



ACMETESTING
WORLDWIDE EMC & PRODUCT SAFETY SERVICES

17 November 2005

Mike Cyr
Daniels Electronic Ltd.
43 Erie Street,
Victoria, British Columbia
Canada V8V 1P8

Dear Mr. Cyr,

Enclosed is the 47 CFR Part 2 Subpart J Section 2.1053 (Radiated Spurious Emissions) Test Report for three UHF Transmitters (i.e., Models UT-4E400, UT-4E450, and UT-4E500), and the CD-ROM containing this Test Report in PDF Format. Please check it thoroughly for discrepancies and please contact us immediately if you have any questions or if you identify any problems.

This is an official copy of your Test Report, complete with the original Acme Testing Co. staff signatures. You should retain this Test Report as the official record of testing, as proof of compliance in the future. Please be aware that our internal controls require us to retain a historical copy of your Test Report on file for a three-year period, after which our copy of your Test Report will be destroyed.

Please note that the FCC Certification Procedure Rules require that this Test Report (and all other Exhibits that form the FCC Filing Package on your UHF Transmitters) must be retained by the Responsible Party for two years after the manufacturing of the product has been permanently discontinued [cf., 47 CFR Part 2 Section 2.938(c)].

Please note that Acme Testing Co. is accredited by the American Association for Laboratory Accreditation (A2LA). Further, Acme Testing Co.'s Open Area Test Site [OATS] # 1 is registered with the FCC.

Thank you for your business! We look forward to being of service to you in the future.

Yours sincerely,

Harry H. Hodes
Principal EMC Engineer
President & CEO

:sg
Enclosure

Acme Testing Co.
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A2LA ACCREDITED LAB:
CERTIFICATE # 0829-01 (ACME, WA)
CERTIFICATE # 0829-02 (PLUMMER, ID)



QUALITY SYSTEM REGISTERED TO
ISO 9001:2000(IE) BY QMI
CERTIFICATE # CC1828-010083 (ACME, WA)
CERTIFICATE # CC1828-014276 (PLUMMER, ID)

A VALIDATED CONFORMITY ASSESSMENT BODY

TEST REPORT
47 CFR Part 2 Subpart J Section 2.1053
Measurements of Field Strength of Spurious Radiation
From:
Power Amplifier Family

DEVICES: THREE UHF TRANSMITTERS

MODELS: UT-4E400,
UT-4E450,
UT-4E500

MANUFACTURER: DANIELS ELECTRONICS LTD.

ADDRESS: 43 ERIE STREET,
VICTORIA, BRITISH COLUMBIA
CANADA V8V 1P8

WORK ORDER: 05-EMC-1007-0225

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1. General

1.1 Document History

REVISION	DATE	COMMENTS
-	17 November 2005	Initial Release, Harry H. Hodes

Note: Acme Testing Co. hereby makes the following statements:

- The Units described in this Test Report were received at Acme Testing Co.'s facilities on 25 October 2005. Testing was performed on the Units described in this Test Report on 01 – 04 November 2005.
- The Test Results reported herein apply only to the Units actually tested, and to substantially identical Units.
- This Test Report must not be used to claim product endorsement by A2LA or any agency of the U.S. Government, or any other foreign government.

This document is the property of Acme Testing, Co., and shall not be reproduced, except in full, without prior written approval of Acme Testing Co. However, all ownership rights are hereby returned unconditionally to Daniels Electronics Ltd., and approval is hereby granted to Daniels Electronics Ltd. and its employees and agents to reproduce all or part of this Test Report for any legitimate business purpose without further reference to Acme Testing Co.

1.2 Purpose

Per Client Request, the purposes of this Test Report are:

- to document the results of Radiated Spurious Emissions measurements made on three UHF Transmitters (i.e., Daniels Electronics Ltd. Models UT-4E400, UT-4E450, and UT-4E500) in accordance with 47CFR Part 2 Subpart J Section 2.1053 (i.e., the FCC Rules governing Radiated Spurious Emissions measurements).
- to document the compliance of the three UHF Transmitters (i.e., Daniels Electronics Ltd. Models UT-4E400, UT-4E450, and UT-4E500) to the -20 dBm Limit applicable to Radiated Spurious Emissions for UHF Transmitters used in conjunction with VHF Transmitter Systems and VHF Repeater Systems operating under 47 CFR Parts 22, 80, and 90.

This Test Report references the applicable Electromagnetic Emissions requirements.

THE DATA CONTAINED IN THIS TEST REPORT WAS COLLECTED AND COMPILED BY:



REUBEN BROWN
ASSOCIATE EMC ENGINEER

1.3 Manufacturer

Company Name: Daniels Electronics Ltd.
Contact: Mike Cyr
Street Address: 43 Erie Street,
City/Province/Postal Code: Victoria, British Columbia, V8V 1P8
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1.4 Test Location

Laboratory: Test Site # 1
Street Address: 2002 Valley Highway,
Mailing Address: P.O. Box 3,
City/State/Zip: Acme, WA 98220-0003 USA
Telephone: 1-360-595-2785
Fax: 1-360-595-2722
E-mail: acmetest@acmetesting.com
Web: www.acmetesting.com

1.5 Accreditations and Listings

Acme Testing Co.'s Quality Management System is registered to ISO 9001:2000(E) by QMI under Certificate Numbers: CC1828-010083 (Acme, WA.) and CC1828-014276 (Plummer, ID.).

