



**WAVETREND TEST REPORT**  
**FOR THE**  
**RFID ACTIVE TAG, L-TG 700 & W-TG 700**  
**FCC PART 15 SUBPART C SECTIONS 15.209 & 15.231**  
**AND RSS-210 ISSUE 7**  
**TESTING**

**DATE OF ISSUE: MARCH 5, 2008**

**PREPARED FOR:**

Wavetrend  
4000 Legato Road  
Fairfax, VA 22033

W.O. No.: 87490

**PREPARED BY:**

Mary Ellen Clayton  
CKC Laboratories, Inc.  
5046 Sierra Pines Drive  
Mariposa, CA 95338

Date of test: January 17 - March 3, 2008

**Report No.: FC08-025**

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## TABLE OF CONTENTS

Administrative Information .....	3
Approvals.....	3
Summary of Results.....	4
Conditions During Testing.....	4
FCC 15.33(a) Frequency Ranges Tested .....	5
FCC 15.35 Analyzer Bandwidth Settings.....	5
EUT Operating Frequency .....	5
Temperature And Humidity During Testing.....	5
Equipment Under Test (EUT) Description .....	5
Equipment Under Test .....	5
Peripheral Devices .....	5
Report of Emissions Measurements.....	6
Testing Parameters.....	6
FCC 15.231/15.209 Spurious Emissions .....	8
FCC 15.231(a)(1) Activation.....	13
FCC 15.231(b) Emissions Limitations .....	13
FCC 15.231(c)/RSS-210 99% Bandwidth .....	16
FCC 15.231(e) Alternative Limit.....	18
FCC 15.231(e) Duration Between Transmission.....	21
Duty Cycle Correction .....	23

## ADMINISTRATIVE INFORMATION

**DATE OF TEST:** January 17 - March 3, 2008

**DATE OF RECEIPT:** January 17, 2008

**REPRESENTATIVE:** Ed Gonsalves

**MANUFACTURER:**

Wavetrend  
4000 Legato Road  
Fairfax, VA 22033

**TEST LOCATION:**

CKC Laboratories, Inc.  
5046 Sierra Pines Drive  
Mariposa, CA 95338

**TEST METHOD:** ANSI C63.4 (2003), RSS-210 Issue 7 and RSS-GEN Issue 2

**PURPOSE OF TEST:** To perform the testing of the RFID Active Tag, L-TG 700 & W-TG 700 with the requirements for FCC 15.209 & 15.231 and RSS-210 Issue 7 devices.

## APPROVALS

**QUALITY ASSURANCE:**

Steve Behm, Director of Engineering Services

**TEST PERSONNEL:**

A handwritten signature in black ink, appearing to read "Mike Wilkinson".

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Mike Wilkinson, EMC Engineer/Lab Manager

## SUMMARY OF RESULTS

Test	Specification/Method	Results
Spurious Emissions	FCC 15.209/15.231/ANSI C63.4(2003)	Pass
Activation	FCC 15.231(a)(1)/ANSI C63.4(2003)	Pass
Emissions Limitations	FCC 15.231(b)/ ANSI C63.4(2003)	Pass
99% Bandwidth	FCC 15.231(c) & RSS-210/ ANSI C63.4(2003) & RSS-GEN	Pass
Alternative Limit	FCC 15.231(e)/ ANSI C63.4(2003)	Pass
Duration Between Transmission	FCC 15.231(e)/ ANSI C63.4(2003)	Pass
Duty Cycle Correction	ANSI C63.4(2003)	Pass
Site File No.	FCC 784962 & IC 3082A-1	

## CONDITIONS DURING TESTING

No modifications to the EUT were necessary during testing.

### **FCC 15.33(a) Frequency Ranges Tested**

15.231 Emissions: 30 MHz – 4500 MHz

<b>FCC SECTION 15.35: ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE</b>			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	4.5 GHz	1 MHz

### **EUT Operating Frequency**

The EUT was operating at 433.9 MHz.

