

# Marstech Limited

11 Kelfield Street, Etobicoke, Ontario, Canada, M9W 5A1

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Authorized by:

Professional Engineers  
Ontario

Engineering &  
Administrative



Testing For FCC  
Submissions/Verifications

Approved Test Facility



## TEST REPORT

REPORT DATE:	08 February 2002		REPORT NO: 21201D
CONTENTS:	See Table of Contents		
SUBMITTOR:	EATON YALE LTD., CUTLER-HAMMER 610 Industrial Drive Milton, Ontario L9T 5C3 CANADA		
SUBJECT:	Model No: RCGS		
	FCC ID: POK-RCGSTX		
TEST SPECIFICATION:	FCC 47 CFR Part 15 NOTE: Tests Conducted Are "Type" Tests.		
DATE SAMPLE RECEIVED:	22 January 2002	DATE TESTED:	23 & 30 January 2002 and 01 February 2002
RESULTS:	Equipment tested complies with referenced specification.		
ALTERATIONS:	None		
Tested by:	Edward Chang	Approved by:	Robert G. Marshall, P. Eng.
		Date:	Feb 20 02

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**TECHNICAL REPORT - FCC 2.1033(b)**

**Applicant**

Eaton Yale Ltd., Cutler-Hammer  
610 Industrial Drive  
Milton, Ontario  
L9T 5C3 CANADA

**FCC Identifier**

POK-RCGSTX

**Manufacturer**

Eaton Yale Ltd. Cutler-Hammer  
4120B Sladeview Crescent  
Mississauga, Ontario  
L5L 5Z3 CANADA

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**EXHIBIT D**

[FCC Ref. 2.1033(b)(6)]

"Report of Measurements"

**EXHIBIT D(1)**

**DEVICE MEASURED**

[FCC Ref. 2.1033(b)(6)]

**APPLICANT:**

Eaton Yale Ltd., Cutler-Hammer  
610 Industrial Drive  
Milton, Ontario  
L9T 5C3 CANADA

**MANUFACTURER:**

Eaton Yale Ltd. Cutler-Hammer  
4120B Sladview Crescent  
Mississauga, Ontario  
L5L 5Z3 CANADA

**FCC IDENTIFIER:**

POK-RCGSTX

**MODEL NUMBER:**

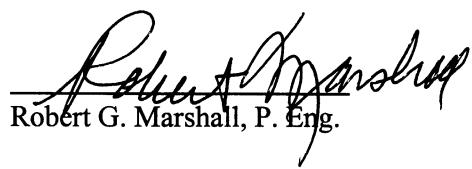
RCGS

**SERIAL NO.:**

Not Marked

Marstech Limited  
11 Kelfield Street  
Etobicoke, Ontario  
M9W 5A1 CANADA

**TECHNICIAN:**  
Edward Chang

  
Robert G. Marshall, P. Eng.

Date: Nov 20 02

EXHIBIT D(2)

**TEST FACILITY AND EQUIPMENT LIST**

**FACILITIES**

Radiated      ANSI C63.4 (FCC OET/55) open field 3 metre test range. This test range is protected from the cold and moisture by a non-conductive enclosure.

**EQUIPMENT**

Anritsu 2601A Spectrum Analyzer  
Advantest R3261A Spectrum Analyzer  
Hewlett-Packard RF generator # 8640 B with an 002 doubler  
A.H. Systems biconical antenna; ..... 20 MHz to 330 MHz  
A.H. Systems log periodic antenna; ..... 300 MHz to 1.8 GHz  
Eaton dipole antennas; T1, T2, T3 ..... 25 MHz to 1.0 GHz  
Roberts dipole antennas; T1, T2, T3 & T4 25 MHz to 1.0 GHz  
Compliance Design P950 Preamp (16 dB) ... 25 MHz to 1.0 GHz

**NOTE:**

The Anritsu 2601A Spectrum Analyzer and the Advantest R3261A Spectrum Analyzer are calibrated annually, and that calibration is directly traceable to the National Research Council of Canada. (NRC) This equipment is only used by qualified technicians and only for the purpose of EMI measurements. The three metre test range has been carefully evaluated to the ANSI document C63.4 and will be remeasured for reflections and losses every three years.

