

**FCC TEST REPORT
FOR THE
QUANTUM INSTRUMENTS, INC.
FREEWIRE PHOTOGRAPHIC DEVICE
REMOTE CONTROL TRANSMITTER (FW9T)**

Prepared for:

Quantum Instruments, Inc.
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Submitted by:

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Quantum Instruments, Inc.
FCC Tests
By
Green Mountain Electromagnetics, Inc.
Middlebury, Vermont

Unit: FreeXWire Photographic Device Remote Control Transmitter (FW9T)

Evaluated: December 15, 2004 to January 18, 2005

I. Applicable Standards:

The unit described in this report was measured for certification with the Code of Federal Regulations Chapter 47 – "Telecommunication, Part 2 – Frequency Allocations and Radio Treaty Matters: General Rules and Regulations, Subpart J – Equipment Authorization Procedures (2002)." Measurements required were per paragraphs 2.1046 RF Power Output, 2.1047 Modulation Characteristics, 2.1049 Occupied Bandwidth, 2.1051 Spurious Emissions at Antenna Terminals, 2.1053 Field Strength of Spurious Radiation, 2.1055 Frequency Stability, and 2.1093 Radiofrequency Radiation Exposure Evaluation: Portable Devices.

The unit was also measured for verification of compliance with "CFR47, Part 15 – Radio Frequency Devices, Subpart C: Intentional Radiators, Paragraph 15.209, Radiated Emissions Limits and Paragraph 15.231, "Periodic operation in the band 40.66 - 40.70 MHz and above 70 MHz."

Measurement procedures were in accordance with ANSI C63.4, "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2000)," and FCC OET Bulletin 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields (August 1997)."

II. Unit Tested:

The Quantum Instruments, Inc. FW9T transmitter is the portion of the remote control attached to a camera. The FW9T uses DC power and has a 433-MHz crystal oscillator transmitter. It consists of the two-piece plastic enclosure with manual switch hardware, the transmit circuit, the electronics, and the antenna. The table below describes the unit tested to determine compliance with the standards:

Model/P/N	Manufacturer	H/W/D in cm	Serial Number
FW9T	Quantum Instruments, Inc.	10/7/3	ENG001

The highest frequency investigated is ten times the highest fundamental (4.33 GHz).

III. Measurement Location:

The GME laboratory and Open Area Test Site (OATS) are located at 219 Blake Roy Road, Middlebury, VT. The OATS is a 3-meter site complete with antenna positioner, ground plane and motorized turntable. The OATS is constructed in accordance with ANSI C63.7-1992 and complies with the requirements for radiated emissions testing in ANSI C63.4-2000 and CISPR 16-1993. The electromagnetic laboratory is constructed in accordance with CE immunity standards and ANSI C63.4-2000 (conducted emissions).

GME is internationally accredited by the American Association for Laboratory Accreditation (A2LA) and meets the quality requirements in ISO/IEC 17025 (1999), "General Requirements for the Competence of Testing and Calibration Laboratories."

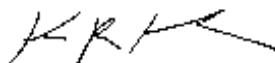
IV. Summary of Results:

The Quantum Instruments, Inc. FW9T transmitter complies with the requirements in CFR 47, Paragraphs 2 and 15. Section IX contains the results summarized in the table below.

	Test	Mode/Port	CFR 47 Paragraph	Frequency Range/Level	Specified Values	Measured Values
1	Output Power	Transmit	2.1046	433 MHz	0 dBm (manu. spec.)	-2 dBm
2	Modulation Characteristics	Transmit	2.1047 15.231(a)	Deactivate time	<5 Seconds	<5 Seconds
3	Occupied Bandwidth	Transmit	2.1049 15.231(c)	20 dB down at 0.25% of Fundamental	1.08 MHz	<10 kHz
4	Conducted Spurious	Transmit	2.1051	1 MHz to 4.33 GHz	>20 dB Attenuation	>20 dB Attenuation
5	Frequency Tolerance	Transmit	2.1055	Battery End Point	3 V	433.9 MHz
6	Radiated Emissions	Enclosure	15.209 15.231(b) 2.1053	1.705 - 30 MHz 30 - 88 MHz 88 - 216 MHz 216 - 960 MHz 960 - 4339 MHz 433.9 MHz (Fund) Above 434 (Spur)	49.5 dBuV/m 40 dBuV/m 43.5 dBuV/m 46 dBuV/m 54 dBuV/m 81 dBuV/m 61 dB/V/m	Within All Limits at 3 Meters
7	Exposure Evaluation	Enclosure	2.1093	433.9 MHz	0.08 W/kg Body 1.6 W/kg 1g Vol	Within All Limits

Testing was performed by Kyle R. Kowalczyk, president, Green Mountain Electromagnetics and requested by:

Quantum Instruments, Inc.
 1075 Stewart Ave.
 Garden City, New York 11530
 USA



Kyle R. Kowalczyk
1/18/05

V. Measuring Equipment:

The table below describes the instrumentation used by Green Mountain Electromagnetics to perform this testing:

Unit	Manufacturer	Model	Serial #	Last Cal.	Next Cal.
Spectrum Analyzer	Hewlett-Packard	8592	3624A00631	1/13/04	1/30/05
Amplifier	Hewlett-Packard	8447 D	2944A07313	5/17/04	5/17/05
Signal Generator	Hewlett-Packard	E4421B	US38220195	10/20/04	10/20/05
Plotter	Hewlett-Packard	7475A	2517A05281	n/a	n/a
Broadband E-field Antenna	Antenna Research Associates	LPB-2513/A	1125	11/2/04	11/2/05

VI. Equipment and Cable Configuration:

GME witnessed the unit in satisfactory condition for testing, however the manufacturer is responsible for ensuring that the equipment under test (EUT) represents the product line. The manufacturer is also responsible for the EMC test plan and for assuring that this report is consistent with that plan. The EUT configuration was arranged to produce maximum radiated emissions as shown in the block diagram below, as well as in the photograph in Section VIII. The equipment was subjected to complete emissions tests.

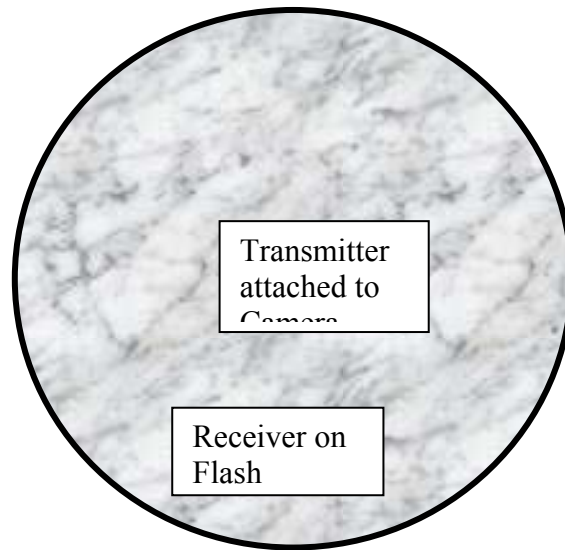


Figure 1 – Block Diagram of EUT on Turntable

The EUT was operating in a continuous mode utilizing and testing its remote control functions. The EUT was also set to self-test upon power up.

VII. Measurement Procedures for FCC Tests:

1. Output Power.

Manufacturer Specification: 0-dBm, 100% duty cycle (Not Normal Operation)

- a. Set up EUT and test instrumentation in laboratory.
 - i. Connect EUT to battery power and operate companion unit.
- b. Verify spectrum analyzer and EUT operation.
 - i. Use internal spectrum analyzer attenuator.
- c. Verify EUT frequency with non-contact probe and spectrum analyzer.
- d. Operate EUT at high power unmodulated.
- e. Record power level displayed on analyzer in dBm.

2. Modulation Characteristics.

Specification: remote control only with <5 second deactivation time

- a. Set up EUT and test instrumentation in laboratory.
 - i. Connect EUT to battery power.
- b. Verify analyzer and EUT operation.
- c. Verify EUT test signal on spectrum analyzer.
- d. Operate EUT at selected test signal with normal duty cycle.
- e. Record off time.

3. Occupied Bandwidth.

Specification: >20 dB at 0.25% of Fundamental (1.08 MHz at 433.9 MHz)

- a. Set up EUT and test instrumentation in laboratory.
 - i. Connect EUT to battery power and operate companion unit.
- b. Verify spectrum analyzer and EUT operation.
 - i. Use internal spectrum analyzer attenuator.
- c. Verify EUT frequency with non-contact probe and spectrum analyzer.
- d. Operate EUT at power unmodulated.
- e. Record level displayed on analyzer.

4. Conducted Spurious.

Specification: Attenuation >20 dB

- a. Set up EUT and test instrumentation in laboratory.
 - i. Connect EUT to battery power and operate companion unit.
- b. Verify spectrum analyzer and EUT operation.

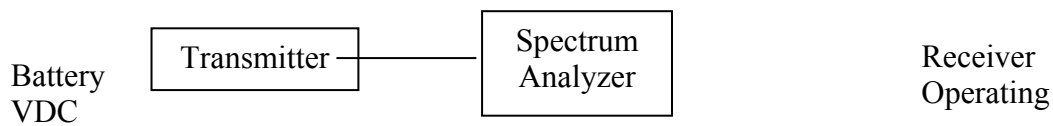
- i. Use internal spectrum analyzer attenuator.
- c. Verify EUT frequency with non-contact probe and spectrum analyzer.
- d. Operate EUT at normal power and modulation.
- e. Record level displayed on analyzer.