### **Temperature And Humidity During Testing**

The temperature during testing was within +15°C and + 35°C.

The relative humidity was between 20% and 75%.

### **EQUIPMENT UNDER TEST (EUT) DESCRIPTION**

The customer declares the EUT tested by CKC Laboratories was representative of a production unit.

### **EQUIPMENT UNDER TEST**

#### **RFID Active Tag**

Manuf: Wavetrend  
Model: L-TG 700  
Serial: None  
FCC ID: O6XL-TG700

#### **RFID Active Tag**

Manuf: Wavetrend  
Model: W-TG 700  
Serial: None  
FCC ID: O6XL-TG700

### **PERIPHERAL DEVICES**

The EUT was not tested with peripheral devices.

## REPORT OF EMISSIONS MEASUREMENTS

### TESTING PARAMETERS

The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

### CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in  $\text{dB}\mu\text{V}/\text{m}$ , the spectrum analyzer reading in  $\text{dB}\mu\text{V}$  was corrected by using the following formula. This reading was then compared to the applicable specification limit.

SAMPLE CALCULATIONS		
	Meter reading	( $\text{dB}\mu\text{V}$ )
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	( $\text{dB}\mu\text{V}/\text{m}$ )

## **SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS**

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the highest readings, this is indicated as a "QP" or an "Ave" on the appropriate rows of the data sheets. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

### **Peak**

In this mode, the spectrum analyzer/receiver readings were recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the measuring device called "peak hold," the measuring device had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

### **Quasi-Peak**

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the quasi-peak detector.

### **Average**

For certain frequencies, average measurements may be made using the spectrum analyzer/receiver. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.

## FCC 15.231/15.209 SPURIOUS EMISSIONS

### Test Setup Photos





## Test Data Sheets

Test Location: CKC Laboratories, Inc. • 4933 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)

Customer: **Wavetrend**

Specification: **FCC 15.231/15.209**

Work Order #: **87490**

Date: 3/3/2008

Test Type: **Maximized Emissions**

Time: 08:46:25

Equipment: **RFID Active Tag**

Sequence#: 4

Manufacturer: Wavetrend

Tested By: Mike Wilkinson

Model: L-TG 700

S/N: None

### Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/03/2007	01/03/2009	02660
HP 8447D Preamp	1937A02604	03/14/2007	03/14/2009	00099
Chase CBL6111C Bilog	2456	12/30/2006	12/30/2008	01991
EMCO 3115 Horn Antenna	8006-3413	03/17/2007	03/17/2009	00327
HP 8449B Preamp	3008A00301	12/13/2006	12/13/2008	2010
Cable 10' 40 GHz Gore	NA	04/23/2007	04/23/2009	ANP04290
Cable 2' 40 GHz Astrolab	NA	01/15/2008	01/15/2010	AN03011
Cable 2' 40 GHz Astrolab	NA	01/15/2008	01/15/2010	AN03008
3M SITE CABLE 20GHZ	NA	03/23/2006	03/23/2008	SITED3M1

### Equipment Under Test (\* = EUT):

Function	Manufacturer	Model #	S/N
RFID Active Tag*	Wavetrend	L-TG 700	None

### Support Devices:

Function	Manufacturer	Model #	S/N
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### Test Conditions / Notes:

EUT is a 433.92 MHz RFID transmitter operating under 15.231a & 15.231e. EUT is set to transmit continuously. EUT is powered by internal battery only. EUT was placed on the test site in the worst case position which was horizontal. Frequency range investigated was 30 to 4500 MHz. The temperature was 70°F and the humidity was 40%. Averaged readings reflect the application of a duty cycle correction factor derived from measurements that show 7.5 ms pulse on time in 100ms and calculated as follows:  $20\log 0.075 = -22.5\text{dB}$ .

