

**SMITH ELECTRONICS, INC.  
ELECTROMAGNETIC COMPATIBILITY LABORATORIES**

**RADIO-FREQUENCY CONDUCTED & RADIATED EMISSIONS TEST REPORT**

FOR

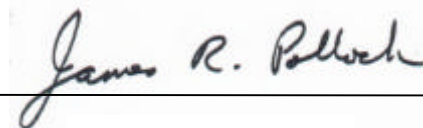
HEXAGRAM, INC.

ELECTRIC METER TRANSMITTING UNIT (MTU)  
(DIGITAL DEVICE)

Model 7330  
FCC ID: LLB7330

November 25, 2002

Prepared by:



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# **TEST REPORT**

## **INTRODUCTION**

The Hexagram Electric MTU transmitter is a line-powered transmitter designed to be installed in a typical electric meter. The transmitter will be mounted inside the glass cover of the meter and provide a very short, intermittent radio frequency transmission to provide a remote reading of the meter. A microprocessor provides timing, control and data processing functions. The built in antenna is inaccessible to the user and no provision is made for an external antenna. This report describes the tests performed on the digital device as support for verification of compliance to the FCC Rules.

## **MEASUREMENTS PERFORMED**

The transmitter under test was examined for emissions from the microprocessor portion of the system with the transmitter portion inactive. Both conducted and radiated emissions were checked. Measurements were performed under the basic procedures of (ANSI) C63.4-1992.

## **CONDUCTED EMISSIONS**

As the system is AC line-powered the conducted emissions on the AC line were measured. The electric meter housing the transmitter assembly was placed on a non-conducting table and positioned 40 cm from the shielded room wall with all other conducting surface at least 80 cm away. The AC power was provided through an LISN, which provides the standardized impedance required. This test was performed at 115 VAC although other voltages may be used to power the system.

The frequency range of 450 kHz – 30 MHz was covered in two sweeps of the spectrum analyzer. The first was 0 – 3 MHz, while the second was 0 – 30 MHz. The results of the sweeps are shown in Fig. 1. Both sides of the AC line were examined and are shown on each sweep along with the limits for Class B digital devices.

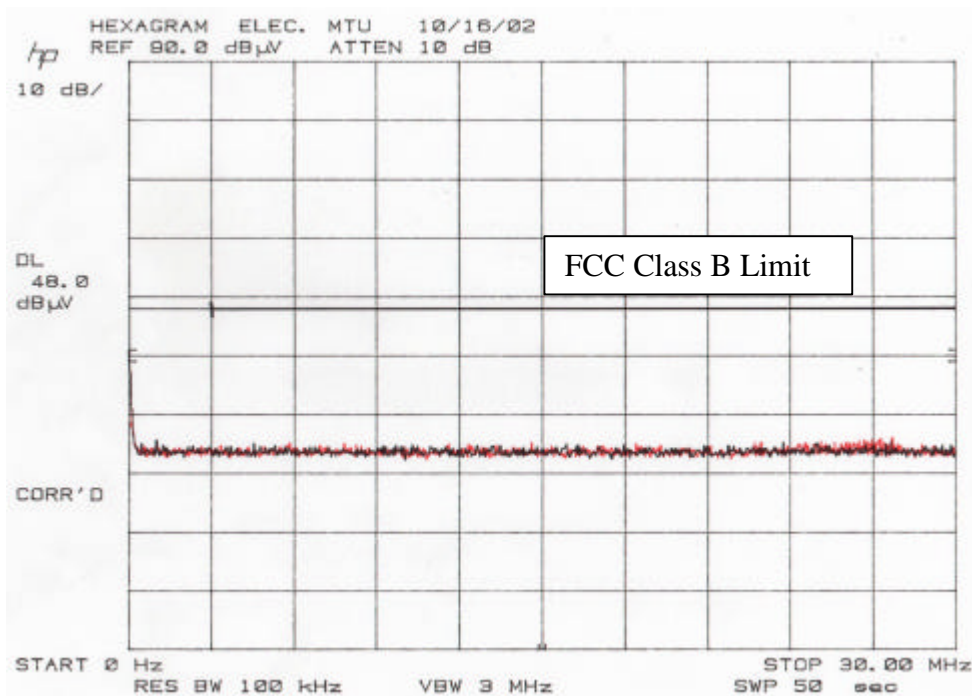
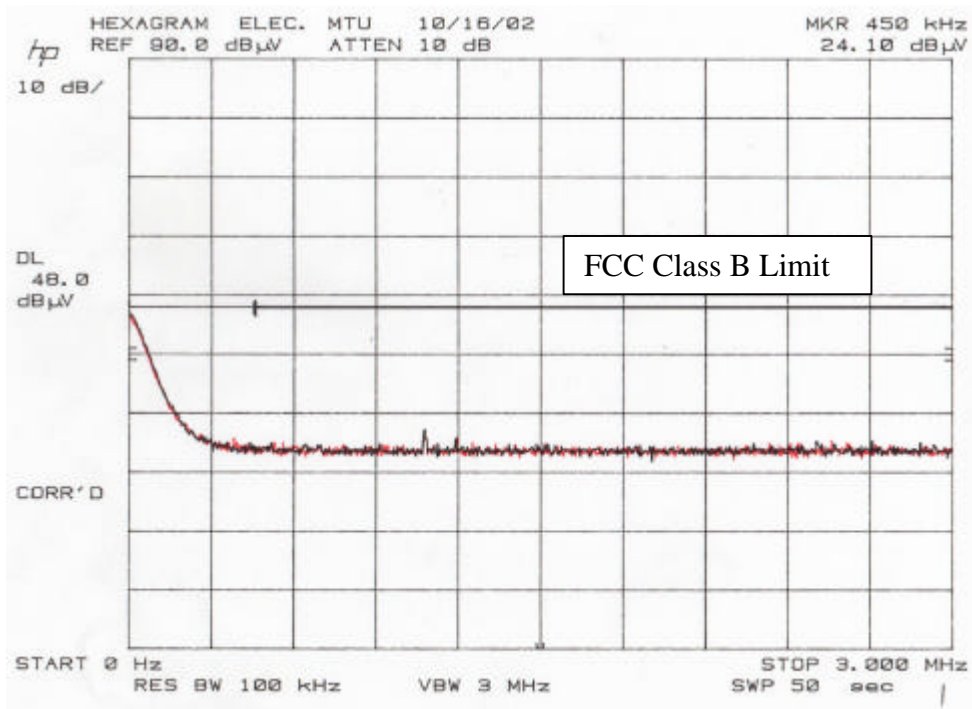
As can be seen in the figure, no emissions are observed above the noise floor of the test system that is at least 20 dB below the limit of 48 dBuV for consumer digital devices.

