Washington Laboratories, Ltd.

# FCC Class II Permissive Change Test Report
# For the
# Miller Edge, Inc.
# Gate and Door Edge Transmitter
# Model: MWCT01

## FCC ID: OYE-MWCK02

WLL JOB# **10306**
**May 23, 2008**

Prepared for:

**Miller Edge, Inc.**
**300 North Jennersville Road**
**PO Box 159**
**West Grove, PA, 19390**

Prepared By:

**Washington Laboratories, Ltd.**
**7560 Lindbergh Drive**
**Gaithersburg, Maryland 20879**

ACCREDITED

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Prepared by: James Ritter
Compliance Engineer

Reviewed by: Steven D. Koster
EMC Operations Manager

# Abstract

This report has been prepared on behalf of Miller Edge, Inc. to support Application for a Class II Permissive Change to existing certified equipment. The test report and application are submitted for a Gate and Door Transmitter Device under Part 15.231. This Certification Test Report documents the test configuration and test results for a Miller Edge, Inc. Gate and Door Edge Transmitter Model: MWCT01. The MWCT01 certified under FCC ID: OYE-MWCK02.

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. Washington Laboratories, Ltd. has been accepted by the FCC and approved by the American Association for Laboratory Accreditation (A2LA) under Certificate 2675.01 as an independent FCC test laboratory.

The Miller Edge, Inc. Gate and Door Edge Transmitter Model: MWCT01 complies with the limits for a Device under FCC Part 15.231.

 

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# 1 Introduction

## 1.1 Compliance Statement

The Miller Edge, Inc. Gate and Door Edge Transmitter Model: MWCT01 complies with the limits for a device under FCC Part 15.231. The EUT is certified under FCC ID: OYE-MWCK02.

## 1.2 Test Scope

Tests for radiated emissions were performed. All measurements were performed in accordance with the 2005 version of ANSI C63.4. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

The testing was performed to determine the effect of the changes made to the unit. The changes are as follows:

*1. The housing, top cover, input cable seal and strain relief remain the same.*

*2. The RF components remained the same with the same overall PCB dimensions, mounting holes, antenna pattern, size and location.*

*3. Peripheral passive components not mentioned below have remained the same, along with the signal input connectors.*

*4. The processor changed from an 18 pin to a 28 pin version of a very similar type with greater number of I/O pins, to accept an increase from a 5 to an 8 position DIP switch, and permit the elimination of the 7400 logic module for the input signals. The processor is from the same manufacturer (Microchip), and the same family (PIC16F84 to PIC16F72 or PIC16F833), runs the same code, at the same processor clock rate, on the same supply voltage.*

*5. The +5volt regulator module was changed from an 8 pin DIP version to a more readily available TO92 package version with similar characteristics.*

*6. The case tamper switch can now be populated with either the original mechanically actuated switch or a magnetic reed switch.*

*7. The vibration/motion sensor has been relocated to the bottom side of the PCB.*

*8. Processor "program-in-place" pads have been added to the PCB.*

*9. The PCB layout pattern has been re-done to accommodate these digital changes (No RF path changes).*

## 1.3 Contract Information

| | |
|---|---|
| Customer: | Miller Edge, Inc.<br>300 North Jennersville Road<br>PO Box 159<br>West Grove, PA, 19390 |
| Purchase Order Number: | 002720 |
| Quotation Number: | 64146 |

### 1.4 Test Dates

Testing was performed on the following date(s): April 15 & 28, 2008

### 1.5 Test and Support Personnel

| | |
|---|---|
| Washington Laboratories, LTD | James Ritter/John Repella |
| Client Representative | Bill Kalin |

### 1.6 Abbreviations

| | |
|---|---|
| **A** | **A**mpere |
| **ac** | **a**lternating **c**urrent |
| **AM** | Amplitude Modulation |
| **Amps** | **Amp**ere**s** |
| **b/s** | **b**its per **s**econd |
| **BW** | **B**and**W**idth |
| **CE** | **C**onducted **E**mission |
| **cm** | **c**enti**m**eter |
| **CW** | **C**ontinuous **W**ave |
| **dB** | **d**eci**B**el |
| **dc** | **d**irect **c**urrent |
| **EMI** | **E**lectro**m**agnetic **I**nterference |
| **EUT** | **E**quipment **U**nder **T**est |
| **FM** | **F**requency **M**odulation |
| **G** | **g**iga - prefix for $10^9$ multiplier |
| **Hz** | **H**ertz |
| **IF** | **I**ntermediate **F**requency |
| **k** | **k**ilo - prefix for $10^3$ multiplier |
| **LISN** | **L**ine **I**mpedance **S**tabilization **N**etwork |
| **M** | **M**ega - prefix for $10^6$ multiplier |
| **m** | **m**eter |
| **µ** | **m**icro - prefix for $10^{-6}$ multiplier |
| **NB** | **N**arrow**b**and |
| **QP** | **Q**uasi-**P**eak |
| **RE** | **R**adiated **E**missions |
| **RF** | **R**adio **F**requency |
| **rms** | **r**oot-**m**ean-**s**quare |
| **SN** | **S**erial **N**umber |
| **S/A** | **S**pectrum **A**nalyzer |
| **V** | **V**olt |