**Transducer Legend:**

T1=ANT AN01991 25-1000MHz	T2=AMP AN00099
T3=ANT AN00327 900MHz-18.5GHz	T4=Cable WL Gore 10' 40 GHz AN P004290
T5=CAB-AN03008-40GHZ-2FT	T6=CAB-AN03011-40GHZ-2FT
T7=CAB-SITED3M1 9k - 20G	T8=Amp HF - AN02010
T9=22.5 dB15.35 Duty Cycle Correction	T10=30.1 dB15.35 Duty Cycle Correction

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dB $\mu$ V	dB	dB	dB	dB	Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
1	867.952M QP	36.5	+22.6 +0.3	-27.5 +0.3	+0.0 +2.7	+1.6	+0.0	36.5	46.0	-9.5	Vert
^	867.942M	42.3	+22.6 +0.3	-27.5 +0.3	+0.0 +2.7	+1.6	+0.0	42.3	46.0	-3.7	Vert
3	1301.937M	49.1	+0.0 +0.3 +0.0	+0.0 +0.3 +0.0	+24.3 +3.2	+1.9 -35.4	+0.0	43.7	54.0	-10.3	Vert
4	867.951M QP	34.2	+22.6 +0.3	-27.5 +0.3	+0.0 +2.7	+1.6	+0.0	34.2	46.0	-11.8	Horiz
^	867.960M	41.3	+22.6 +0.3	-27.5 +0.3	+0.0 +2.7	+1.6	+0.0	41.3	46.0	-4.7	Horiz
6	1301.882M Ave	57.1	+0.0 +0.3 -22.5	+0.0 +0.3 +0.0	+24.3 +3.2	+1.9 -35.4	+0.0	29.2	54.0	-24.8	Horiz
^	1301.882M	57.1	+0.0 +0.3	+0.0 +0.3	+24.3 +3.2	+1.9 -35.4	+0.0	51.7	54.0	-2.3	Horiz

Test Location: CKC Laboratories, Inc. • 4933 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)

Customer: **Wavetrend**

Specification: **FCC 15.231/15.209**

Work Order #: **87490**

Date: 3/3/2008

Test Type: **Maximized Emissions**

Time: 09:13:09

Equipment: **RFID Active Tag**

Sequence#: 3

Manufacturer: Wavetrend

Tested By: Mike Wilkinson

Model: W-TG 700

S/N: None

**Test Equipment:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/03/2007	01/03/2009	02660
HP 8447D Preamp	1937A02604	03/14/2007	03/14/2009	00099
Chase CBL6111C Bilog	2456	12/30/2006	12/30/2008	01991
EMCO 3115 Horn Antenna	8006-3413	03/17/2007	03/17/2009	00327
HP 8449B Preamp	3008A00301	12/13/2006	12/13/2008	2010
Cable 10' 40 GHz Gore	NA	04/23/2007	04/23/2009	ANP04290
Cable 2' 40 GHz Astrolab	NA	01/15/2008	01/15/2010	AN03011
Cable 2' 40 GHz Astrolab	NA	01/15/2008	01/15/2010	AN03008
3M SITE CABLE 20GHZ	NA	03/23/2006	03/23/2008	SITED3M1

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
RFID Active Tag*	Wavetrend	W-TG 700	None

**Support Devices:**

Function	Manufacturer	Model #	S/N
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**Test Conditions / Notes:**

EUT is a 433.92 MHz RFID transmitter operating under 15.231a & 15.231e. EUT is set to transmit continuously. EUT is powered by internal battery only. EUT was placed on the test site in the worst case position which was horizontal. Frequency range investigated was 30 to 4500 MHz. The temperature was 70°F and the humidity was 40%. Averaged readings reflect the application of a duty cycle correction factor derived from measurements that show 3.1 ms pulse on time in 100ms and calculated as follows:  $20\log 0.031 = -30.1\text{dB}$ .