## **ADDITIONAL TEST EQUIPMENT LIST**

1. Spectrum Analyzer: HP 8591EM, S/N 3639A00995, Calibrated April 2001
2. Spectrum Analyzer: ANRITSU 2601A, S/N MT64544, Calibrated May 2001
3. Spectrum Analyzer: IFR AN940, S/N 635001039, Calibrated March 2001
4. Preamp: HP 8449B, S/N 3008A00378, Calibrated August 2001
5. Horn Antenna: Q-PAR 6878/24, S/N 1721, 1.5-18GHz.
6. Line Impedance Stabilization Network.: Marstech, Cal. July 2001

FEDERAL COMMUNICATIONS COMMISSION  
Laboratory Division  
7435 Oakland Mills Road  
Columbia, MD. 21046

September 20, 2000

Electrohome Electronics Ltd.  
809 Wellington St. N.  
Kitchener, Ontario N2G 4J6  
Canada

Attention: Gerry Gallagher

Registration Number: 90578

Re: Measurement facility located at Roseville  
3 meter-site  
Date of Listing: September 20, 2000

Gentlemen:

Your submission of the description of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The description has, therefore, been placed on file and the name of your organization added to the Commission's list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that this filing must be updated for any changes made to the facility, and at least every three years from the date of listing the data on file must be certified as current.

If requested, the above mentioned facility has been added to our list of those who perform these measurement services for the public on a fee basis. An up-to-date list of such public test facilities is available on the Internet on the FCC Website at WWW.FCC.GOV, E-Filing, OET Equipment Authorization Electronic Filing.

Sincerely,



Thomas W Phillips  
Electronics Engineer

FCC ID: POK-RCGSTX  
Marstech Report No. 21201D  
EXHIBIT D(2)-3

## **SUMMARY OF RESULTS**

**COMPLIANCE**

(yes) (no)

### **FIELD STRENGTH OF THE CARRIER FREQUENCY**

Transmitter: 15.231(b)

**70.60 dB $\mu$ V/M @ 3 Meters @ 433.88 MHz** Limit: 72.86 dB $\mu$ V/M

(x) ( )

### **BANDWIDTH**

Transmitter: 15.231(c)

**405 KHz**

(x) ( )

### **TRANSMITTER BAND RESTRICTIONS**

The limit for spurious emission per 15.231(e) is lower than the general limit of 54 dB $\mu$ V/M for restricted bands.

(x) ( )

### **SPURIOUS RADIATION LEVELS**

Transmitter: 15.231(b)

**46.19 dB $\mu$ V/M @ 1735.52 MHz** Limit: 54 dB $\mu$ V/M

(x) ( )

### **LINE CONDUCTED RADIATION**

Transmitter:

N/A

### **PEAK TO AVERAGE RATIO**

Transmitter: **-9 dB**

(x) ( )

## SPURIOUS RADIATED EMISSIONS

Page 1 of 2

### RESULTS

The maximum field strength of the carrier while transmitting was:

Transmitter: **Maximum field strength: 70.60 dB $\mu$ V/M at 433.88 MHz.**

### TEST CONDITIONS

Equipment Positioning:

Receiver: N/A  
Transmitter: Vertical

Antenna Polarization: Vertical

Measurement Bandwidth: 120KHz

Supply Voltage:

Transmitter: 12Vdc Battery  
Receiver: N/A

### METHODS OF MEASUREMENT

Transmitter:

The transmitter was placed on a one meter high non-metallic turntable. The EUT was unmodified sample, as supplied by the manufacturer. All emissions were measured and recorded.

