: FCC Part 15 Class B 1m  
LIMIT 2: NONE  
LIMIT 3: NONE  
LIMIT 4: NONE  
LIMIT 5: NONE  
LIMIT 6: NONE

pk - Peak detector  
qp - Quasi-Peak detector  
av - Average detector  
avlg - denotes average log detection  
ave - denotes average detection  
tm - Trace Math Result



Note: Measurements from 1-3 GHz were performed at 1 meter distance. Three meter limit is adjusted upward by 9.54 dB (1/r). These measurements were performed with the receiver located inside the measurement chamber.

For the scan in red from 1.7GHz to 3 GHz, the RBW = 1MHz and the VBW = 10Hz.

Adtran  
 Channel B Low Channel  
 Model: Tracer 4106  
 Proj: 04CA38689 File: MC1002  
 Tested by: JT Bl=Horiz Gr=Vert

No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3
Horizontal 1000 - 3000MHz -----								
1	1636.212	26.41 pk	5.4	25.7	57.51	63.5	-	-
	Azimuth:16	Height:124	Horz	Margin	[dB]	-5.99	-	-
2	2215.739	25.79 pk	6.2	27.9	59.89	63.5	-	-
	Azimuth:16	Height:124	Horz	Margin	[dB]	-3.61	-	-
3	2382.461	26.3 pk	6.5	28.3	61.1	63.5	-	-
	Azimuth:16	Height:124	Horz	Margin	[dB]	-2.4	-	-
5	2521.841	25.95 pk	6.7	28.7	61.35	63.5	-	-
	Azimuth:16	Height:101	Horz	Margin	[dB]	-2.15	-	-
6	2667.223	26.06 pk	6.9	29.1	62.06	63.5	-	-
	Azimuth:344	Height:124	Horz	Margin	[dB]	-1.44	-	-
7	2930.644	25.45 pk	7.3	29.9	62.65	63.5	-	-
	Azimuth:236	Height:101	Horz	Margin	[dB]	-.85	-	-
Vertical 1000 - 3000MHz -----								
8	1646.215	26.41 pk	5.4	25.8	57.61	63.5	-	-
	Azimuth:17	Height:101	Vert	Margin	[dB]	-5.89	-	-
9	2217.072	25.03 pk	6.2	27.9	59.13	63.5	-	-
	Azimuth:344	Height:123	Vert	Margin	[dB]	-4.37	-	-
10	2396.466	25.85 pk	6.5	28.4	60.75	63.5	-	-
	Azimuth:358	Height:123	Vert	Margin	[dB]	-2.75	-	-
12	2495.832	25.92 pk	6.7	28.6	61.22	63.5	-	-
	Azimuth:344	Height:123	Vert	Margin	[dB]	-2.28	-	-
13	2653.885	25.98 pk	6.9	29.1	61.98	63.5	-	-
	Azimuth:124	Height:123	Vert	Margin	[dB]	-1.52	-	-
14	2919.973	25.82 pk	7.3	29.9	63.02	63.5	-	-
	Azimuth:344	Height:123	Vert	Margin	[dB]	-.48	-	-

LIMIT 1: FCC Part 15 Class B 1m

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - denotes average log detection  
 ave - denotes average detection  
 tm - Trace Math Result

Adtran  
 Channel B Low Channel  
 Model: Tracer 4106  
 Proj: 04CA38689 File: MC1002  
 Tested by: JT Bl=Horiz Gr=Vert

Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
Horizontal 1000 - 3000MHz								
1636.212	12.02 ave	5.4	25.7	43.12	63.5	-	-	-
Azimuth: 357		Height:124	Horz	Margin [dB]:	-20.38	-	-	-
2215.739	11.84 ave	6.2	27.9	45.94	63.5	-	-	-
Azimuth: 357		Height:124	Horz	Margin [dB]:	-17.56	-	-	-
2382.461	12.03 ave	6.5	28.3	46.83	63.5	-	-	-
Azimuth: 357		Height:124	Horz	Margin [dB]:	-16.67	-	-	-
2521.841	12.56 ave	6.7	28.7	47.96	63.5	-	-	-
Azimuth: 357		Height:124	Horz	Margin [dB]:	-15.54	-	-	-
2667.223	12.58 ave	6.9	29.1	48.58	63.5	-	-	-
Azimuth: 357		Height:124	Horz	Margin [dB]:	-14.92	-	-	-
2930.644	12.19 ave	7.3	29.9	49.39	63.5	-	-	-
Azimuth: 357		Height:124	Horz	Margin [dB]:	-14.11	-	-	-
Vertical 1000 - 3000MHz								
1646.215	11.97 ave	5.4	25.8	43.17	63.5	-	-	-
Azimuth: 357		Height:124	Vert	Margin [dB]:	-20.33	-	-	-
2217.072	11.76 ave	6.2	27.9	45.86	63.5	-	-	-
Azimuth: 357		Height:124	Vert	Margin [dB]:	-17.64	-	-	-
2396.466	12.96 ave	6.5	28.4	47.86	63.5	-	-	-
Azimuth: 357		Height:124	Vert	Margin [dB]:	-15.64	-	-	-
2495.832	14.05 ave	6.7	28.6	49.35	63.5	-	-	-
Azimuth: 357		Height:124	Vert	Margin [dB]:	-14.15	-	-	-
2653.885	12.63 ave	6.9	29.1	48.63	63.5	-	-	-
Azimuth: 357		Height:124	Vert	Margin [dB]:	-14.87	-	-	-