**Transducer Legend:**

T1=ANT AN01991 25-1000MHz	T2=AMP AN00099
T3=ANT AN00327 900MHz-18.5GHz	T4=Cable WL Gore 10' 40 GHz AN P004290
T5=CAB-AN03008-40GHZ-2FT	T6=CAB-AN03011-40GHZ-2FT
T7=CAB-SITED3M1 9k - 20G	T8=Amp HF - AN02010
T9=30.1 dB15.35 Duty Cycle Correction	

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dB $\mu$ V	dB	dB	dB	dB	Table	dB $\mu$ V/m	dB $\mu$ V/m	dB	Ant
1	2169.499M	50.6	+0.0 +0.4 +0.0	+0.0 +0.4	+27.8 +4.4	+2.5 -34.6	+0.0	51.5	54.0	-2.5	Horiz
2	2169.499M	50.6	+0.0 +0.4 +0.0	+0.0 +0.4	+27.8 +4.4	+2.5 -34.6	+0.0	51.5	54.0	-2.5	Horiz
3	1735.518M	50.7	+0.0 +0.4 +0.0	+0.0 +0.4	+26.2 +3.7	+2.2 -35.0	+0.0	48.6	54.0	-5.4	Horiz
4	867.780M	39.4	+22.6 +0.3	-27.5 +0.3	+0.0 +2.7	+1.6	+0.0	39.4	46.0	-6.6	Vert
5	867.803M QP	37.5	+22.6 +0.3	-27.5 +0.3	+0.0 +2.7	+1.6	+0.0	37.5	46.0	-8.5	Horiz
^	867.809M	44.6	+22.6 +0.3	-27.5 +0.3	+0.0 +2.7	+1.6	+0.0	44.6	46.0	-1.4	Horiz
7	1301.707M	49.0	+0.0 +0.3	+0.0 +0.3	+24.3 +3.2	+1.9 -35.4	+0.0	43.6	54.0	-10.4	Vert
8	1301.792M Ave	57.5	+0.0 +0.3 -30.1	+0.0 +0.3	+24.3 +3.2	+1.9 -35.4	+0.0	22.0	54.0	-32.0	Horiz
^	1301.792M	57.5	+0.0 +0.3	+0.0 +0.3	+24.3 +3.2	+1.9 -35.4	+0.0	52.1	54.0	-1.9	Horiz

### **FCC 15.231(a)(1) ACTIVATION**

EUT models L-TG 700 AND W-TG 700 were observed to automatically deactivate the transmitter within not more than 5 seconds of being released as per FCC 15.231(a) (1).

### **FCC 15.231(b) EMISSIONS LIMITATIONS**

#### **Test Setup Photos**



## Test Data Sheets

Test Location: CKC Laboratories, Inc. • 4933 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)  
 Customer: **Wavetrend**  
 Specification: **FCC 15.231(b) Fundamental**  
 Work Order #: **87490** Date: 2/29/2008  
 Test Type: **Maximized Emissions** Time: 14:46:55  
 Equipment: **RFID Active Tag** Sequence#: 1  
 Manufacturer: Wavetrend Tested By: Mike Wilkinson  
 Model: L-TG 700  
 S/N: None

### Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/03/2007	01/03/2009	02660
HP 8447D Preamp	1937A02604	03/14/2007	03/14/2009	00099
Chase CBL6111C Bilog	2456	12/30/2006	12/30/2008	01991
Cable 10' 40 GHz Gore	NA	04/23/2007	04/23/2009	ANP04290
Cable 2' 40 GHz Astrolab	NA	01/15/2008	01/15/2010	AN03011
Cable 2' 40 GHz Astrolab	NA	01/15/2008	01/15/2010	AN03008
3M SITE CABLE 20GHZ	NA	03/23/2006	03/23/2008	SITED3M1

### Equipment Under Test (\* = EUT):

Function	Manufacturer	Model #	S/N
RFID Active Tag*	Wavetrend	L-TG 700	None

### Support Devices:

Function	Manufacturer	Model #	S/N
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### Test Conditions / Notes:

EUT is a 433.92 MHz RFID transmitter operating under 15.231a & 15.231e. EUT is set to transmit continuously. EUT is powered by internal battery only. EUT was placed on the test site in the worst case position which was horizontal. Frequency range investigated was Carrier. The temperature was 70°F and the humidity was 40%. Averaged readings reflect the application of a duty cycle correction factor derived from measurements that show 7.5 ms pulse on time in 100ms and calculated as follows:  $20\log 0.075 = -22.5\text{dB}$ .