The turntable was rotated through 360 degrees, while the receiving antenna, at three (3) meters from the EUT, was varied in height from 1 to 4 meters, to find the maximum signal strength. The measured level was converted to a field strength using the antenna correction factors and cable losses. The equipment was tested in three (3) orthogonal planes.

**RADIATED EMISSION RESULTS**

Page 2 of 2

**Test Data:****Remote TX Unit**

Frequency Band MHz	Meter Reading @ 3 m dB $\mu$ V	Antenna	Cable and ACF dB	Field Strength dB $\mu$ V/M	Pk/Av Ratio (dB)	Corrected F. S. dB $\mu$ V/M	FCC Limit dB $\mu$ V/M	Margin dB	Detector & BW KHz
433.88	54.4	RT4 V	25.2	79.6	9	70.6	72.86	-2.26	PK 100
867.50	10	LP H	29.2	39.2	9	30.2	52.86	-22.66	PK 100
1735.52	21.83	Horn V	33.36	55.19	9	46.19	54	-7.81	PK 1000
2169.40	18.09	Horn V	33	51.09	9	42.09	54	-11.91	PK 1000
2603.28	21.09	Horn H	33.75	54.84	9	45.84	54	-8.16	PK 1000
3037.16	11	Horn H	34.45	45.45	9	36.45	54	-17.55	PK 1000

## **PEAK TO AVERAGE RATIO**

The peak to average ratio was measured and calculated as follows:

One complete cycle was 18 mS (refer to Graph A)

Pulse 1 has an ON time of 0.184 mS (refer to Graph B) and an OFF time of 0.576 mS (refer to Graph C).

Pulse 2 has an ON time of 0.944 mS (refer to Graph D) and an OFF time of 0.2 mS (refer to Graph E).

Pulse 3 has an ON time of 0.552 mS (refer to Graph F) and an OFF time of 0.2 mS (refer to Graph G).

The total number of pulses in one cycle is 20 Pulse 1 + 1 Pulse 2 + 3 Pulse 3 (refer to Graph A).

The total number of ON pulses is  $20 \times 0.184 \text{ mS} + 1 \times 0.944 \text{ mS} + 3 \times 0.552 \text{ mS} = 6.28 \text{ mS}$

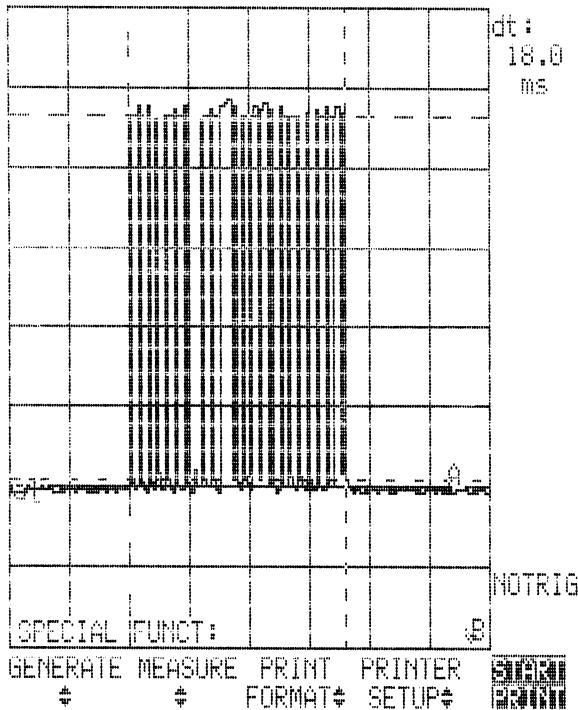
The peak to average ratio is the total ON time (6.28 mS) divided by the total cycle time (18 mS).