## **RADIATED EMISSIONS**

The meter and transmitter were set up on a non-conducting table in the shielded room. With the system powered but not transmitting, scans were made of the radiated emissions between 30 and 1000 MHz. Using broadband antennas at a 1 m test distance, the required spectrum was scanned using two spans. The first, 0 – 200 MHz was for the 30 – 200 MHz range while the second, 0 – 1000 MHz was for the 200 – 1000 MHz range. Although the test sample was not rotated, the higher sensitivity capability of the test setup permits observation of any significant signals. The results of the frequency scans are seen in Fig. 2. Each plot shows the results of both horizontal and vertical polarized antennas as well as the limit for Class B digital devices as modified for gains and losses of the system. As can be seen in the plots, no emissions are observed above the noise floor and ambients of the system. Because no emissions were observed at this close range, no attempt was made to measure the emissions on the 3 m open field test site. It is obvious that the digital portion of the Electric MTU produces no emissions greater than, or even close to, the appropriate limit.

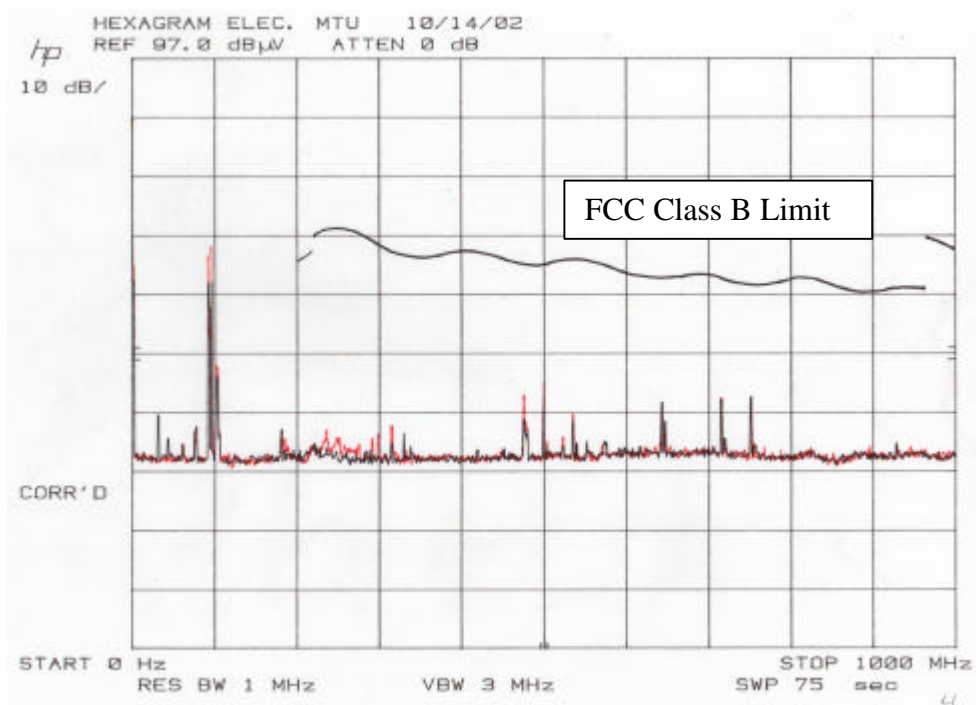
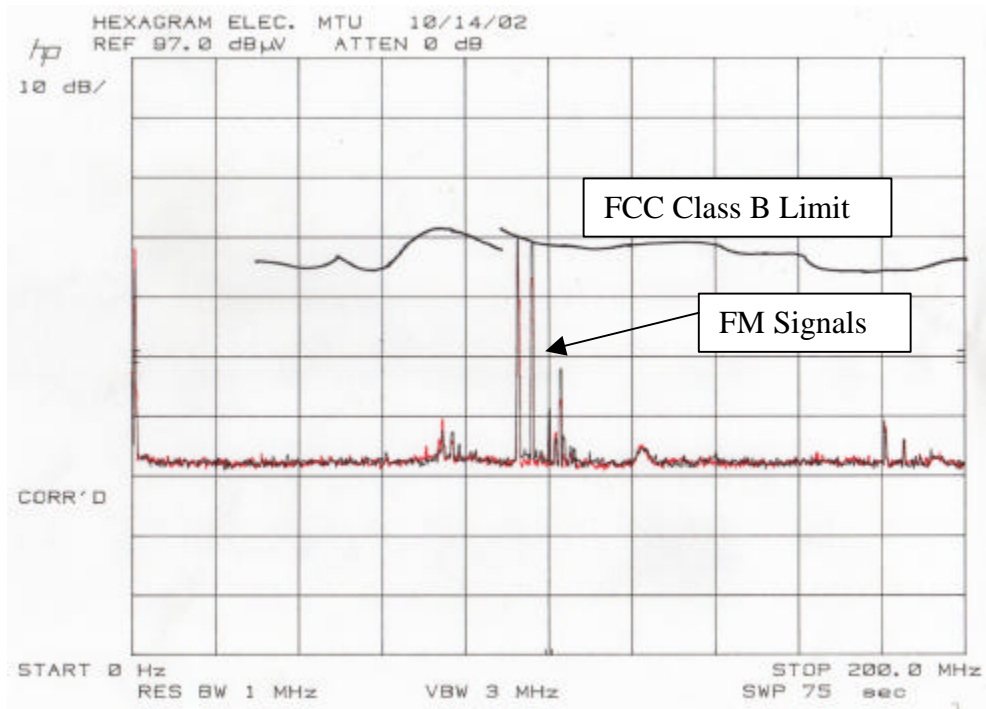