Acme Testing Co.'s test facilities are accredited by A2LA to ISO 17025:1999(E) for a specific Scope of Accreditation which includes the tests detailed herein, under Certificate Numbers: 0829-01 (Acme, WA), and 0829-02 (Plummer, ID).

Acme Testing Co.'s test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with the Federal Communications Commission under Registration Numbers: 90420 (Acme, WA), and 96502 (Plummer, ID).

Acme Testing Co.'s test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: IC3251 (Acme, WA), and IC3618 (Plummer, ID).

2. Test Results Summary

**47 CFR Part 2 Subpart J Section 2.1053 Radiated Spurious Emissions Test Results
 for Daniels Electronics Ltd. UHF Transmitters
 (Models UT-4E400, UT-4E450, and UT-4E500)
 used in conjunction with VHF Transmitter Systems and/or VHF Repeater Systems
 operating under 47 CFR Parts 22, 80, & 90**

Summary of Test Results - Emissions

EUT	Test Description	Limit	Result and Worst-Case Margin (dB)
UT-4E400	47 CFR Section 2.1053 Radiated Spurious Emissions	-20 dBm	Pass Margin = -9.5 dB
UT-4E450	47 CFR Section 2.1053 Radiated Spurious Emissions	-20 dBm	Pass Margin = -10.0 dB
UT-4E500	47 CFR Section 2.1053 Radiated Spurious Emissions	-20 dBm	Pass Margin = -10.1 dB

The signed original of this report, supplied to the client, represents the only “official” copy. Retention of any additional copies (electronic or non-electronic media) is at Acme Testing Co.’s discretion to meet internal requirements only. The client has made the determination that SUT Condition, Characterization, and Mode of Operation are representative of production units, and meet the requirements of the specifications referenced herein.

Consistent with Industry practice, the effects of measurement and test equipment not directly involved in obtaining measurement results but having an impact on measurements (such as cable loss, antenna factors, etc.) are factored into the “Correction Factor” documented in certain test results. Instrumentation employed for testing meets tolerances consistent with known Industry Standards and Regulations.

The measurements contained in this report were made in accordance with the referenced standards. Acme Testing Co. assumes responsibility only for the accuracy and completeness of this data as it pertains to the sample tested.

REVIEWED AND APPROVED BY:



Harry H. Hodes
 Principal EMC Engineer
 President & CEO

17 NOVEMBER 2005

Date of Issuance

3. Description of Equipment and Peripherals

3.1 Equipments Under Test (EUTs)

The EUT were three UHF Transmitters which were parts of a single family.

Device: UHF Transmitter
 Model Number: UT-4E400
 Serial Number: D&D 10002
 FCC ID: H4JUT-4E450
 Input Power: +13.8 VDC
 Grounding: *via* the Subrack Chassis [Note: The DC Return was tied (internally to the Subrack) to the Subrack Chassis Ground. The Power Supply DC Return was floated].
 Size of Device: 19 cm x 7 cm x 12.5 cm

Device: UHF Transmitter
 Model Number: UT-4E450
 FCC ID: H4JUT-4E450
 Input Power: +13.8 VDC
 Grounding: *via* the Subrack Chassis [Note: The DC Return was tied (internally to the Subrack) to the Subrack Chassis Ground. The Power Supply DC Return was floated].
 Size of Device: 19 cm x 7 cm x 12.5 cm

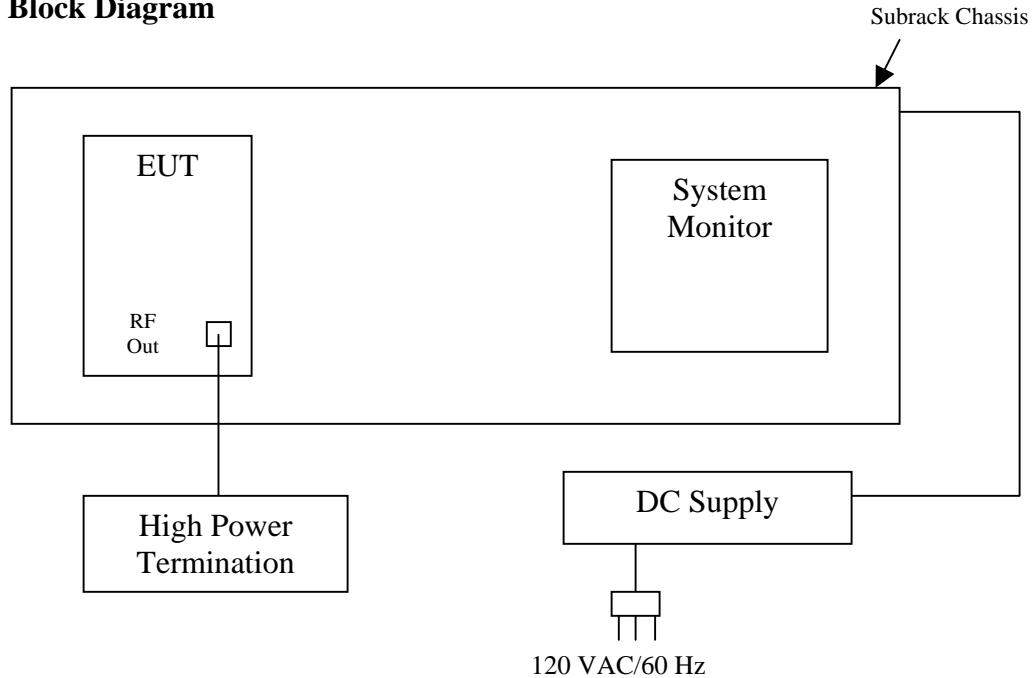
Device: UHF Transmitter
 Model Number: UT-4E500
 FCC ID: H4JUT-4E450
 Input Power: +13.8 VDC
 Grounding: *via* the Subrack Chassis [Note: The DC Return was tied (internally to the Subrack) to the Subrack Chassis Ground. The Power Supply DC Return was floated].
 Size of Device: 19 cm x 7 cm x 12.5 cm