File Number: MC1002  
Project Number: 04CA38689  
Model Number: Tracer 4106

Issued: 1/30/2006  
FCC ID: HDCTRC4106L2

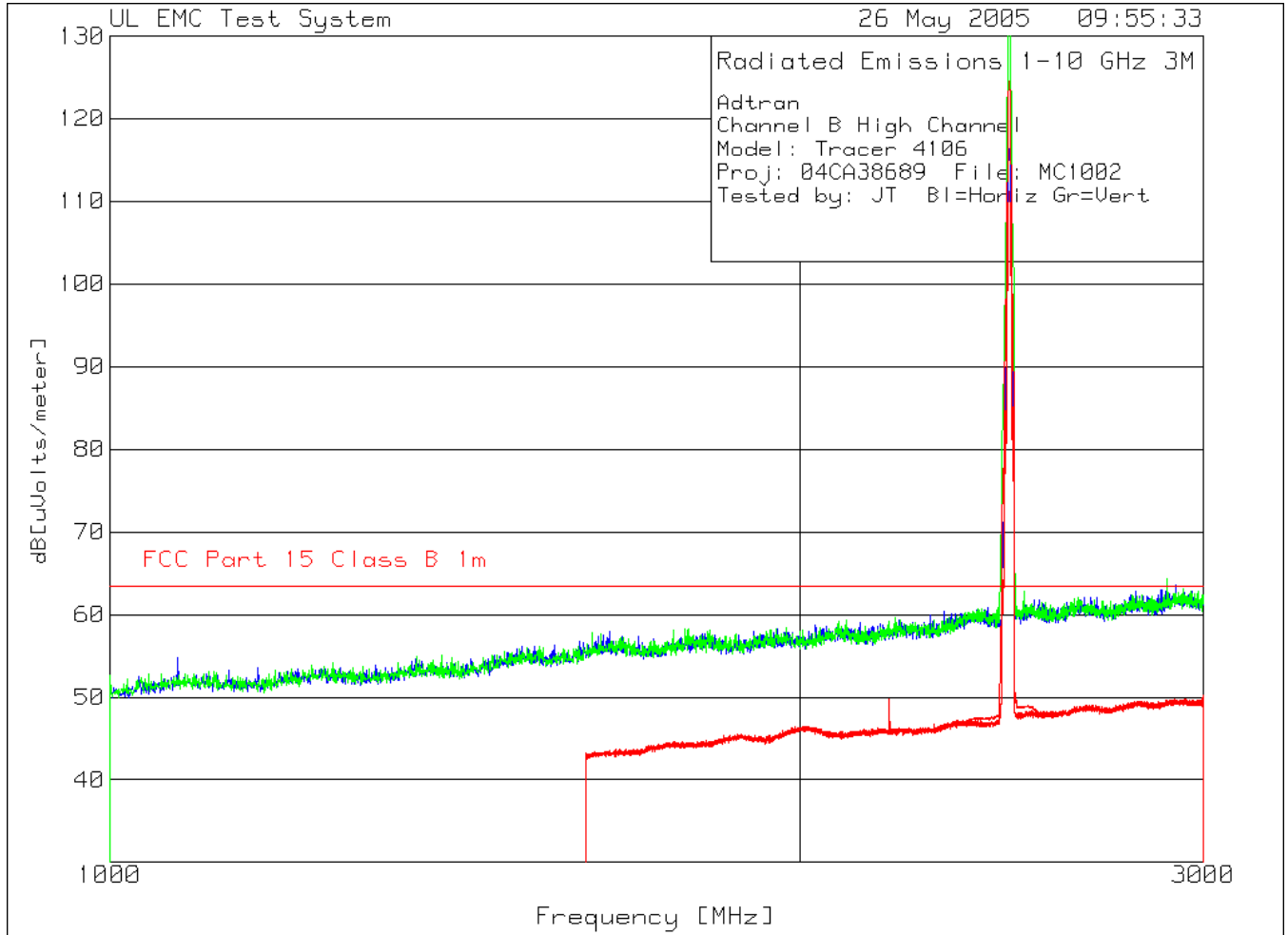
---

2919.973	12.29 ave	7.3	29.9	49.49	63.5	-	-	-
Azimuth: 357		Height:124	Vert	Margin [dB]:	-14.01	-	-	-

LIMIT 1: FCC Part 15 Class B 1m  
LIMIT 2: NONE  
LIMIT 3: NONE  
LIMIT 4: NONE  
LIMIT 5: NONE  
LIMIT 6: NONE

pk - Peak detector  
qp - Quasi-Peak detector  
av - Average detector  
avlg - Average log detector  
ave - Average detector





Note: Measurements from 1-3 GHz were performed at 1 meter distance. Three meter limit is adjusted upward by 9.54 dB (1/r). These measurements were performed with the receiver located inside the measurement chamber.

For the scan in red from 1.7GHz to 3 GHz, the RBW = 1MHz and the VBW = 10Hz.

Adtran  
 Channel B High Channel  
 Model: Tracer 4106  
 Proj: 04CA38689 File: MC1002  
 Tested by: JT Bl=Horiz Gr=Vert

No.	Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3
Horizontal 1000 - 3000MHz -----								
1	1070.69	26.05 pk	4.5	24.3	54.85	63.5	-	-
	Azimuth:344	Height:101	Horz	Margin [dB]		-8.65	-	-
2	1651.551	26.7 pk	5.4	25.8	57.9	63.5	-	-
	Azimuth:345	Height:101	Horz	Margin [dB]		-5.6	-	-
3	2053.685	25.12 pk	6	27.5	58.62	63.5	-	-
	Azimuth:106	Height:101	Horz	Margin [dB]		-4.88	-	-
5	2875.959	26.09 pk	7.2	29.7	62.99	63.5	-	-
	Azimuth:16	Height:101	Horz	Margin [dB]		-.51	-	-
6	2918.64	26.36 pk	7.3	29.9	63.56	63.5	-	-
	Azimuth:9	Height:101	Horz	Margin [dB]		.06	-	-
Vertical 1000 - 3000MHz -----								
7	1078.026	24.04 pk	4.5	24.3	52.84	63.5	-	-
	Azimuth:1	Height:124	Vert	Margin [dB]		-10.66	-	-
8	1668.223	25.82 pk	5.4	25.9	57.12	63.5	-	-
	Azimuth:351	Height:124	Vert	Margin [dB]		-6.38	-	-
9	2094.365	25.78 pk	6	27.6	59.38	63.5	-	-
	Azimuth:264	Height:124	Vert	Margin [dB]		-4.12	-	-
11	2504.502	27.45 pk	6.7	28.6	62.75	63.5	-	-
	Azimuth:344	Height:124	Vert	Margin [dB]		-.75	-	-
12	2645.882	26.22 pk	6.9	29	62.12	63.5	-	-
	Azimuth:201	Height:124	Vert	Margin [dB]		-1.38	-	-
13	2893.298	27.25 pk	7.3	29.8	64.35	63.5	-	-
	Azimuth:106	Height:124	Vert	Margin [dB]		.85	-	-

LIMIT 1: FCC Part 15 Class B 1m  
 LIMIT 2: NONE  
 LIMIT 3: NONE  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - denotes average log detection  
 ave - denotes average detection  
 tm - Trace Math Result

Adtran  
 Channel B High Channel  
 Model: Tracer 4106  
 Proj: 04CA38689 File: MC1002  
 Tested by: JT Bl=Horiz Gr=Vert

Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
Horizontal 1000 - 3000MHz								
2918.64	12.32	ave 7.3	29.9	49.52	63.5	-	-	-
Azimuth: 357 Height:124 Horz			Margin [dB]:		-13.98	-	-	-
2875.959	12.09	ave 7.2	29.7	48.99	63.5	-	-	-
Azimuth: 357 Height:124 Horz			Margin [dB]:		-14.51	-	-	-
2053.685	12.17	ave 6	27.5	45.67	63.5	-	-	-
Azimuth: 357 Height:124 Horz			Margin [dB]:		-17.83	-	-	-
1651.551	12.05	ave 5.4	25.8	43.25	63.5	-	-	-
Azimuth: 357 Height:124 Horz			Margin [dB]:		-20.25	-	-	-
Vertical 1000 - 3000MHz								
2094.365	11.8	ave 6	27.6	45.4	63.5	-	-	-
Azimuth: 357 Height:124 Vert			Margin [dB]:		-18.1	-	-	-
2504.502	13.28	ave 6.7	28.6	48.58	63.5	-	-	-
Azimuth: 357 Height:124 Vert			Margin [dB]:		-14.92	-	-	-
2645.882	12.62	ave 6.9	29	48.52	63.5	-	-	-
Azimuth: 357 Height:124 Vert			Margin [dB]:		-14.98	-	-	-
2893.298	12.21	ave 7.3	29.8	49.31	63.5	-	-	-
Azimuth: 357 Height:124 Vert			Margin [dB]:		-14.19	-	-	-