### Transducer Legend:

T1=ANT AN01991 25-1000MHz	T2=AMP AN00099
T3=Cable WL Gore 10' 40 GHz AN P004290	T4=CAB-AN03008-40GHZ-2FT
T5=CAB-AN03011-40GHZ-2FT	T6=CAB-SITED3M1 9k - 20G
T7=22.5 dB15.35 Duty Cycle Correction	

### Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	433.961M	92.5	+16.7	-27.4	+1.1	+0.2	+0.0	62.7	80.5	-17.8	Horiz
Ave			+0.2	+1.9	-22.5						
^	433.972M	92.5	+16.7	-27.4	+1.1	+0.2	+0.0	85.2	80.5	+4.7	Horiz
			+0.2	+1.9							
3	433.971M	80.9	+16.7	-27.4	+1.1	+0.2	+0.0	51.1	80.5	-29.4	Vert
Ave			+0.2	+1.9	-22.5						
^	433.971M	80.9	+16.7	-27.4	+1.1	+0.2	+0.0	73.6	80.5	-6.9	Vert
			+0.2	+1.9	+0.0						

Test Location: CKC Laboratories, Inc. • 4933 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)

Customer: **Wavetrend**  
Specification: **FCC 15.231(b) Fundamental**  
Work Order #: **87490**  
Test Type: **Maximized Emissions**  
Equipment: **RFID Active Tag**  
Manufacturer: Wavetrend  
Model: W-TG 700  
S/N: None

Date: 2/29/2008  
Time: 14:59:59  
Sequence#: 2  
Tested By: Mike Wilkinson

**Test Equipment:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/03/2007	01/03/2009	02660
HP 8447D Preamp	1937A02604	03/14/2007	03/14/2009	00099
Chase CBL6111C Bilog	2456	12/30/2006	12/30/2008	01991
Cable 10' 40 GHz Gore	NA	04/23/2007	04/23/2009	ANP04290
Cable 2' 40 GHz Astrolab	NA	01/15/2008	01/15/2010	AN03011
Cable 2' 40 GHz Astrolab	NA	01/15/2008	01/15/2010	AN03008
3M SITE CABLE 20GHZ	NA	03/23/2006	03/23/2008	SITED3M1

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
RFID Active Tag*	Wavetrend	W-TG 700	None

**Support Devices:**

Function	Manufacturer	Model #	S/N
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**Test Conditions / Notes:**

EUT is a 433.92 MHz RFID transmitter operating under 15.231a & 15.231e. EUT is set to transmit continuously. EUT is powered by internal battery only. EUT was placed on the test site in the worst case position which was horizontal. Frequency range investigated was Carrier. The temperature was 70°F and the humidity was 40%. Averaged readings reflect the application of a duty cycle correction factor derived from measurements that show 3.1 ms pulse on time in 100ms and calculated as follows:  $20\log 0.031 = -30.1\text{dB}$ .

