

APPLICANT Quantum Instruments Inc. 1075 Stewart Avenue Garden City, NY 11530	MANUFACTURER Quantum Instruments Inc. 1075 Stewart Avenue Garden City, NY 11530
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TEST SPECIFICATION: FCC Rules and Regulations Part 15, Subpart C, Para. 15.231

TEST PROCEDURE: ANSI C63.4:1992

TEST SAMPLE DESCRIPTION

BRANDNAME: Quantum MODEL: FW10

TYPE: Pulsed Transmitter

POWER REQUIREMENTS: 3 VDC derived from CUI Stack, AC Adapter Model DPP060020-P1-SZ

FREQUENCY OF OPERATION: 433.92 MHz

TESTS PERFORMED

Para. 15.207(a), Conducted Emissions

Para. 15.231(a), Radiated Emissions, Fundamental and Harmonics

Para. 15.231(b), Radiated Emissions, Spurious Case

Para. 15.231(c), Occupied Bandwidth

REPORT OF MEASUREMENTS

Applicant: Quantum Instruments Inc.

Device: AM Pulsed Transmitter

FCC ID: CEXFW10

Power Requirements: 3VDC

Applicable Rule Section: Part 15, Subpart C, Section 15.231

Test Report No. R-8568-1
FCC ID: CEXFW10

REPORT OF MEASUREMENTS (continued)

TEST RESULTS

- 15.207(a): The radio frequency voltage that was conducted back on to the AC power line on any frequency/frequencies within the bandwidth of 450kHz to 30MHz did not exceed 250 microvolts.
- 15.231 (a): This device is used as a remote control of photography equipment.
- 15.231 (a)(1) & 15.231(a)(2): The transmitter is manually operated and ceases transmission within 5 seconds after deactivation.
- 15.231 (a)(3): The transmitter does not perform periodic transmissions.
- 15.231 (b): The fundamental field strength did not exceed 11000 $\mu\text{V/M}$ (Average) at a test distance of 3 meters. In addition, the requirements of section 15.35 for averaging pulsed emissions and for limiting peak emissions were met.
- The field strength of harmonic and spurious emissions did not exceed 1100 $\mu\text{V/M}$ (AVERAGE).

DETERMINATION OF FIELD STRENGTH LIMITS

The field strength limits shown below are found in Section 15.231.

Frequency			Limit		
F1	=	260	3750	=	L1
Fo	=	433.92			Lo
F2	=	470	12500	=	L2

The formula below was utilized to determine the limits:

$$\text{Limit} = L1 + [(Fo-F1)(L2-L1)/(F2-F1)]$$

Solving yields:

$$\text{Fundamental Limit} = 11,000 \mu\text{V/M (AVERAGE) @ 3 Meters}$$

$$\text{Harmonic Limit} = 1,100 \mu\text{V/M (AVERAGE) @ 3 Meters}$$

REPORT OF MEASUREMENTS (continued)

DUTY CYCLE DETERMINATION

The spectrum analyzer was set to a 0 Hz span with a sweep time of 100 mSec at the fundamental transmitter frequency. The worst case duty cycle during any 100 mSec period was then measured. The information below is a calculation of duty cycle based on the measured values obtained:

$$(8 \times 15 \mu\text{sec}) = 0.120 \text{ mSec}$$

$$(10) \times 20 \mu\text{sec} = 0.200 \text{ mSec}$$

$$(1) \times 30 \mu\text{sec} = 0.030 \text{ mSec}$$

$$(1) \times 40 \mu\text{sec} = 0.040 \text{ mSec}$$

$$\text{Duty Cycle Correction Factor} = 20 \log (0.0039) = -48.2 \text{ dB}$$

SPECTRUM ANALYZER DESENSITIZATION CONSIDERATIONS

Due to the nature of the emissions being measured, care was taken to ensure that the resolution bandwidth of the spectrum analyzer was adequate to provide accurate measurements. The following formula was utilized:

Setting pulse desensitization equal to zero and utilizing the minimum observed pulse width of 20 μ s yields a minimum required bandwidth of 33.3 kHz. FCC specified bandwidths of 100kHz and 1MHz were utilized below and above 1GHz, respectively.

GENERAL NOTES

1. All readings were taken utilizing a peak detector function at a test distance of 3 meters.
2. The duty cycle was applied to the peak readings in order to determine the average value of the emissions.
3. All measurements were made with 3 VDC being derived from an AC Adapter.
4. The frequency range was scanned from 30 MHz to 4.4 GHz. All emissions not reported were more than 20 dB below the specified limit.

EQUIPMENT LISTS

Radiated Emissions, Fundamental and Harmonics, 430MHz-4.5GHz

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
067	Open Area Test Site	Retlif	3 Meter	RNY	10/15/1997	10/15/2000
128C	Double Ridge Guide	Eaton Corporation	1 GHz - 18 GHz	96001	09/16/1999	09/16/2000
133	Broadband Pre-Amplifier	Electro-Metrics	10 kHz - 1 GHz, 26dB	BPA-1000	06/22/1999	06/22/2000
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	03/20/2000	09/20/2000
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	03/08/2000	03/08/2001
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	03/20/2000	09/20/2000
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	06/22/1999	06/22/2000
443	Log Periodic Antenna	Electro-Metrics	200 MHz - 1000 MHz	LPA-25	01/17/2000	01/17/2001
543	Preamplifier	Hewlett Packard	1.0 GHz - 26.5 GHz	8449B	06/16/1999	06/16/2001

Radiated Emissions, Spurious, and Occupied Bandwidth, 430MHz-4.5GHz

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
067	Open Area Test Site	Retlif	3 Meter	RNY	10/15/1997	10/15/2000
128C	Double Ridge Guide	Eaton Corporation	1 GHz - 18 GHz	96001	09/16/1999	09/16/2000
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141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	03/20/2000	09/20/2000
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	03/08/2000	03/08/2001
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	03/20/2000	09/20/2000
206B	6.0 dB Attenuator	Texscan	0 - 1.0 GHz	FP-50 - 6 dB	06/22/1999	06/22/2000
443	Log Periodic Antenna	Electro-Metrics	200 MHz - 1000 MHz	LPA-25	01/17/2000	01/17/2001
543	Preamplifier	Hewlett Packard	1.0 GHz - 26.5 GHz	8449B	06/16/1999	06/16/2001

Conducted Emissions, Transmit, 450kHz-30MHz

EN	Type	Manufacturer	Description	Model No.	Cal Date	Due Date
078	LISN	Solar Electronics	10 kHz - 30 MHz	8028-50-TS24BNC	04/27/2000	04/27/2001
141	Spectrum Analyzer	Hewlett Packard	100 Hz - 40 GHz	8566B	03/20/2000	09/20/2000
141A	Graphics Plotter	Hewlett Packard	N/A	7470A	03/08/2000	03/08/2001
141B	Quasi-Peak Adaptor	Hewlett Packard	100 Hz - 1 GHz	85650A	03/20/2000	09/20/2000
202	Transient Limiter	Hewlett Packard	.009 MHz - 200 MHz	11947A	07/19/1999	07/19/2000
513	LISN	Solar Electronics	10 kHz - 30 MHz	8028-50-TS24BNC	04/27/2000	04/27/2001

FCC 15.207(a)

Conducted Emissions

Please refer to separate electronic file named cedata.pdf

FCC 15.231(b)

RADIATED EMISSIONS, FUNDAMENTAL & SPURIOUS CASE

See separate e-file attachment named RE fund.pdf and RE spur.pdf

FCC 15.231(c)

OCCUPIED BANDWIDTH

Please refer to separate electronic file named Occbw.pdf