5. Frequency Tolerance.

Frequency: 433.9 MHz

Voltage Specification: 3 VDC Battery (Normal Operation)

- a. Set up EUT and test instrumentation in laboratory.
 - i. Connect EUT to DC power and operate companion unit.
- b. Verify spectrum analyzer and EUT operation.
 - i. Use internal spectrum analyzer attenuator.
- c. Verify EUT frequency with non-contact probe and spectrum analyzer.
- d. Operate EUT at power unmodulated.
- e. Record level displayed on analyzer.
 - i. Sweep voltage from low to high and observe any variation in frequency.



Block Diagram of Procedures 1-5.

VII. Measurement Procedures for FCC Tests Cont'd:

6. Radiated Emissions.

Frequency range: 1.7 MHz to 30 MHz

Limit: 49.5 dBuV/m @ 3 meters

Frequency range: 30 MHz to 88 MHz

Limit: 40 dBuV/m @ 3 meters

Frequency range: 88 kHz to 216 MHz

Limit: 43.5 dBuV/m @ 3 meters

Frequency range: 216 MHz to 960 MHz

Limit: 46 dBuV/m @ 3 meters

Frequency range: 960 MHz to 4339 MHz

Limit: 54 dBuV/m @ 3 meters

Frequency range: 434 MHz to 4.33 GHz Spurious

Limit: 61 dBuV/m @ 3 meters

Frequency range: 434 MHz to 4.33 GHz Fundamental

Limit: 81 dBuV/m @ 3 meters

- a. Set up instrumentation at open area test site.
 - i. Mount EUT on turntable and broadband antenna on antenna positioner.
 - ii. Record temperature, humidity and atmospheric pressure.
 - iii. Measurement distance is 3 meters and antenna scan height is varied from 1 to 4 meters.
- b. Verify spectrum analyzer and antenna operation.
 - i. Spectrum analyzer is connected to antenna.
 - ii. Preamplifier is inserted between antenna and analyzer to ensure analyzer noise threshold is at least 6 dB below specification limit (not normally necessary below 30 MHz).
- c. Set up, power and operate EUT as described in Section VI.
- d. Perform preliminary evaluation of equipment in the near field.
 - i. Vary antenna height, antenna polarization, and antenna orientation to EUT.
 - ii. Repeat step d.i. while evaluating electromagnetic radiation in the 1-MHz to 4.33-GHz spectrum.
 - iii. Ensure appropriate resolution bandwidth is set and less than or equal to VBW.
 - iv. Near field measurements of unit emissions are made at ambient frequencies.
- e. Determine frequencies and equipment orientations that produce maximum radiation.
 - i. Identify any processor, clock and beat frequencies, and harmonics.

- f. Perform final evaluation of unit by recording spectrum analyzer data on the plotter.
 - i. Ensure the EUT is producing the maximum radiation found in step e.
 - ii. Collect data over the entire frequency range.
 - iii. Identify all ambient signals.

7. Exposure Evaluation.

Frequency: 433.3 MHz

Limit: 0.8 W/kg and 1.6 W/kg

- a. Set up instrumentation at open area test site.
 - i. Mount EUT on table and isotropic probe or loop on antenna positioner.
 - ii. Record temperature, humidity and atmospheric pressure.
 - iii. Measurement distance is 1 meter and antenna scan height is varied over human body dimensions (0.1 to 2 meters).
- b. Verify spectrum analyzer and antenna operation.
 - i. Spectrum analyzer is connected to antenna.
 - ii. Preamplifier is inserted between antenna and analyzer to ensure analyzer noise threshold is at least 6 dB below specification limit (not normally necessary below 30 MHz).
- c. Set up, power and operate EUT as described in Section VI.
- d. Perform preliminary evaluation of equipment in the near field.
 - i. Vary antenna height, antenna polarization, and antenna orientation to EUT.
 - ii. Repeat step d.i. while evaluating electromagnetic radiation at 433 MHz.
 - iii. Ensure appropriate resolution bandwidth is set and less than or equal to VBW.
 - iv. Near field measurements of unit emissions are made at ambient frequencies.
- e. Determine equipment orientations that produce maximum radiation.
 - i. Set peak hold on analyzer for 30 minutes while slowly varying antenna height.
- f. Perform final evaluation of unit by recording spectrum analyzer data on the plotter.
 - i. Ensure the EUT is producing the maximum radiation found in step e.
 - ii. Collect data over the entire frequency range.
 - iii. Identify all ambient signals.

VIII. Test Setup Photograph for FCC Tests:

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

IX. Measurement Results for FCC Tests:

1. Output Power.

Specification: 0 dBm, 100% duty cycle per manufacturer

OutTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.