3.2 Support Equipment Used During Emissions Testing

Device	Manufacturer	Model Number	Serial Number
Power Supply	GW	GPR-6030D	8661470
High Power Termination	Bird	8166	5941
Subrack Chassis	Daniels Electronics	43-920112*	12402
System Monitor	Daniels Electronics	SM-3	18684

*Note: Model Number of Backplane Circuit Board. No other markings found on the Subrack Chassis.

3.3 Test Setup Block Diagram



3.4 Description of Interface Cables Used During Emissions Testing

EUT / High Power Termination (RG-223 with “N” Connector)

Shielded	Unshielded	Flat	Round	Length	Ferrite
Yes	No	No	Yes	0.33 m	No

Subrack Chassis / DC Supply (3 Conducted)

Shielded	Unshielded	Flat	Round	Length	Ferrite
Yes	No	No	Yes	2.75 m	No

DC Power Supply [AC Input Port] / AC Mains Input Power (120 VAC/60 Hz)

Shielded	Unshielded	Flat	Round	Length	Ferrite
No	Yes	No	Yes	1.8 m	No

ARRANGEMENT OF INTERFACE CABLES: All interface cables were positioned for worst-case maximum emissions within the manner assumed to be a typical operation condition (please reference photographs).

3.5 Mode of Operation During Emissions Testing

The EUT was mounted into the Subrack Chassis with its RF Output terminated. The transmitter was turned on.

3.6 Modifications Required for Compliance

None.

4. Radiated Spurious Emissions Tests

Test Requirement: FCC Rules: 47CFR Part 2 Subpart J Section 2.1053

Test Procedure: EIA/TIA 603-1993 Section 2.2.12

Date of Test: 01 – 04 November 2005

Laboratory: Test Site #2 (Acme, WA)

4.1 Test Equipment

- ⇒ Spectrum Analyzer (yellow): Hewlett-Packard HP8566B, Serial Number: 2410A00139, Calibrated: 21 March 2005, Calibration Due Date: 21 March 2006
- ⇒ RF Preselector (yellow): Hewlett-Packard HP85685A, Serial Number: 2648A00392, Calibrated: 21 March 2005, Calibration Due Date: 21 March 2006
- ⇒ Quasi Peak Adapter (yellow): Hewlett-Packard HP85650A, Serial Number: 2521A00689, Calibrated: 21 March 2005, Calibration Due Date: 21 March 2006
- ⇒ Preamplifier (10 kHz – 1 GHz): Amplifier Research LN1000A, Serial Number: 21541, Calibrated: 21 September 2005, Calibration Due Date: 21 September 2006
- ⇒ Preamplifier (1 GHz to 26.5 GHz): Hewlett Packard 8449B, Serial Number: 3008A00982, Calibrated: 15 September 2005, Calibration Due Date: 15 September 2006
- ⇒ Synthesized RF Signal Generator: Gigatronics 6062A, Serial Number: 5140235, Calibrated: 11 December 2003, Calibration Due Date: 11 December 2005
- ⇒ Biconical Antenna (black): EMCO 3110B, Serial Number 9707-2961, Calibrated: 12 September 2005, Calibration Due Date: 12 September 2006
- ⇒ Log Periodic Antenna (yellow) (200 MHz to 1000 MHz): Electro-Metrics LPA-25, Serial Number: 1189, Calibrated: 20 December 2004, Calibration Due Date: 20 December 2005
- ⇒ Double Ridge Guide Horn Antenna (blue) (1 GHz to 18 GHz): EMCO 3115, Serial Number: 9807-5534, Calibrated: 30 March 2005, Calibration Due Date: 30 March 2006
- ⇒ Double Ridge Guide Horn Antenna (red) (1 GHz to 18 GHz): EMCO 3115, Serial Number: 2551, Calibrated: 15 August 2005, Calibration Due Date: 15 August 2007. [Note: Substitution Source Antenna].

(Continue on the Next Page)

(Test Equipment – Continued from the Previous Page)

- ⇒ Roberts Dipole: Set Dipole 2 (65 MHz – 185 MHz): Compliance Design, Serial Number 17267, Calibrated 13 February 2003, 13 February 2006. [Note: Substitution Source Antenna].
- ⇒ Roberts Dipole: Set Dipole 3 (180 MHz – 400 MHz): Compliance Design, Serial Number 17267, Calibrated 13 February 2003, 13 February 2006. [Note: Substitution Source Antenna].
- ⇒ Roberts Dipole: Set Dipole 4 (400 MHz – 1000 MHz): Compliance Design, Serial Number 17267, Calibrated 13 February 2003, 13 February 2006. [Note: Substitution Source Antenna].
- ⇒ Attenuator, 6 dB: Omni-Spectra, Asset Tag # 000906.
- ⇒ Attenuator, 6 dB: Pasternak 7004-06, Asset Tag # 000907.
- ⇒ Attenuator, 10 dB: Pasternak 7004-10, Asset Tag # 000905.
- ⇒ Attenuator, 1 dB: Weinschel Model AS-18/1, Asset Tag # 000403.
- ⇒ Attenuator, 1 dB: Weinschel Model AS-18/6, Asset Tag # 000406.
- ⇒ Tripod, EMCO Model TR-1, No Calibration Required
- ⇒ Plastic Stand Assembly: Acme Testing Co., No Calibration Required
- ⇒ Antenna Mast and Controller: Acme Testing Co., No Calibration Required
- ⇒ Turntable: Acme Testing Co., Custom, No Calibration Required
- ⇒ Open Area Test Site: Acme Testing Co., Test Site Number 1, Normalized Site Attenuation [NSA] Calibrated: 28 June 2005, Calibration Due Date 28 June 2006