Peak to average ratio:  $\frac{6.28}{18} = 0.348$

Peak to average ratio:  $20 \log 0.348 = -9.16 \text{ dB}$  or  $-9 \text{ dB}$

ScopeMeter 97

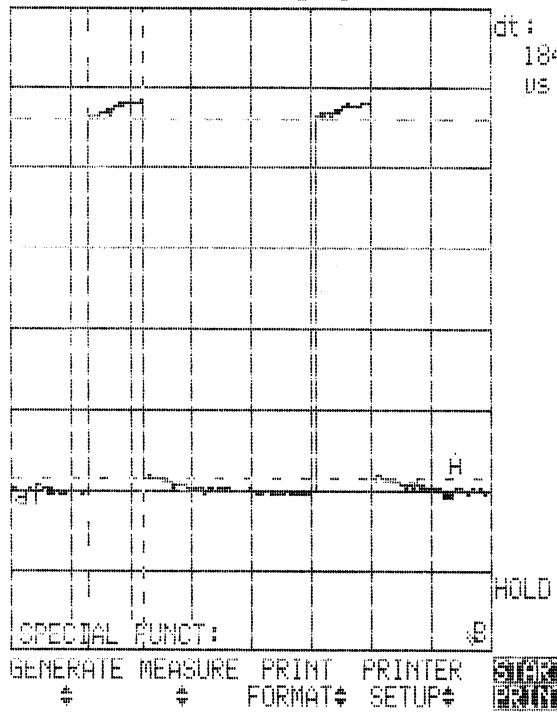
A 1V DC 10:1 PROBE B 5V GND 10:1 PROBE  
5ms/DIV Trig:AI -20DIV