LIMIT 1: FCC Part 15 Class B 1m  
 LIMIT 2: NONE  
 LIMIT 3: NONE  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

Radiated Spurious Emissions (4-25GHz)

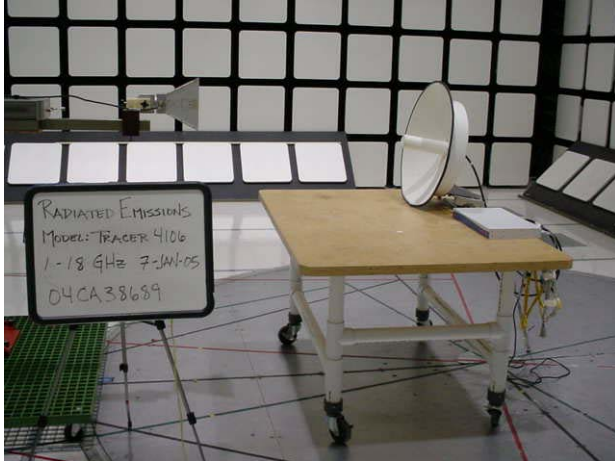
Test Item (A-Z)	Test Frequency (MHz)	Antenna Polarity (H/V)	Antenna Distance (m)	Measured Peak Data (dBuV)	Measured Avg. Data (dBuV)	Peak Limit (dBuV/m)	Avg. Limit (dBuV/m)	Peak Margin (dB)	Avg. Margin (dB)
Channel A - Low Channel									
A	4832	H	1	62.8	51.37	83.5	63.5	-20.7	-12.13
A	4832	V	1	68.76	61.97	83.5	63.5	-14.74	-1.53
A	7248	H	1	66.5	56.95	83.5	63.5	-17	-6.55
A	7248	V	1	66.96	55.37	83.5	63.5	-16.54	-8.13
A	12080	H	1	72.12	62.58	83.5	63.5	-11.38	-0.92
A	12080	V	1	73.63	61.24	83.5	63.5	-9.87	-2.26
A	14496	H	1	74.72	62.25	83.5	63.5	-8.78	-1.25
A	14496	V	1	75.12	61.84	83.5	63.5	-8.38	-1.66
A	16912	H	1	72.75	60.71	83.5	63.5	-10.75	-2.79
A	16912	V	1	73.59	62.30	83.5	63.5	-9.91	-1.2
A	19328	H	1	45.49	-	83.5	-	-38.01	-
A	19328	V	1	45.57	-	83.5	-	-37.93	-
A	21744	H	1	45.76	-	83.5	-	-37.74	-
A	21744	V	1	46.17	-	83.5	-	-37.33	-
A	24160	H	1	47.86	-	83.5	-	-35.64	-
A	24160	V	1	47.78	-	83.5	-	-35.72	-

Test Item (A-Z)	Test Frequency (MHz)	Antenna Polarity (H/V)	Antenna Distance (m)	Measured Peak Data (dBuV)	Measured Avg. Data (dBuV)	Peak Limit (dBuV/m)	Avg. Limit (dBuV/m)	Peak Margin (dB)	Avg. Margin (dB)
Channel B - Low Channel									
A	4912	H	1	64.04	54.50	83.5	63.5	-19.46	-9
A	4912	V	1	75.10	62.12	83.5	63.5	-8.4	-1.38
A	7368	H	1	67.21	55.61	83.5	63.5	-16.29	-7.89
A	7368	V	1	68.08	53.67	83.5	63.5	-15.42	-9.83
A	12280	H	1	72.62	60.94	83.5	63.5	-10.88	-2.56
A	12280	V	1	73.34	60.94	83.5	63.5	-10.16	-2.56
A	14736	H	1	76.53	62.21	83.5	63.5	-6.97	-1.29
A	14736	V	1	76.14	62.16	83.5	63.5	-7.36	-1.34
A	17192	H	1	74.85	60.04	83.5	63.5	-8.65	-3.46
A	17192	V	1	75.60	60.04	83.5	63.5	-7.9	-3.46
A	19648	H	1	47.50	-	83.5	-	-36	-
A	19648	V	1	46.83	-	83.5	-	-36.67	-

Test Item (A-Z)	Test Frequency (MHz)	Antenna Polarity (H/V)	Antenna Distance (m)	Measured Peak Data (dBuV)	Measured Avg. Data (dBuV)	Peak Limit (dBuV/m)	Avg. Limit (dBuV/m)	Peak Margin (dB)	Avg. Margin (dB)
A	22104	H	1	48.16	-	83.5	-	-35.34	-
A	22104	V	1	47.44	-	83.5	-	-36.06	-
A	24560	H	1	48.20	-	83.5	-	-35.3	-
A	24560	V	1	48.12	-	83.5	-	-35.38	-

Test Item (A-Z)	Test Frequency (MHz)	Antenna Polarity (H/V)	Antenna Distance (m)	Measured Peak Data (dBuV)	Measured Avg. Data (dBuV)	Peak Limit (dBuV/m)	Avg. Limit (dBuV/m)	Peak Margin (dB)	Avg. Margin (dB)
Channel B - High Channel									
A	4936	H	1	66.32	54.92	83.5	63.5	-17.18	-8.58
A	4936	V	1	73.90	59.41	83.5	63.5	-9.6	-4.09
A	7404	H	1	67.93	56.21	83.5	63.5	-15.57	-7.29
A	7404	V	1	67.68	56.21	83.5	63.5	-15.82	-7.29
A	12340	H	1	73.25	61.81	83.5	63.5	-10.25	-1.69
A	12340	V	1	73.25	61.81	83.5	63.5	-10.25	-1.69
A	14808	H	1	66.04	54.48	83.5	63.5	-17.46	-9.02
A	14808	V	1	66.38	54.51	83.5	63.5	-17.12	-8.99
A	17276	H	1	65.05	54.08	83.5	63.5	-18.45	-9.42
A	17276	V	1	65.22	54.04	83.5	63.5	-18.28	-9.46
A	19744	H	1	43.89	-	83.5	-	-39.61	-
A	19744	V	1	43.90	-	83.5	-	-39.6	-
A	22212	H	1	45.02	-	83.5	-	-38.48	-
A	22212	V	1	45.12	-	83.5	-	-38.38	-
A	24680	H	1	45.49	-	83.5	-	-38.01	-
A	24680	V	1	45.88	-	83.5	-	-37.62	-

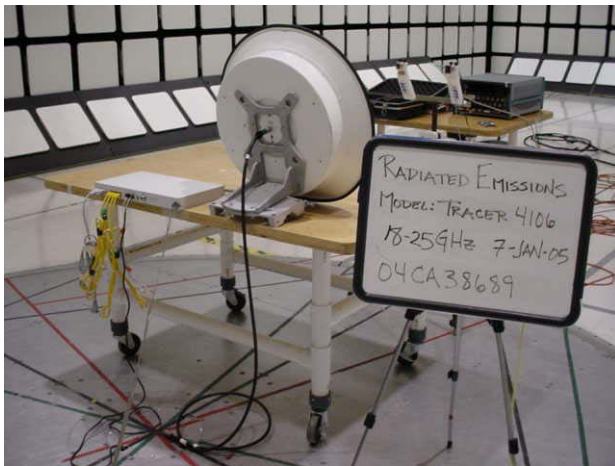
Note: Measurements above 3 GHz were performed at 1 meter distance. Three meter limit is adjusted upward by 9.54 dB (1/r). These measurements were performed with the receiver located inside the measurement chamber.