4.2 Purpose

The purposes of this Test were:

- to measure the Radiated Spurious Emissions resulting from the operation of each of the three members of the UHF Transmitter Family (i.e., Daniels Electronics Ltd. Models UT-4E400, UT-4E450, and UT-4E500) in accordance with 47CFR Part 2 Subpart J Section 2.1053 (i.e., the FCC Rules governing Radiated Spurious Emissions measurements), and,
- to determine the compliance of each of the three members of the UHF Transmitter Family (i.e., Daniels Electronics Ltd. Models UT-4E400, UT-4E450, and UT-4E500) to the –20 dBm Limit applicable to Radiated Spurious Emissions for UHF Transmitters used in conjunction with VHF Transmitter Systems and VHF Repeater Systems operating under 47 CFR Parts 22, 80, and 90.

4.3 Test Procedures

4.3.1 Procedures Applicable to Testing of the UHF Transmitter Model UT-4E400

The UHF Transmitter System containing the EUT (i.e., the Model UT-4E400 UHF Transmitter) was placed on a 1.5 metre high plastic stand assembly consisting of two plastic saw-horses and two plastic shelving units. The plastic stand assembly was placed directly onto the flush-mounted turntable (on the Open Area Test Site).

The VHF Transmitter System containing the EUT was set-up to operate in the “worst-case” (i.e. highest RF Output Power) mode, whilst set to transmit at $f_0 = 393$ MHz. Emissions from the GHz UHF Transmitter System containing the EUT were maximized by manipulating the cables, by adjusting the height of the receive antenna (from 1 metre to 4 metres), and by rotating the turntable. Measurements were made at both Horizontal and Vertical Polarization, noting in each case the “maximized” antenna height and azimuth, and the received signal level.

The UHF Transmitter System containing the EUT was then removed from the Turntable. A calibrated RF Signal Generator, calibrated Coaxial Cables, calibrated Precision Attenuators, and (dielectric tripod-mounted) calibrated Substitution Antennas were then used to make Substitution Measurements to determine the Effective Radiated Power of the Spurious Emissions over the frequency range from 393 MHz to 3,930 MHz. The resulting measurements were then compared to the -20 dBm Limit applicable to Radiated Spurious Emissions for VHF Transmitters used in conjunction with VHF Transmitter Systems and VHF Repeater Systems operating under 47 CFR Parts 22, 80, and 90.

4.3.2 Procedures Applicable to Testing of the Power Amplifier Model UT-4E450

The UHF Transmitter System containing the EUT (i.e., the Model UT-4E450 UHF Transmitter) was placed on a 1.5 metre high plastic stand assembly consisting of two plastic saw-horses and two plastic shelving units. The plastic stand assembly was placed directly onto the flush-mounted turntable (on the Open Area Test Site).

The VHF Transmitter System containing the EUT was set-up to operate in the “worst-case” (i.e. highest RF Output Power) mode, whilst set to transmit at $f_0 = 438$ MHz. Emissions from the GHz UHF Transmitter System containing the EUT were maximized by manipulating the cables, by adjusting the height of the receive antenna (from 1 metre to 4 metres), and by rotating the turntable. Measurements were made at both Horizontal and Vertical Polarization, noting in each case the “maximized” antenna height and azimuth, and the received signal level.

The UHF Transmitter System containing the EUT was then removed from the Turntable. A calibrated RF Signal Generator, calibrated Coaxial Cables, calibrated Precision Attenuators, and (dielectric tripod-mounted) calibrated Substitution Antennas were then used to make Substitution Measurements to determine the Effective Radiated Power of the Spurious Emissions over the frequency range from 438 MHz to 4,380 MHz. The resulting measurements were then compared to the -20 dBm Limit applicable to Radiated Spurious Emissions for VHF Transmitters used in conjunction with VHF Transmitter Systems and VHF Repeater Systems operating under 47 CFR Parts 22, 80, and 90.

4.3.3 Procedures Applicable to Testing of the Power Amplifier Model UT-4E500

The UHF Transmitter System containing the EUT (i.e., the Model UT-4E500 UHF Transmitter) was placed on a 1.5 metre high plastic stand assembly consisting of two plastic saw-horses and two plastic shelving units. The plastic stand assembly was placed directly onto the flush-mounted turntable (on the Open Area Test Site).

The VHF Transmitter System containing the EUT was set-up to operate in the “worst-case” (i.e. highest RF Output Power) mode, whilst set to transmit at $f_0 = 491$ MHz. Emissions from the GHz UHF Transmitter System containing the EUT were maximized by manipulating the cables, by adjusting the height of the receive antenna (from 1 metre to 4 metres), and by rotating the turntable. Measurements were made at both Horizontal and Vertical Polarization, noting in each case the “maximized” antenna height and azimuth, and the received signal level.

