

**NATIONAL CERTIFICATION LABORATORY**

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**FCC REPORT OF RADIO INTERFERENCE**

**for**

**Custer Products Inc.**

**4101 Shuffel Drive, N.W., Suite 100**

**North Canton, Ohio 44720**

**FCC ID: OJN-TLB100B**

**May 5, 1999**



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## 1.0 Introduction

This report has been prepared on behalf of Custer Products, Inc. to support the attached Application for Certification of a Part 15 Unintentional Radiator. The Equipment Under Test was the ***Wireless Tow-Light Bar Receiver***.

Radio-Noise Emissions tests were performed according to **ANSI C63.4-1992 "Methods of Measurement of RFI from Low-Voltage Electronic Equipment in the Range of 9 KHz - 40 GHz"**. The measuring equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

Testing was performed at National Certification Laboratory in Ellicott City, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch. FCC acceptance was granted on May 26, 1993.

## 1.1 Summary

The Custer Products ***Wireless Tow-Light Bar Receiver*** complies with the Part 15 Radio Limits for an Unintentional Radiator.

## 2.0 Description of Equipment Under Test (EUT)

The EUT Features:

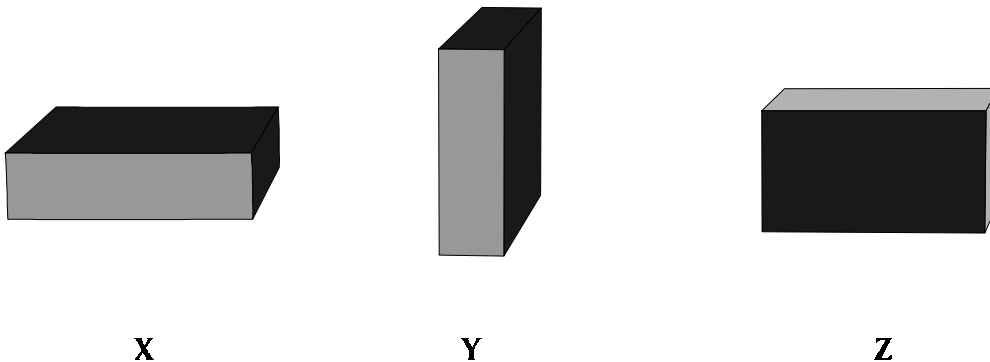
<u>FEATURES</u>	<u>FREQUENCY</u>
Relay Activation	315.115 MHz
Superregenerative Design	
PCM Decoding	

### 3.0 Test Configuration

The EUT was setup on the test table in a manner which follows the general guidelines of ANSI C63.4, Section 6 **"General Operating Conditions and Configurations"**.

An RF signal generator was used to cohere the spectral components of the emissions, as prescribed in ANSI C63.4, Section 12.1.1.1. An output level of -20 dBm at 315 MHz (CW) was fed into a 10 inch whip antenna in order to create a field level sufficient to accomplish this.

The EUT was configured in 3 orthogonal positions to determine the maximum RF level at each emission frequency. The data tables give the EUT postion designation that produces worst-case field strength, in an X, Y, Z system. This is described below:



#### **4.0 Conducted Emissions Scheme**

The EUT is battery powered only.

#### **5.0 Radiated Emissions Scheme**

The EUT was initially scanned in the frequency range 30 to 2000 MHz indoors, at a distance of 1 meter to determine its emissions profile. The EUT was then placed on an 80 cm high 1 X 1.5 meter non-conductive motorized turntable for radiated testing on the 3-meter open area test site. The emissions from the EUT are measured continuously at every azimuth by rotating the turntable. Waveguide horn and log periodic broadband antennas are mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna is varied between 1 and 4 meters. Cables are varied in position to produce maximum emissions. Both the horizontal and vertical field components are measured.

The output from the antenna is connected to the input of the spectrum analyzer. The detector function is set to **PEAK**. The resolution bandwidth of the spectrum analyzer system is set at 120 kHz, for measurements in the range 30 MHz -1 GHz, and 1 MHz for measurements in the range of 1 - 2 GHz, with all post-detector filtering no less than 10 times the resolution bandwidth. All emissions within 20 dB of the limit are recorded in the data tables.

To convert the spectrum analyzer reading into a quantified E-field level to allow comparison with the FCC limits, it is necessary to account for various calibration factors. These factors include cable loss (CL) and antenna factors (AF). The AF/CL in dB/m is algebraically added to the Spectrum Analyzer Voltage in dB $\mu$ V to obtain the Radiated Electric Field in dB $\mu$ V/m. This level is then compared with the FCC limit.

**Example:**

Spectrum Analyzer Volt: VdB $\mu$ V

Composite Factor: AF/CLdB/m

Electric Field: EdB $\mu$ V/m = VdB $\mu$ V + AF/CLdB/m

~~Linear Conversion: EuV/m = Antilog (EdB $\mu$ V/m/20)~~

FCC CLASS B RADIATED EMISSIONS DATA

APPLICANT: CUSTER PRODUCTS, INC.  
MODEL: WIRELESS TOW LIGHT RECEIVER  
FREQUENCY: 315.115 MHZ



DETECTOR: PEAK  
 TEST DISTANCE: 3 METERS  
 TEST ENGINEER: STEVEN DAYHOFF

FREQUENCY MHz	ANT. POL. H/V	READING dBuV	AF/CL dB/m	E-FIELD dBuV/m	uV/m	E-FIELD uV/m	LIMIT dB	MARGIN
323.6	H	28.0	14.0	42.0	125.9	200.0	-4.0	
333.3	V	27.0	14.0	41.0	112.2	200.0	-5.0	
843.3	H	16.0	24.0	40.0	100.0	200.0	-6.0	
877.2	H	18.0	24.0	42.0	125.9	200.0	-4.0	
1109.7	V	21.0	25.0	46.0	199.5	500.0	-8.0	
1669.7	V	15.0	29.0	44.0	158.5	500.0	-10.0	

**Table 1**

**Measurement Equipment Used**

The following equipment is used to perform measurements:

EQUIPMENT	SERIAL NUMBER
Wavetek 2410A 1100 MHz Signal Generator	1362016
HP Model 8449B Preamplifier	12A533-A
EMCO Model 3146 Log Periodic Antenna	1222
Solar 8012-50-R-24-BNC LISN	924867
Advantest Model R4131D Spectrum Analyzer	54378A
EMCO Model 3115 Ridge Horn Antenna	1238
4 Meter Antenna Mast	None
Motorized Turntable	None
RG-233U 50 ohm coax Cable	None