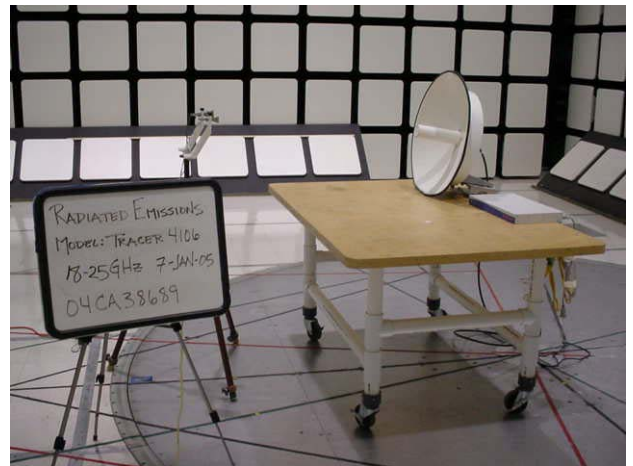
**1-18GHz Front**



**1-18GHz Rear**



**18-25GHz Rear**



**18-25GHz Front**

### **Radiated Spurious Emissions Test Setup**

### 5.1.6 Radiated Disturbance Emissions - 30 to 1000 MHz Electric Field

**Test Requirement:** 47 CFR Part 15, Subpart B

**Test Specification:** CISPR 22:1997 Class B

**Test Procedure:**

The test was performed in accordance with the Test Requirement and Specification and configured as noted in the Test Setup. The EUT was placed inside the anechoic chamber and connected to the proper power supply source. A peak measurement was first made by scanning the entire test frequency range and maximizing the EUT emissions by rotating the EUT and raising the antenna height from 1 to 4 meters above the ground reference plane. Then, a measurement was taken for all peak emissions to verify each were below the Test Limits. In each case, all cables and equipment were adjusted and EUT orientation and antenna height were varied for maximum emissions.

Radiated Disturbance Limits for Class B Equipment  
at a measuring distance of 3m.

Frequency Range MHz	Quasi-Peak Limits dB $\mu$ V/m
30 to 230	30
230 to 1000	37

**Test Deviations:**

None

**Test Setup:** Only the following ports were tested. See EUT Information for details.

Port #	Port Name	EUT Operation Mode	EUT Configuration	Power Interface
0	Enclosure	1	1	1
0	Enclosure	2	1	1
0	Enclosure	3	1	1

Measurements were made in a 10-meter semi-anechoic chamber that complies to ANSI C63.4. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

### Results

The system met the requirements for radiated emissions. Data Pages follow.

Temperature:	20.5 °C	21.5 °C
Humidity:	44.0 %RH	42.0 %RH
Pressure:	1018 mbar	1013 mbar
Date test performed:	06 December 2005	26 May 2005

#### Test Results Summary:

EUT Operation Mode	Pass/Fail (P/F)	Comment #
1	P	None
2	P	None
3	P	None

#### Test equipment used for Radiated Emissions

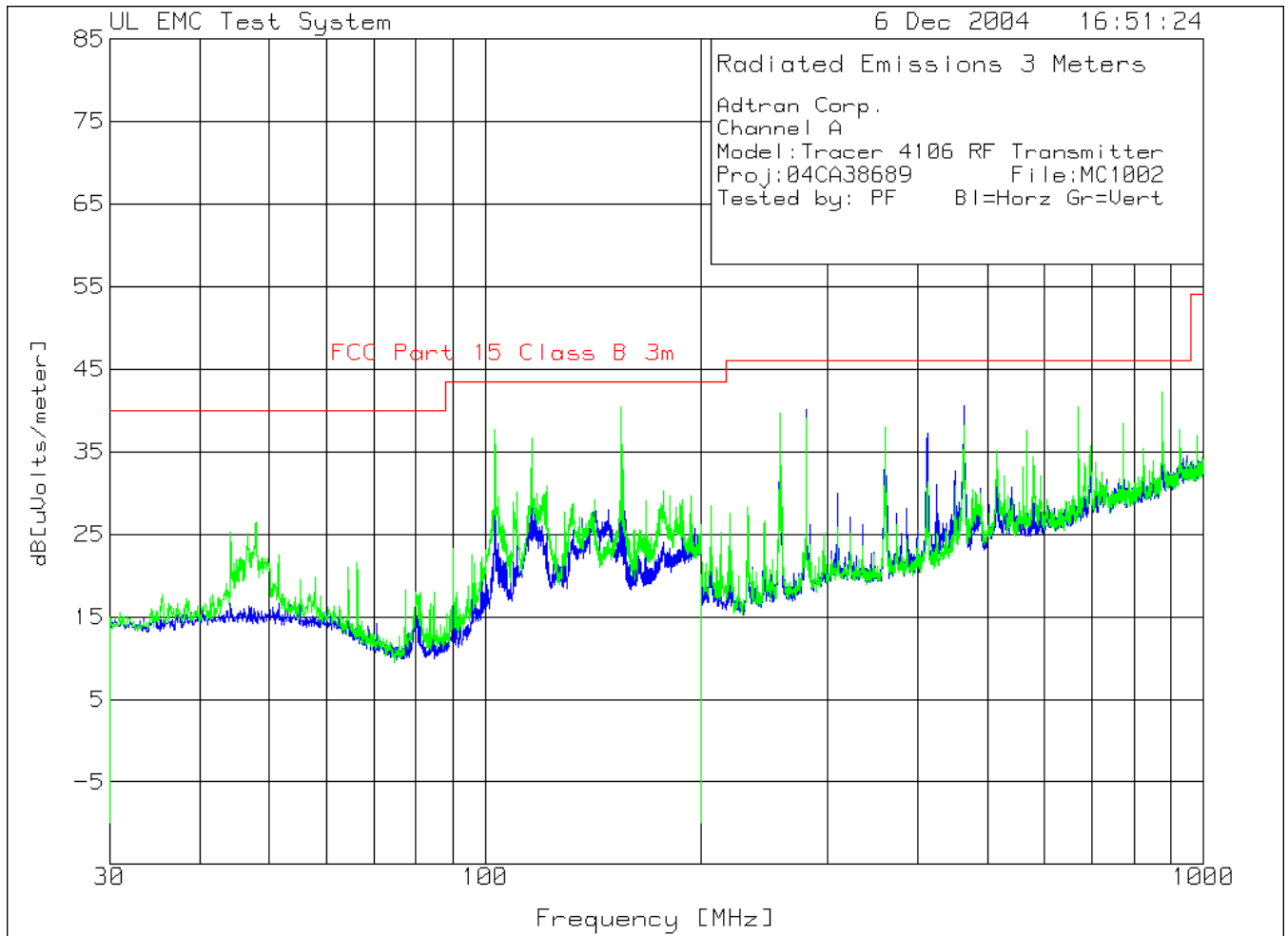
<b>ESI26</b>	<b>Rohde &amp; Schwarz</b>	<b>EMI Receiver</b>	<b>Equipment No.: ME5B-081</b>
			<b>Quasi Peak BW: 200Hz 9kHz to 150kHz</b>
			<b>RBW 10 KHz</b>
			<b>Quasi Peak BW: 9kHz 150kHz to 30MHz</b>
			<b>RBW 100 KHz</b>
			<b>Quasi Peak BW: 120 kHz 30 to 1000MHz</b>
			<b>RBW 1.0 MHz</b>
Range: 30-1000MHz	Last Calibration Date: 07 September 2004	Calibration Due Date: 07 September 2005	