The UHF Transmitter System containing the EUT was then removed from the Turntable. A calibrated RF Signal Generator, calibrated Coaxial Cables, calibrated Precision Attenuators, and (dielectric tripod-mounted) calibrated Substitution Antennas were then used to make Substitution Measurements to determine the Effective Radiated Power of the Spurious Emissions over the frequency range from 491 MHz to 4,910 MHz. The resulting measurements were then compared to the -20 dBm Limit applicable to Radiated Spurious Emissions for VHF Transmitters used in conjunction with VHF Transmitter Systems and VHF Repeater Systems operating under 47 CFR Parts 22, 80, and 90.

4.3.4 Radiated Spurious Emissions Test Characteristics

Test Characteristics	Test Criteria
Frequency ranges:	
[UT-4E400]	393 MHz – 3,930 MHz
[UT-4E450]	438 MHz – 4,380 MHz
[UT-4E500]	491 MHz – 4,910 MHz
Test distance	3 m
Test instrumentation resolution/video bandwidths	30 kHz/30 kHz
Receive antenna scan height	1 m - 4 m
Receive antenna polarization	Vertical/Horizontal

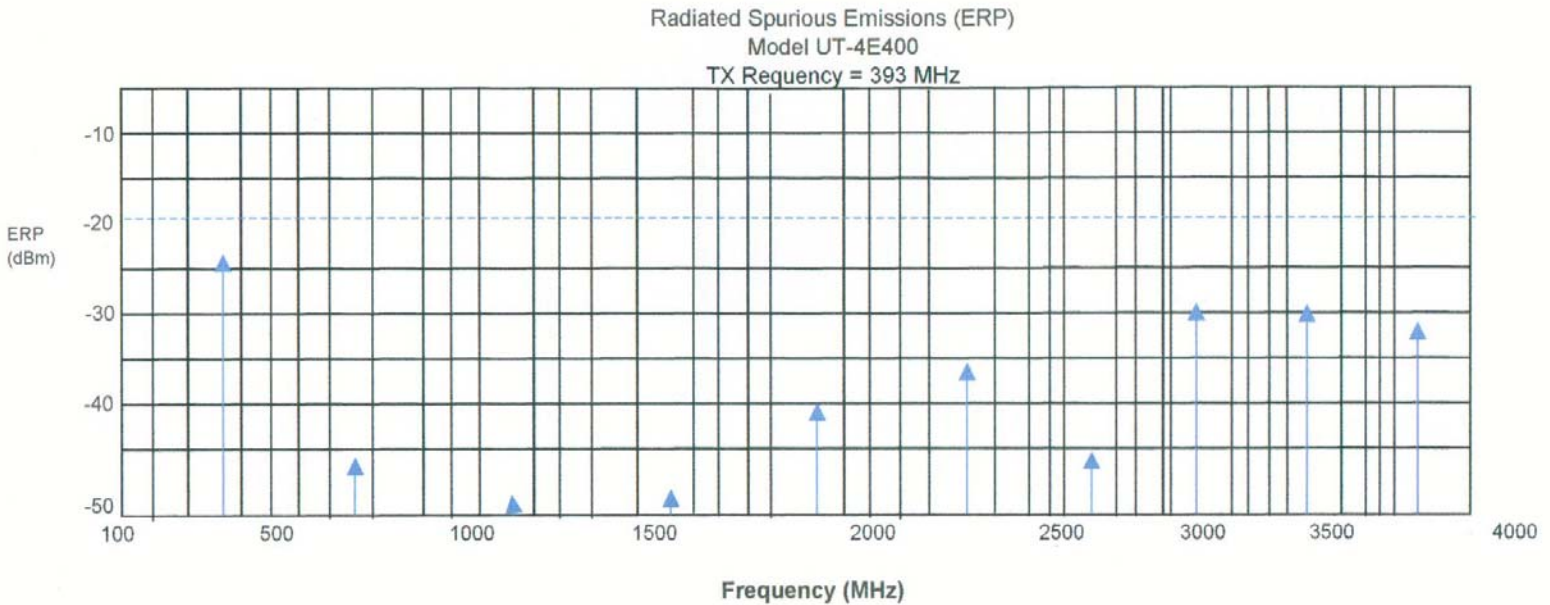
4.4 Test Results

4.4.1 Test Results for UHF Transmitter Model UT-4E400

Daniels UT-4E400 @ 393 MHz
 Temp: 15 degrees C
 Humidity: 74 %
 Pressure: 996 mBar

Limit -20 dBm

Frequency	Polarization	Height	Azimuth	Signal Generator	Cable Loss	Antenna Gain	EIRP	Margin
392.999	H	1.31	303	-2.8	22.9	1.6	-24.1	-4.1
785.998	H	2.01	255	-22.0	25.7	0.9	-46.8	-26.8
1179.000	V	2.67	219	-37.0	18.7	6.2	-49.5	-29.5
1571.999	H	1.00	208	-38.0	18.9	8.5	-48.4	-28.4
1964.997	V	1.02	222	-31.0	18.6	8.68	-40.9	-20.9
2357.999	H	1.08	012	-26.0	19.4	9.43	-36.0	-16.0
2751.000	V	1.00	360	-35.0	19.5	9.05	-45.5	-25.5
3143.998	V	1.16	256	-20.0	19.2	9.65	-29.6	-9.6
3536.999	V	2.07	348	-19.0	20.3	9.84	-29.5	-9.5
3930.001	V	1.35	349	-21.5	20.4	9.64	-32.3	-12.3