# 2 Equipment Under Test

## 2.1 EUT Identification & Description

The Miller Edge MWCK02 transmitter and receiver set are designed to provide obstacle-sensing protection for a variety of motorized doors and gates. The MWCT01 is the transmitter part of this set. The transmitter is mounted on the door or gate and wired to the sensor, the receiver is mounted at, and wired to, the door operator. When the sensing edge comes into contact with an obstruction, a closed circuit signal is created and sent to the transmitter. The transmitter sends the signal to the receiver which provides a signal to the operator which then stops the movement of the gate or door, and reverses its direction of travel. The transmitter senses a low battery condition, sensing edge wiring fault, sensing edge activity, and cover tamper switch sensor.

The Model MWCT01 has three major sections: Transmitter, Cut-off, and Alarm. The transmitter operates on a nominal frequency of 315 MHz, modulated with and on-off keyed Manchester encoded signal. The Cut-off section shuts off the RF signal after 3.5 seconds, except for the duration of the Safety Edge activated contact. The Alarm section signals a periodic status of the battery, tamper switch, and transmitter condition. The transmitter is powered by a 9 Volt lithium battery.

The transmitter is in a weatherproof polycarbonate enclosure 1 ¾" H x 5 5/8" L x 1 ¾" W; the receiver is in a polycarbonate enclosure 4 13/16" L x 3 ¾" W x 1 ¾"H.

**Table 1. Device Summary**

| ITEM | DESCRIPTION |
|---|---|
| Manufacturer: | Miller Edge, Inc. |
| FCC ID: | OYE-MWCK02 |
| Model: | MODEL MWCT01 (Part of MWCK02) |
| FCC Rule Parts: | §15.231 |
| Frequency Range: | Fixed 315MHz |
| Keying: | Manual- sensor |
| Power Output Level | Fixed |
| Power Source & Voltage: | 9VDC |

## 2.2 Test Configuration

The EUT was tested as a standalone unit powered from a 9V Battery.

## 2.3 Testing Algorithm

The MWCT01 was tested in a continuous transmit mode at 315MHz.

Worst case emission levels are provided in the test results data.

## 2.4 Test Location

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD.

Washington Laboratories, Ltd. has been accepted by the FCC and approved by the American Association for Laboratory Accreditation (A2LA) under Certificate 2675.01 as an independent FCC test laboratory.

### 2.5 Measurements

2.5.1 References

ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

### 2.6 Measurement Uncertainty

All results reported herein relate only to the equipment tested. For the purposes of the measurements performed by Washington Laboratories, the measurement uncertainty is ±2.3 dB. This has been calculated for a *worst-case situation* (radiated emissions measurements performed on an open area test site).

The following measurement uncertainty calculation is provided:

$$\text{Total Uncertainty} = (A^2 + B^2 + C^2)^{1/2}/(n-1)$$

where:

A = Antenna calibration uncertainty, in dB = 2 dB

B = Spectrum Analyzer uncertainty, in dB = 1 dB

C = Site uncertainty, in dB = 4 dB

n = number of factors in uncertainty calculation = 3

Thus, Total Uncertainty = $0.5\ (2^2 + 1^2 + 4^2)^{1/2} = \pm 2.3$ dB.

## 3 Test Equipment

Table 2 shows a list of the test equipment used for measurements along with the calibration information.

**Table 2: Test Equipment List**

| WLL Asset # | Manufacturer Model/Type | Function | Cal. Due |
|---|---|---|---|
| 00068 | HP, 85650A | ADAPTER, QP | 7/6/2008 |
| 00070 | HP, 85685A | PRESELECTOR, RF W/OPT 8ZE | 7/6/2008 |
| 00072 | HP, 8568B | ANALYZER, SPECTRUM | 7/6/2008 |
| 00004 | ARA, DRG-118/A | ANTENNA, DRG, 1-18GHZ | 2/2/2009 |
| 00618 | HP 8563A | ANALYZER, SPECTRUM | 3/7/2009 |
| 00066 | HP, 8449B | PRE-AMPLIFIER, RF. 1-26.5GHZ | 8/2/2008 |

# 4 Test Results

## 4.1 Radiated Transmit Power: (FCC Part §15.231)

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. Both the horizontal and vertical field components were measured.

Table 3: Maximum Field Strength at Fundamental shows the measured power as compared to original FCC test report, all three orthogonal planes were tested, the report did not indicate in which plane the power was recorded.

**Table 3: Maximum Field Strength at Fundamental**

| Rec. Antenna Polarity | Field Strength Power from Original FCC Test Report (dBuV) | Field Strength Power from Test EUT Unit On side (dBuV) | Field Strength Power from Test EUT Unit Upright (dBuV) | Field Strength Power from Test EUT Unit Flat (dBuV) |
|---|---|---|---|---|
| V | 68.9 | 57.1 | 66.9 | 68.8 |
| H | 68.5 | 68.1 | 66.9 | 68.2 |

## 4.2 Radiated Emissions: (FCC Parts §15.231)

The EUT must comply with requirements for radiated spurious emissions per the limits given in §15.231(a). In addition, any emissions appearing in the restricted bands listed in §15.205 must comply with the general emission limits of 15.209.