#### Test Accessories for Radiated Emissions

<b>3104C</b>	<b>EMCO</b>	<b>Biconnical Antenna</b>	<b>Equipment No.: ME5-810</b>
Range: 30-200MHz	Last Calibration Date: 01 April 2004	Calibration Due Date: 01 April 2005	
<b>3146</b>	<b>EMCO</b>	<b>Log Periodic Antenna</b>	<b>Equipment No.: ME5-811</b>
Range: 200-1000MHz	Last Calibration Date: 01 April 2004	Calibration Due Date: 01 April 2005	
<b>94455-1</b>	<b>Ailtech</b>	<b>Biconnical Antenna</b>	<b>Equipment No.: ME5-439</b>
Range: 30-200MHz	Last Calibration Date: 12 January 2005	Calibration Due Date: 31 January 2006	
<b>3146</b>	<b>EMCO</b>	<b>Log Periodic Antenna</b>	<b>Equipment No.: ME5-451</b>
Range: 200-1000MHz	Last Calibration Date: 16 December 2004	Calibration Due Date: 31 December 2005	
<b>99760-00</b>	<b>Cole -Parmer</b>	<b>Hygrometer/Temp/Baro meter</b>	<b>Equipment No.: ME4-268</b>
		Ranges	Temp: 0°C-55°C
			Humidity: 25% to 95 %RH
			Pressure: 795 to 1050 mbar
	Last Calibration Date: 18 June 2004		Calibration Due Date: 18 June 2005



Radiated Emissions (Channel A, Bandplan 1)



File Number: MC1002  
 Project Number: 04CA38689  
 Model Number: Tracer 4106

Issued: 1/30/2006  
 FCC ID: HDCTRC4106L2

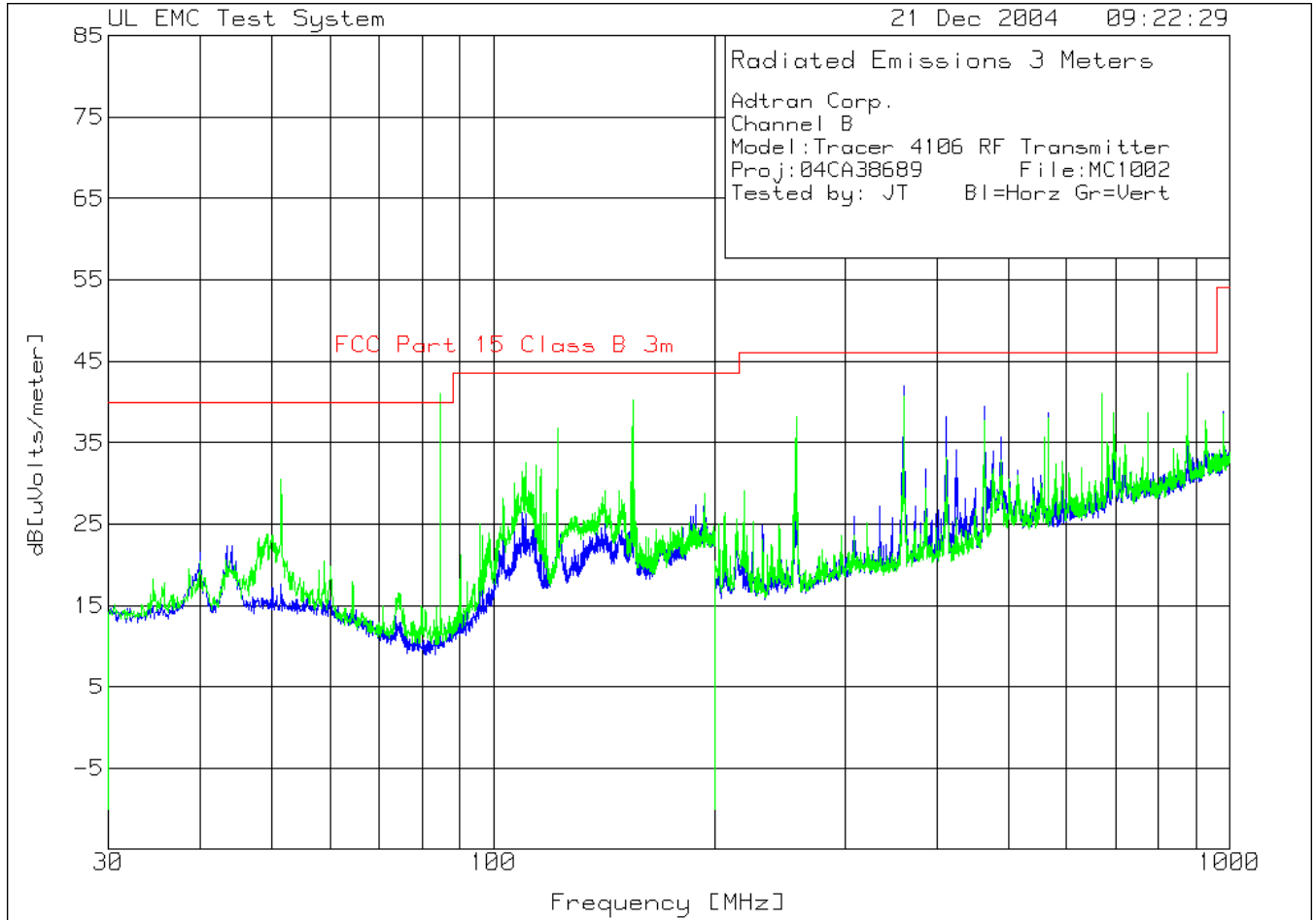
Adtran Corp.  
 Channel A  
 Model:Tracer 4106 RF Transmitter  
 Proj:04CA38689 File:MC1002  
 Tested by: PF Bl=Horz Gr=Vert