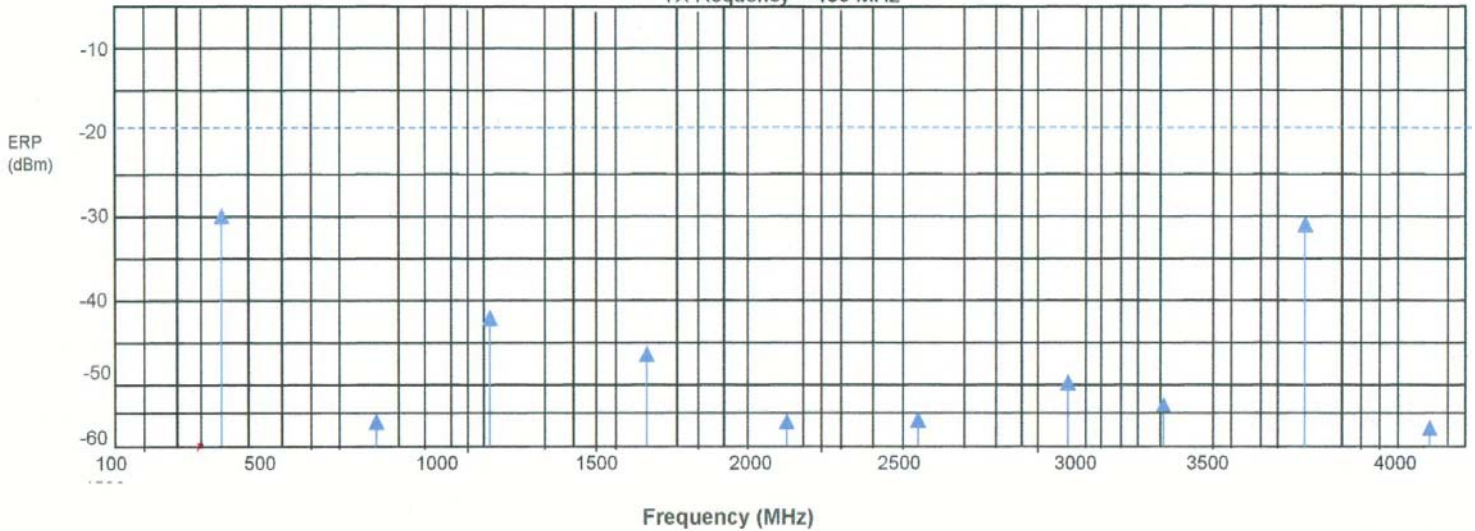
4.4.2 Test Results for UHF Transmitter Model UT-4E450

Daniels UT-4E450 @ 438 MHz
 Temp: 13 degrees C
 Humidity: 70 %
 Pressure: 1000 mBar
 11/2/05

Limit -20 dBm

Frequency	Polarization	Height	Azimuth	Signal Generator	Cable Loss	Antenna Gain	EIRP	Margin
437.998	H	1.18	222	-8.0	22.7	1.6	-29.1	-9.1
875.995	V	1.47	117	-29.0	26.6	0.6	-55.0	-35.0
1313.997	H	1.50	79	-32.0	18.3	7.4	-42.9	-22.9
1752.000	V	1.13	196	-35.0	18.7	8.6	-45.1	-25.1
2189.999	V	1.52	360	-45.0	18.9	8.68	-55.2	-35.2
2627.997	V	1.15	187	-45.5	19.2	9.43	-55.3	-35.3
3065.997	V	1.11	292	-37.5	19.3	9.65	-47.2	-27.2
3503.996	H	1.20	249	-43.5	20	9.84	-53.7	-33.7
3941.997	V	1.10	210	-19.5	20.1	9.64	-30.0	-10.0
4379.993	V	1.45	167	-46.0	20.4	10.36	-56.0	-36.0

Radiated Spurious Emissions (ERP)
 Model UT-4E450
 TX Frequency = 438 MHz



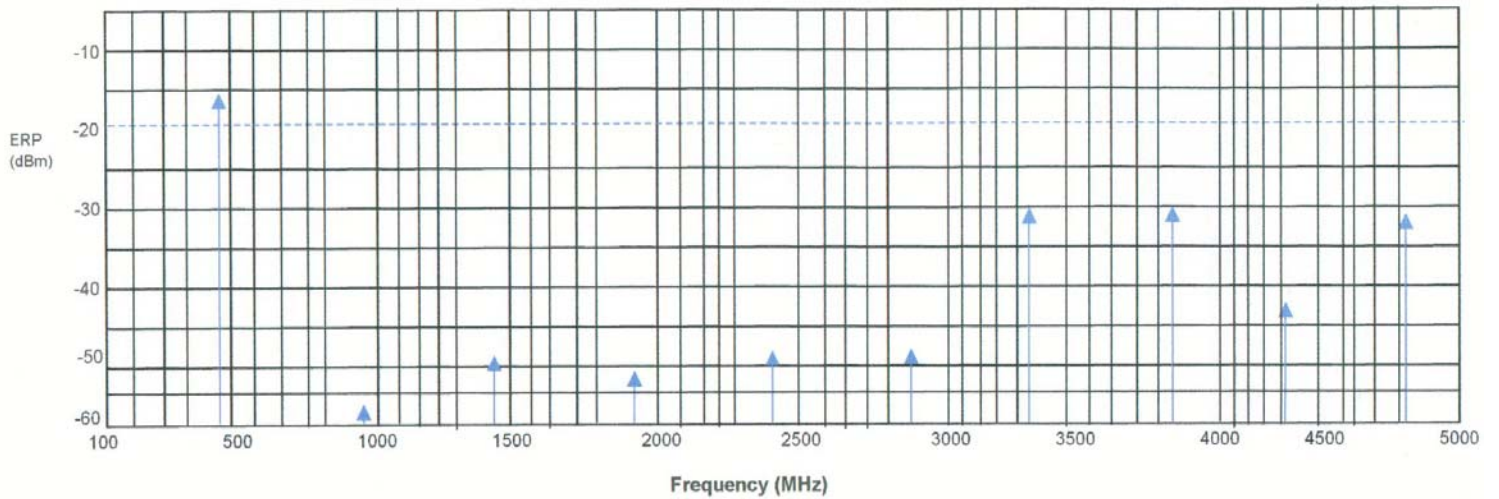
4.4.3 Test Results for UHF Transmitter Model UT-4E500