## **CONCLUSION**

Based on the emissions measured and described in this report, the digital portion of the Electric MTU, Model 7330, are well within the emissions limits of the FCC as found in sections 15.107 and 15.109 of the Rules and Regulations.



Red = Neutral Line  
 Black = Hot Line

Fig. 1  
 CONDUCTED EMISSIONS  
 HEXAGRAM ELECTRIC MTU  
 450 kHz – 30 MHz



Red = Vertical  
 Black = Horizontal

Fig. 2  
 RADIATED EMISSIONS  
 HEXAGRAM ELECTRIC MTU  
 30 MHz – 1000 MHz

## **TEST INFORMATION**

### **SUMMARY**

The Hexagram Electric Meter Transmitting Unit transmitter, has been shown to be capable of complying with those requirements of the Federal Communications Commission for a Class B digital device under Parts 15.107 and 15.109.

### **EQUIPMENT UNDER TEST**

“Electric MTU” Transmitter, Model 7330

### **MANUFACTURER**

Hexagram, Inc.  
23905 Mercantile  
Cleveland, OH 44122

### **TEST DATE**

October 14-16, 2002

### **TEST LABORATORY**

Smith Electronics, Inc.  
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### **MEASUREMENT EQUIPMENT**

Hewlett-Packard Spectrum Analyzer  
Type 8568B with 8560A RF Section  
S/N 2216A02120  
85662A Display Section S/N 2152A03686  
85650A Quasi-Peak Adapter  
S/N 2043A00350 Calibrated 6/02

### **ANTENNAS**

EMCO Model 3104 Bi-Conical  
Frequency Range 30 – 200 MHz

EMCO Model 3146 Log-Periodic  
Frequency Range 200 – 1000 MHz

### **MISCELLANEOUS**

12.2 m RG-214/U coaxial cable

1.8 m RG-214/U coaxial cable

LISN's