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
Vertical 30 - 200MHz								
154.6069	27.83 qp	1.8	12.2	41.83	43.5	-	-	-
Azimuth: 116 Height:105 Vert					Margin [dB]:	-1.67	-	-
103.0727	26.36 qp	1.4	10.6	38.36	43.5	-	-	-
Azimuth: 70 Height:104 Vert					Margin [dB]:	-5.14	-	-
Horizontal 200 - 1000MHz								
463.8225	17.04 qp	3.1	17.1	37.24	46	-	-	-
Azimuth: 25 Height:105 Horz					Margin [dB]:	-8.76	-	-
280.0042	25.6 qp	2.4	14	42	46	-	-	-
Azimuth: 112 Height:119 Horz					Margin [dB]:	-4	-	-
Vertical 200 - 1000MHz								
669.9756	17.78 qp	3.9	20.2	41.88	46	-	-	-
Azimuth: 126 Height:104 Vert					Margin [dB]:	-4.12	-	-
876.1086	15.49 qp	4.3	23	42.79	46	-	-	-
Azimuth: 344 Height:104 Vert					Margin [dB]:	-3.21	-	-
257.6848	24.61 qp	2.3	12.9	39.81	46	-	-	-
Azimuth: 21 Height:104 Vert					Margin [dB]:	-6.19	-	-

LIMIT 1: FCC Part 15 Class B 3m  
 LIMIT 2: NONE  
 LIMIT 3: NONE  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - Average log detector  
 ave - Average detector

Radiated Emissions (Channel B, Bandplan 1)



File Number: MC1002  
 Project Number: 04CA38689  
 Model Number: Tracer 4106

Issued: 1/30/2006  
 FCC ID: HDCTRC4106L2

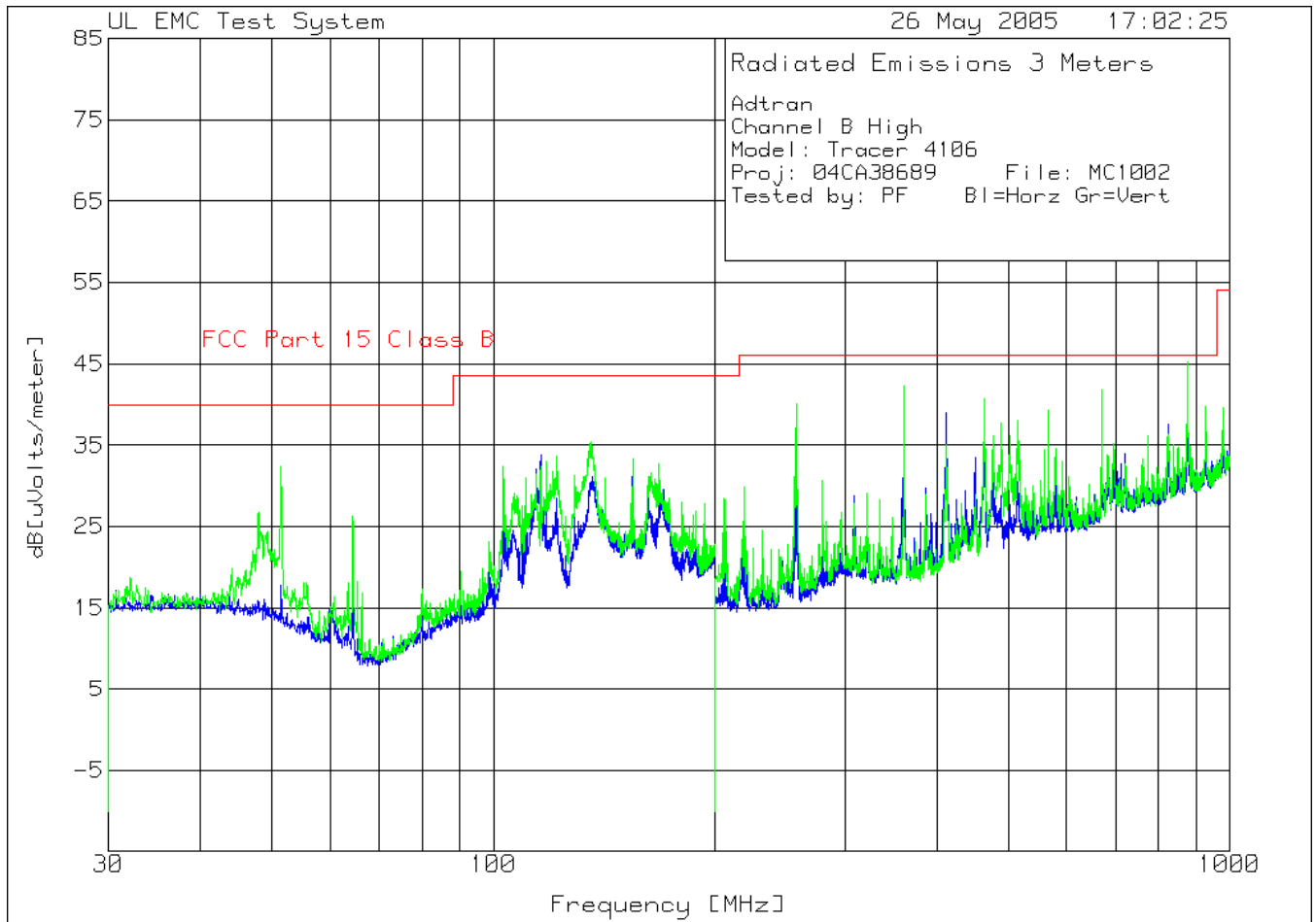
Adtran Corp.  
 Channel B  
 Model:Tracer 4106 RF Transmitter  
 Proj:04CA38689 File:MC1002  
 Tested by: JT Bl=Horz Gr=Vert

Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
Vertical 30 - 200MHz								
84.7858	10.15 qp	1.3	6.7	18.15	40	-	-	-
Azimuth: 139 Height:157 Vert					Margin [dB]:	-21.85	-	-
154.607	28.01 qp	1.8	12.2	42.01	43.5	-	-	-
Azimuth: 122 Height:102 Vert					Margin [dB]:	-1.49	-	-
Vertical 200 - 1000MHz								
876.1152	16.41 qp	4.3	23	43.71	46	-	-	-
Azimuth: 18 Height:101 Vert					Margin [dB]:	-2.29	-	-
669.9711	20.25 qp	3.9	20.2	44.35	46	-	-	-
Azimuth: 54 Height:105 Vert					Margin [dB]:	-1.65	-	-
360.7715	20.28 qp	2.7	15.2	38.18	46	-	-	-
Azimuth: 115 Height:112 Vert					Margin [dB]:	-7.82	-	-
360.7637	23.98 qp	2.7	15.2	41.88	46	-	-	-
Azimuth: 310 Height:107 Horz					Margin [dB]:	-4.12	-	-

LIMIT 1: FCC Part 15 Class B 3m  
 LIMIT 2: NONE  
 LIMIT 3: NONE  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - Average log detector  
 ave - Average detector

Radiated Emissions (Channel B, Bandplan 3)