Daniels UT-4E500 @ 491 MHz
 Temp: 12 degrees C
 Humidity: 70 %
 Pressure: 982 mBar
 11/3/05

Limit -20 dBm

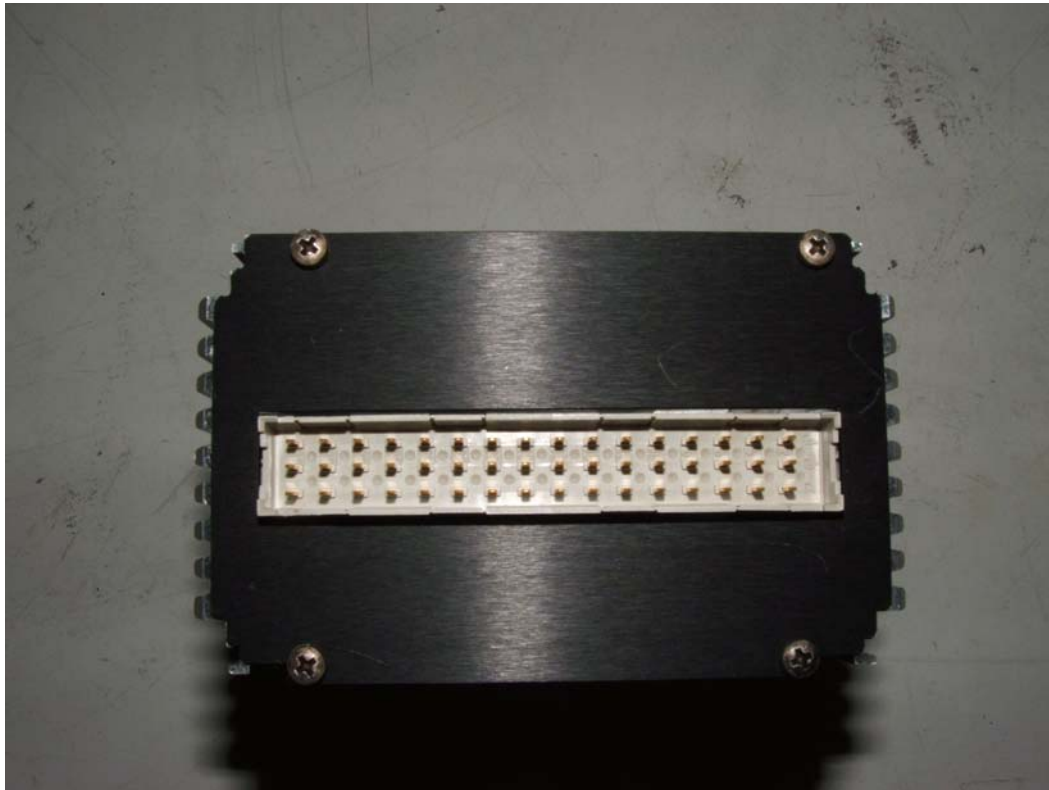
Frequency	Polarizatio	Height	Azimuth	Signal Generator	Cable Loss	Antenna Gain	EIRP	Margin	
490.999	H	1.64	360	7.3	23.5	0.9	-15.3	4.7	Customer says fundamental may exceed the limit
981.998	H	2.50	343	-29.5	28	0.4	-57.1	-37.1	
1472.998	V	1.19	0	-35.5	20	8.11	-47.4	-27.4	
1963.996	V	1.18	275	-39.5	19.7	8.16	-51.0	-31.0	
2454.996	H	1.33	307	-37.0	18.3	8.92	-46.4	-26.4	
2945.997	V	1.26	360	-37.0	18.6	8.99	-46.6	-26.6	
3436.994	H	1.23	330	-20.5	19.1	9.1	-30.5	-10.5	
3927.994	V	1.15	345	-19.8	19.4	9.09	-30.1	-10.1	
4418.994	H	2.07	347	-34.2	19.6	10.41	-43.4	-23.4	
4909.993	V	1.60	158	-21.5	20.1	9.83	-31.8	-11.8	