**COMPLETE PULSE TRAIN (Graph A)  
MODEL RCGS**

ScopeMeter 97

A 1V DC 10:1 PROBE B 5V GND 10:1 PROBE  
2000us/DIV SINGLE Trig:AI +8DIV

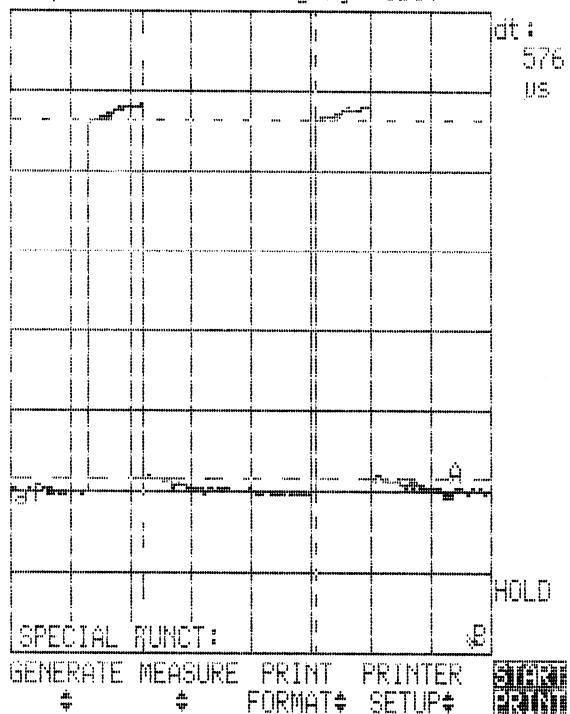


**PULSE 1 (ON Time) [Graph B]  
MODEL RCGS**

FCC ID: POK-RCGSTX  
Marstech Report No. 21201D  
EXHIBIT D(3)-5

ScopeMeter 97

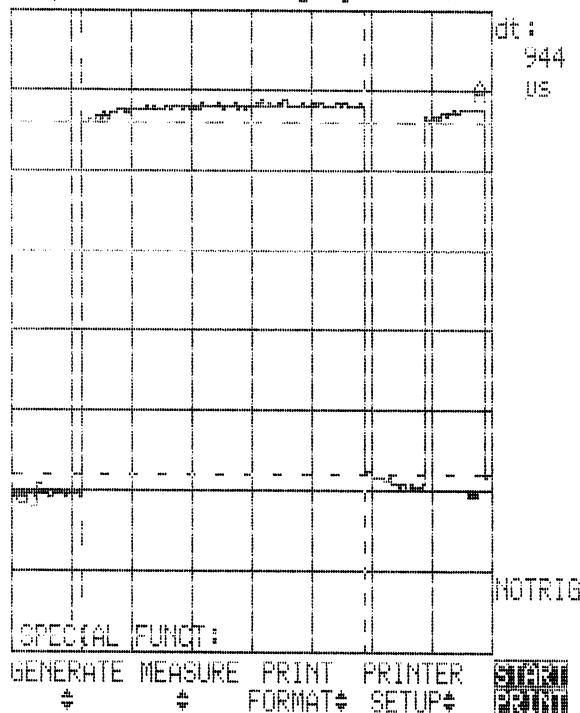
A 1V DC 10:1 PROBE B 5V GND 10:1 PROBE  
200μs/DIV SINGLE Trig:AJ +80DIV



**PULSE 1 (OFF Time) [Graph C]  
MODEL RCGS**

ScopeMeter 97

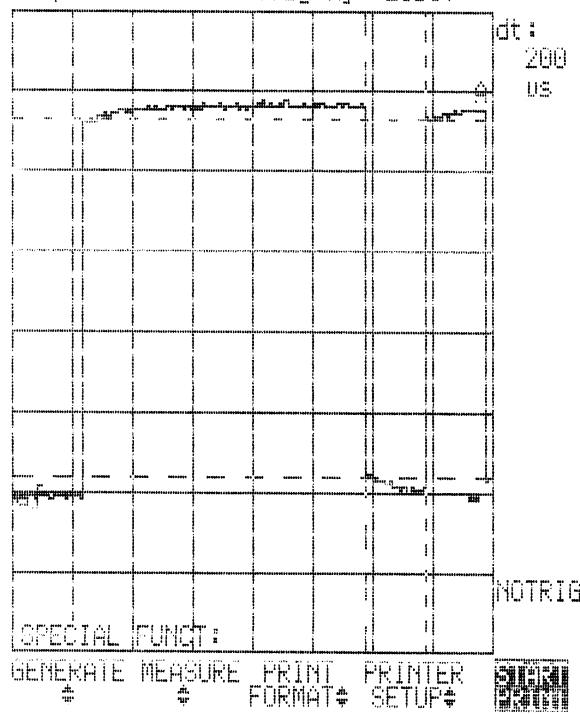
A 1V DC 10:1 PROBE B 5V OFF 10:1 PROBE  
200 $\mu$ s/DIV Trig:AJ +25DIV