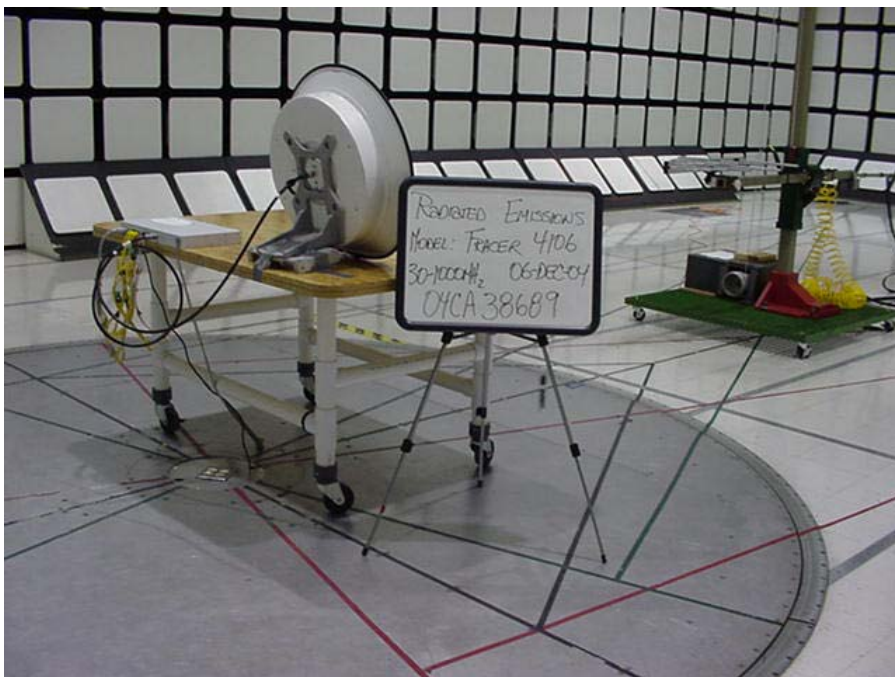
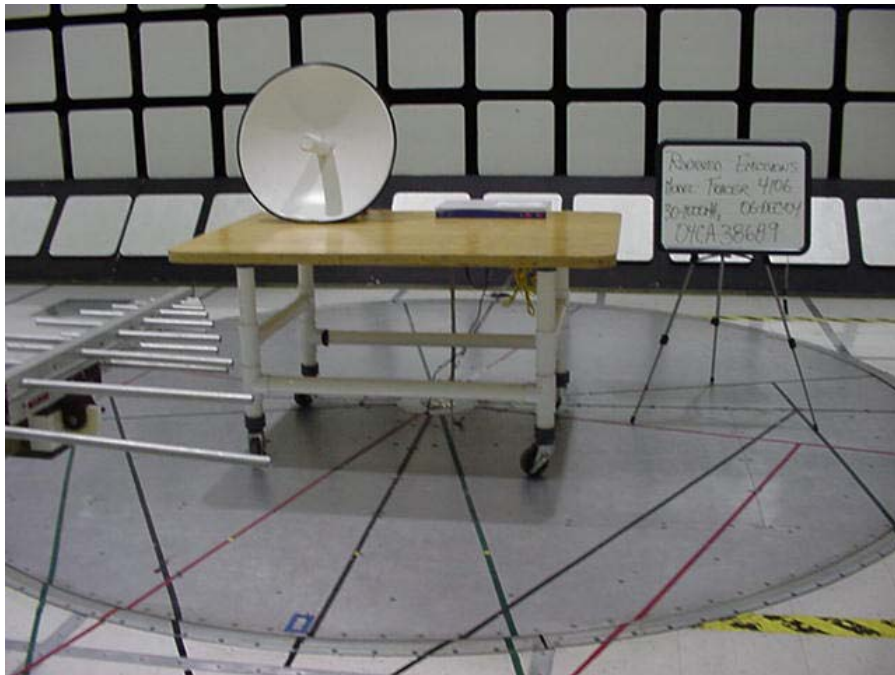


Adtran  
 Channel B High  
 Model: Tracer 4106  
 Proj: 04CA38689 File: MC1002  
 Tested by: PF Bl=Horz Gr=Vert

Test Frequency [MHz]	Meter Reading [dB (uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
Vertical 200 - 1000MHz								
876.1112	18.57 qp	3.3	23.1	44.97	46	-	-	-
Azimuth: 22 Height:102 Vert					Margin [dB]:	-1.03	-	-
669.9621	19.21 qp	2.7	20.7	42.61	46	-	-	-
Azimuth: 202 Height:108 Vert					Margin [dB]:	-3.39	-	-
566.893	18.19 qp	2.3	18.7	39.19	46	-	-	-
Azimuth: 112 Height:238 Vert					Margin [dB]:	-6.81	-	-
463.8234	18.95 qp	2	16.9	37.85	46	-	-	-
Azimuth: 136 Height:174 Vert					Margin [dB]:	-8.15	-	-
360.7495	21.56 qp	1.6	15.2	38.36	46	-	-	-
Azimuth: 355 Height:157 Vert					Margin [dB]:	-7.64	-	-
257.6812	25.71 qp	1.3	12.8	39.81	46	-	-	-
Azimuth: 106 Height:102 Vert					Margin [dB]:	-6.19	-	-

LIMIT 1: FCC Part 15 Class B  
 LIMIT 2: NONE  
 LIMIT 3: NONE  
 LIMIT 4: NONE  
 LIMIT 5: NONE  
 LIMIT 6: NONE

pk - Peak detector  
 qp - Quasi-Peak detector  
 av - Average detector  
 avlg - Average log detector  
 ave - Average detector



**Radiated Emissions Test Setup**

### 5.1.7 Restricted Bands

**Test Requirement:** 47 CFR Part 15 Subpart C

**Test Specification:** 47 CFR Part 15.205

**Test Procedure:**

The EUT is verified to produce only spurious emissions in the bands listed below. Where spurious emissions exist they must comply with the general limits from 47 CFR Part 15, Section 15.209.

Results from measurements are examined to ensure that no spurious emission in a restricted band (below) exceeds the general limits in Section 15.209. The restricted bands from Section 15.205 are:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	608 - 614	4.5 - 5.15
0.495 - 0.505	16.69475 - 16.69525	960 - 1240	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	1300 - 1427	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1435 - 1626.5	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1645.5 - 1646.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1660 - 1710	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1718.8 - 1722.2	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	2200 - 2300	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2310 - 2390	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2483.5 - 2500	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2655 - 2900	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	3260 - 3267	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3332 - 3339	23.6 - 24.0
12.29 - 12.293	127.72 - 167.17	3345.8 - 3358	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3600 - 4400	36.43 - 36.5
12.57675 - 12.57725	332-335.4		Above 38.6
13.36 - 13.41	399.9 - 410		



**Test Deviations:**

None

**Test Setup:** Only the following ports were tested. See EUT Information for details.

Port #	Port Name	EUT Operation Mode	EUT Configuration	Power Interface
0	Enclosure	1	1	1
0	Enclosure	2	1	1
0	Enclosure	3	1	1

**Comments:**

Comment #	Description
1	All spurious emissions were found to comply with the general limits of 15.209. Refer to data in Section 5.1.5