Radiated Spurious Emissions (ERP)
 Model UT-4E500
 TX Frequency = 491 MHz

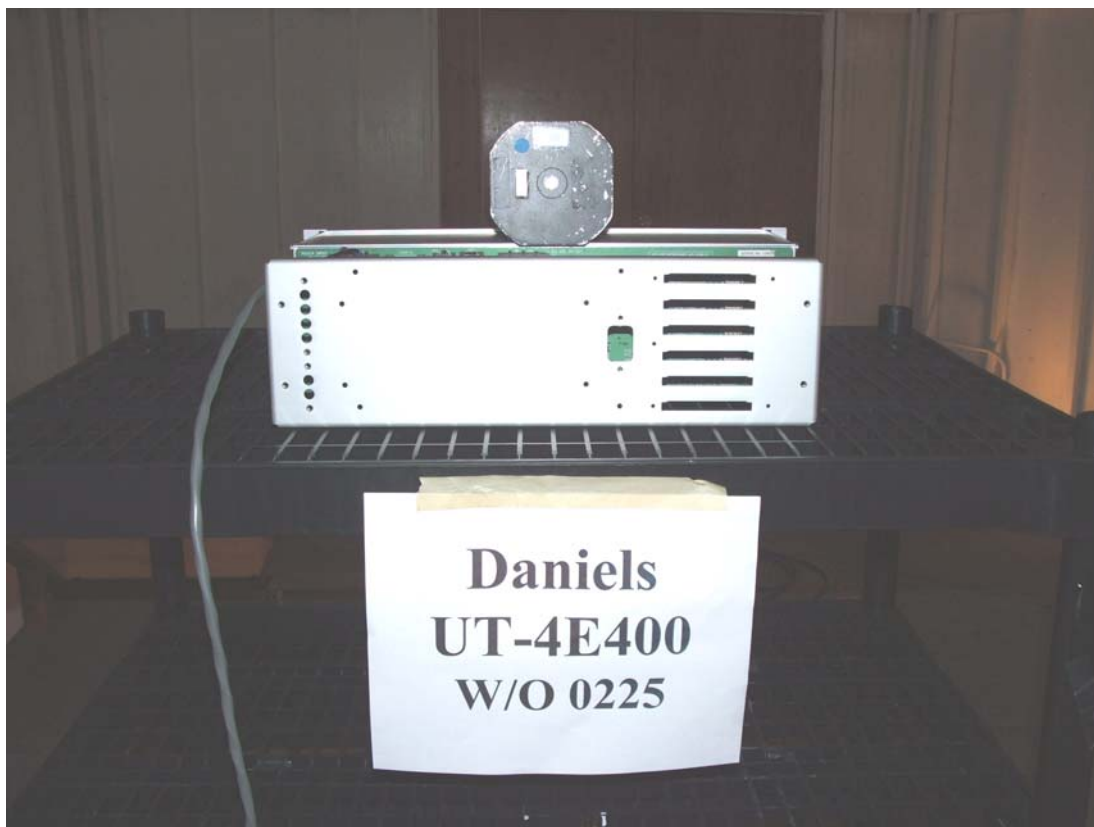


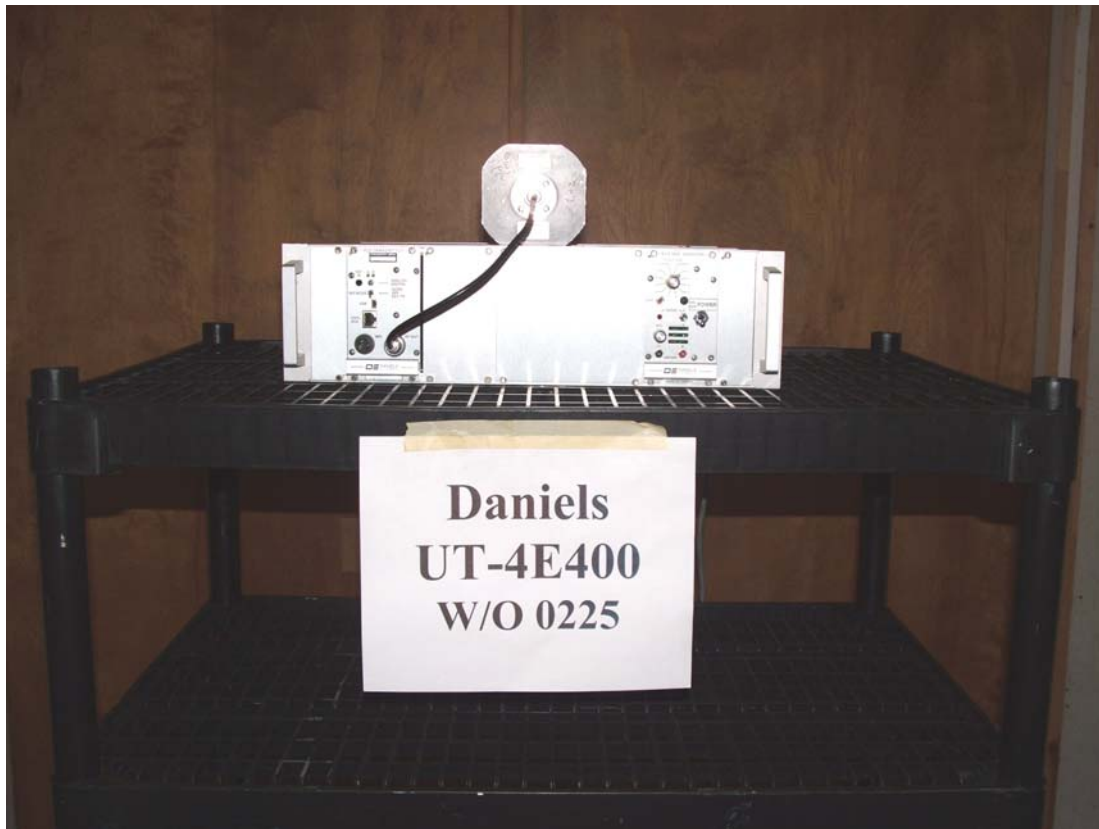
4.5 Test Setup Photographs

4.5.1 UT-4E400



















4.5.2 UT-4E450