**PULSE 2 (ON Time) [Graph D]  
MODEL RCGS**

ScopeMeter 97

A 1V DC 10:1 PROBE B 5V OFF 10:1 PROBE  
200 $\mu$ s/DIV Trig:AJ +25DIV

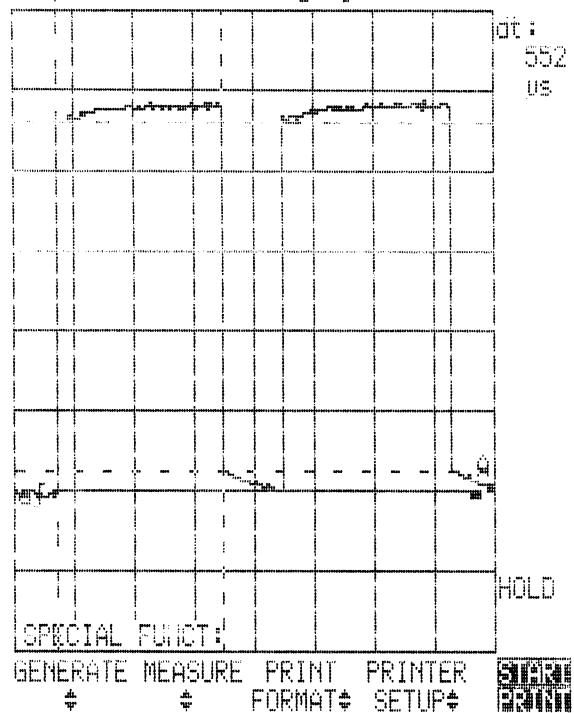


**PULSE 2 (OFF Time) [Graph E]  
MODEL RCGS**

FCC ID: POK-RCGSTX  
Marstech Report No. 21201D  
EXHIBIT D(3)-7

ScopeMeter 97

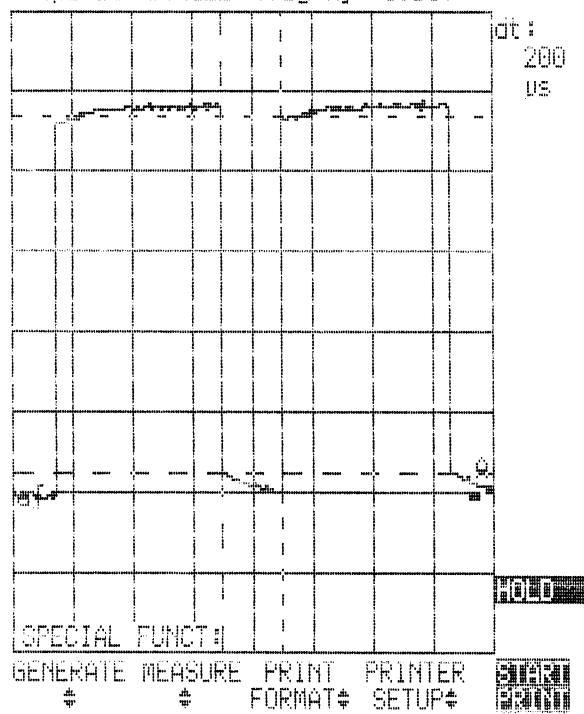
A 1V DC 10:1 PROBE B 5V OFF 10:1 PROBE  
2000 $\mu$ s/DIV SINGLE Trig:AJ +390DIV



**PULSE 3 (ON Time) [Graph F]  
MODEL RCGS**

ScopeMeter 97

A 1V DC 10:1 PROBE B 5V OFF 10:1 PROBE  
2000 $\mu$ s/DIV SINGLE Trig:AJ +390DIV



**PULSE 3 (OFF Time) [Graph G]  
MODEL RCGS**

FCC ID: POK-RCGSTX  
Marstech Report No. 21201D  
EXHIBIT D(3)-8

## **BANDWIDTH**

The 20 dB bandwidth was measured at **405 KHz**, which is less than 0.25% of 434 MHz = **1085 KHz**.

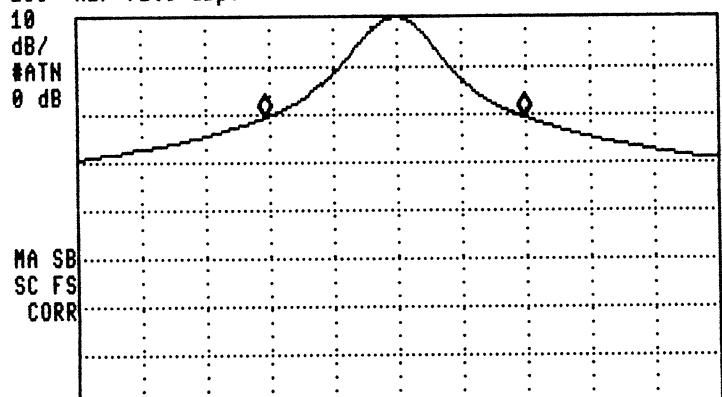
**20dB BANDWIDTH OF EMISSION**  
[15.231 (c)]  
**MODEL RCGS**

11:00:02 FEB 04, 2002

SWEETIME  
10.0 sec

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKRA 405 kHz  
-.01 dB

LOG REF 71.0 dB $\mu$ V



CENTER 433.890 MHz SPAN 1.000 MHz  
IF BW 120 kHz #AVG BW 100 kHz #SWP 10.0 sec