### 5.1.8 Maximum Permissible Exposure

**Test Requirement:** 47 CFR Part 1

**Test Specification:** 47 CFR Part 1, Section 1.1307

**Test Procedure:**

Maximum Permissible Exposure limits are as follows:

**FCC Limits for Occupational/Controlled Exposure**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E <sup>2</sup>  ,  H <sup>2</sup>  , or S (minutes)
0.3 – 3.0	614	1.63	(100)*	6
3.0 - 30	1824/f	4.89/f	(900/f <sup>2</sup> )*	6
30 - 300	61.4	0.163	1.0	6
300 – 1500	-	-	f/300	6
1500 – 100,000	-	-	5.0	6

\* Plane-wave equivalent power density

**FCC Limits for General Population/Uncontrolled Exposure**

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E <sup>2</sup>  ,  H <sup>2</sup>  , or S (minutes)
0.3 - 1.34	614	1.63	(100)*	30
1.34 - 30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30 - 300	27.5	0.073	0.2	30
300 – 1500	-	-	f/1500	30
1500 – 100,000	-	-	1.0	30

\*Plane-wave equivalent power density

**Test Details:** This device is considered to possibly be located in either environment. See calculation for assumptions.

**Background:** Per the following guidance from OET Bulletin 65 Supplement C required minimum spacings are provided to the professional installer.

Transmitter or Device Type <sup>18</sup>	Output <sup>19</sup>	Applicable Methods to Ensure Compliance <sup>20</sup>
Transmitters using indoor antennas that operate at 20 cm or more from nearby persons	>2.5 W at 915 MHz	<p>If the MPE distance is greater than that required for normal operation of the device, operating instructions, warning instructions and/or warning labels may be used to ensure compliance by indicating the minimal separation distance to comply with MPE limits.</p> <p>If the antennas are professionally installed to ensure compliance, warning instructions and warning labels are not necessary.</p>
	<p>=&lt; 2.5 W at 915 MHz or          =&lt; 4 W at 2450 MHz</p>	<p>Transmitters operating at 2.5 W EIRP (1.5 W ERP) or less at 915 MHz, or at 4 W EIRP (2.4 W ERP) or less at 2450 MHz, generally are not expected to exceed MPE limits when nearby persons are 20 cm or more from most antennas. Therefore, special instructions and warnings are normally not necessary to ensure compliance.</p>

**MPE Calculation with highest EIRP:**

Assuming the highest gain antenna intended for use (21.3 dBi gain) and the Tracer 4106 is outputting at highest measured power continuously and no cable loss to the antenna, then the threshold for meeting MPE requirements in an uncontrolled environment is calculated to be 4.6 m. It is recommended that a greater distance be specified as a margin of safety to account for equipment and measurement uncertainties.

A caution statement must be provided to the installer to ensure that limits are not exceeded in the uncontrolled environment.

### Maximum Permissible Exposure

Power Density = $EIRP / (4 * \pi * R^2)$ ,
where EIRP = Output Power * Antenna Gain

### Controlled/Occupational Exposure

Operating Frequency	2420 MHz		
Output Power (Peak)	0.1 Watts		
Antenna Gain	21.3 dB	or (linear)	134.8963 (unitless)
Separation Distance	4.6 m	-or-	181.102 inches

Peak Power Density            0.051 W/m<sup>2</sup>            - or -            0.0051 mW/cm<sup>2</sup>

Exposure % (over 30 minute timespan for occupational exposure)	100%
--	------

Transmit Duty Cycle (Peak-to-Average Ratio)	100%
--	------

Average Power Density    **0.05073** W/m<sup>2</sup>            - or -            **0.0051** mW/cm<sup>2</sup>

Limit for

### Controlled/Occupational

Exposure at Operating  
Frequency                    **50** W/m<sup>2</sup>            - or -            **5** mW/cm<sup>2</sup>

### Limit for Uncontrolled

Exposure at Operating  
Frequency                    **10** W/m<sup>2</sup>            - or -            **1** mW/cm<sup>2</sup>

### Uncontrolled/General Exposure

Operating Frequency	2420 MHz		
Output Power (Peak)	0.1 Watts		
Antenna Gain	21.3 dB	or (linear)	134.8963 (unitless)
Separation Distance	4.6 m	-or-	181.102 inches

Peak Power Density            0.051 W/m<sup>2</sup>            - or -            0.0051 mW/cm<sup>2</sup>

Exposure % (over 6 min timespan for uncontrolled)	100%
---	------

Transmit Duty Cycle (Peak-to-Average Ratio)	100%
--	------

Average Power Density    **0.05073** W/m<sup>2</sup>            - or -            **0.0051** mW/cm<sup>2</sup>

## Appendix A

### Accreditations and Authorizations



NVLAP Lab code: 100255-0

NVLAP: Recognized under the National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC EN17025 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. The specific scope includes IEC/CISPR 22:1997, Amendment 1:1995, Amendment 2:1997, EN 55022:1998, AS/NZS 1044, CNS 13438:1997, ANSI C63.4, FCC Method - 47 CFR Part 15, FCC Method -47 CFR Part 68, AS/NZS 3548, IEC 61000-3-2, EN 61000-3-2, CISPR 14-1, EN 55014-1, AS/NZS 1044, CNS 13783-1, CISPR 22, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, and IEC 61000-4-11 testing.



FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland and accepted in a letter dated September 24, 1997 (Ref. No. 91040).



Industry Canada

Industrie Canada

Industry of Canada: Accredited by Industry Canada for performance of radiated measurements. Our test site complies with RSP 100, Issue 7, Section 3.3. File #: IC 2181



VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: (Radiated Emissions) R-797, (Conducted Emissions) C-832, C-833, C-834 and (Conducted Emissions - Telecommunications Ports) T-160.



ICASA: ICASA (Independent Communications Authority of South Africa) has appointed UL as a Designated Test Laboratory to test Telecommunications equipment for type approval in compliance with CISPR 22 to assist in fulfilling its mandate under section 54(1) of the Telecommunications Act, 1996 (Act 103 of 1996).



NIST/CAB: Validated by the European Commission as a U.S. Conformity Assessment Body (CAB) of the U.S.-EU Mutual Recognition Agreement (MRA) for the Electromagnetic Compatibility - Council Directive 89/336/EEC, Article 10 (2). Also validated for the Telecommunication Equipment-Council Directive 99/5/EC, Annex III and IV, Identification Number: 0983.

NIST/CAB: Provisioned to act as a U.S. Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the Asia Pacific Economic Cooperation (APEC) MRA between the American Institute in Taiwan (AIT) and the United States. Our laboratory is considered qualified to test equipment subject to the applicable EMC regulations of the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) which require testing to CNS 13438 (CISPR 22).

NIST/CAB: Recognized by the Infocomm Development Authority of Singapore (IDA) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Our laboratory is provisionally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA. Our scope of designation includes IDA TS EMC (CISPR 22), IEC 61000-4-2, -4-3, -4-4, -4-5, and -4-6. U.S. Identifier Number: US0113