### 4.2.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. Both the horizontal and vertical field components were measured.

The emissions were measured using the following resolution bandwidths:

| Frequency Range | Resolution Bandwidth | Video Bandwidth |
|---|---|---|
| 30MHz-1000 MHz | 100kHz | >100kHz |
| >1000 MHz | 1 MHz | 1MHz (peak)<br>10Hz (Avg) |

Emissions were measured to the $10^{th}$ harmonic of the transmit frequency. The EUT was tested in three orthogonal planes.

The following is a sample calculation used in the data tables for calculating the final field strength of spurious emissions and comparing these levels to the specified limits.

Sample Calculation:

Spectrum Analyzer Voltage (SA Level): V dBµV (Peak)

Antenna Factor (Ant Corr): AFdB/m

Cable Loss Correction (Cable Corr): CCdB

Amplifier Gain: GdB

Electric Field (Corr Level): EdBµV/m = VdBµV + AFdB/m + CCdB + DCCdB – GdB

**Table 4: Peak Radiated Emission Test Data**

| Frequency (MHz) | Polarity H/V | Azimuth Degree | Ant. Height (m) | SA Level (dBuV) | Ant. Corr. (dB/m) | Cable Corr. (dB) | Amplifier Gain (dB) | Corr. Level (dBuV/m) | Corr. Level (uV/m) | Limit (uV/m) | Margin dB |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 315.02 | V | 245.0 | 1.0 | 53.6 | 13.8 | 1.4 | 0.0 | 68.8 | 2748.3 | 6042.6 | -6.8 |
| 630.04 | V | 288.0 | 1.7 | 15.7 | 19.3 | 2.5 | 0.0 | 37.5 | 75.2 | 604.3 | -18.1 |
| 945.07 | V | 210.0 | 1.2 | 5.3 | 22.2 | 4.0 | 0.0 | 31.5 | 37.7 | 604.3 | -24.1 |
| 1260.09 | V | 200.0 | 2.4 | 52.1 | 25.7 | 2.0 | 35.8 | 44.1 | 159.7 | 604.3 | -11.6 |
| 1575.11 | V | 24.0 | 2.1 | 51.2 | 26.8 | 2.0 | 35.5 | 44.5 | 167.4 | 500.0 | -9.5 |
| 1890.13 | V | 156.0 | 2.5 | 49.3 | 27.7 | 2.0 | 35.4 | 43.6 | 152.2 | 604.3 | -12.0 |
| 2205.15 | V | 220.0 | 2.6 | 45.9 | 28.5 | 3.0 | 35.3 | 42.0 | 125.3 | 500.0 | -12.0 |
| 2520.18 | V | 210.0 | 2.6 | 42.1 | 29.1 | 4.3 | 35.4 | 40.1 | 101.6 | 604.3 | -15.5 |
| 2835.20 | V | 200.0 | 2.4 | 45.1 | 29.7 | 5.4 | 35.5 | 44.8 | 173.6 | 500.0 | -9.2 |
| 3150.22 | V | 145.0 | 2.3 | 44.3 | 30.2 | 5.9 | 35.4 | 45.0 | 177.6 | 604.3 | -10.6 |
| 315.02 | H | 199.0 | 1.3 | 53.0 | 13.8 | 1.4 | 0.0 | 68.2 | 2564.8 | 6042.6 | -7.4 |
| 630.04 | H | 143.0 | 1.5 | 17.6 | 19.3 | 2.5 | 0.0 | 39.4 | 93.6 | 604.3 | -16.2 |
| 945.07 | H | 228.0 | 1.6 | 4.8 | 22.2 | 4.0 | 0.0 | 31.0 | 35.6 | 604.3 | -24.6 |
| 1260.09 | H | 45.0 | 2.4 | 56.2 | 25.7 | 2.0 | 35.8 | 48.1 | 254.9 | 604.3 | -7.5 |
| 1575.11 | H | 190.0 | 2.8 | 43.9 | 26.8 | 2.0 | 35.5 | 37.2 | 72.3 | 500.0 | -16.8 |
| 1890.13 | H | 200.0 | 2.5 | 48.3 | 27.7 | 2.0 | 35.4 | 42.7 | 135.9 | 604.3 | -13.0 |
| 2205.15 | H | 185.0 | 2.7 | 45.1 | 28.5 | 3.0 | 35.3 | 41.2 | 114.8 | 500.0 | -12.8 |
| 2520.18 | H | 210.0 | 2.1 | 43.1 | 29.1 | 4.3 | 35.4 | 41.1 | 113.6 | 604.3 | -14.5 |
| 2835.20 | H | 200.0 | 2.1 | 43.2 | 29.7 | 5.4 | 35.5 | 42.9 | 139.5 | 500.0 | -11.1 |
| 3150.22 | H | 190.0 | 2.3 | 46.0 | 30.2 | 5.9 | 35.4 | 46.7 | 215.9 | 604.3 | -8.9 |

No other emissions were detected