**Transducer Legend:**

T1=ANT AN01991 25-1000MHz	T2=AMP AN00099
T3=Cable WL Gore 10' 40 GHz AN P004290	T4=CAB-AN03008-40GHZ-2FT
T5=CAB-AN03011-40GHZ-2FT	T6=CAB-SITED3M1 9k - 20G
T7=30.1 dB15.35 Duty Cycle Correction	

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	T5	T6	T7		Table	dBμV/m	dBμV/m	dB	Ant
1	433.900M	90.8	+16.7	-27.4	+1.1	+0.2	+0.0	53.4	80.5	-27.1	Horiz
	Ave		+0.2	+1.9	-30.1						
^	433.900M	90.8	+16.7	-27.4	+1.1	+0.2	+0.0	83.5	80.5	+3.0	Horiz
			+0.2	+1.9							
3	433.909M	80.0	+16.7	-27.4	+1.1	+0.2	+0.0	42.6	80.5	-37.9	Vert
	Ave		+0.2	+1.9	-30.1						
^	433.909M	80.0	+16.7	-27.4	+1.1	+0.2	+0.0	72.7	80.5	-7.8	Vert
			+0.2	+1.9							



## FCC 15.231(c)/RSS-210 99% BANDWIDTH

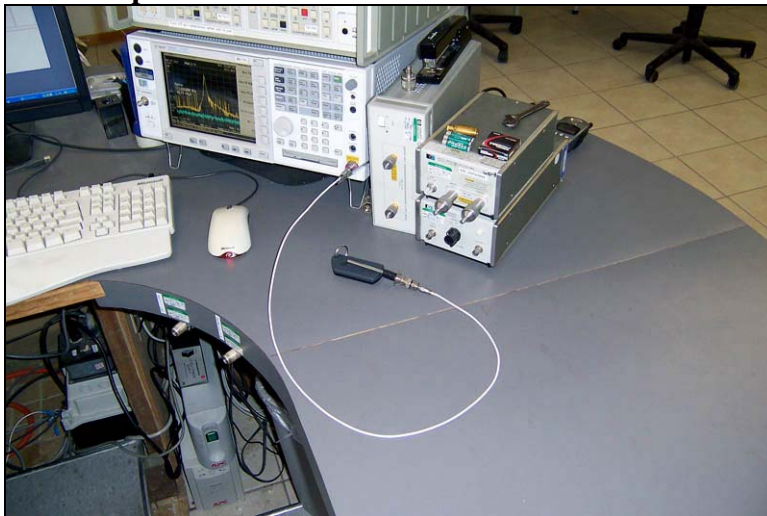
### Test Equipment

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/03/2007	01/03/2009	02660

### Test Conditions

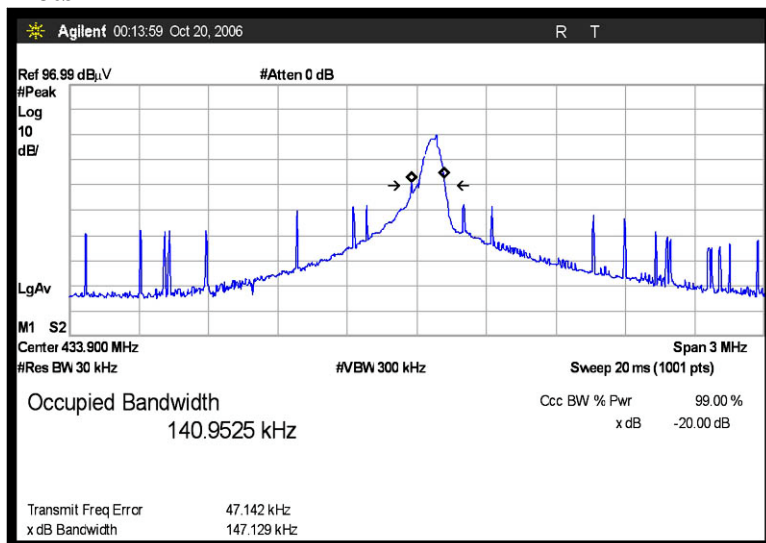
EUT is a 433.92 MHz RFID transmitter operating under 15.231a & 15.231e. EUT is set to transmit continuously. EUT is powered by internal battery only. EUT was placed on the test site in the worst case position which was horizontal.

### Test Setup Photos

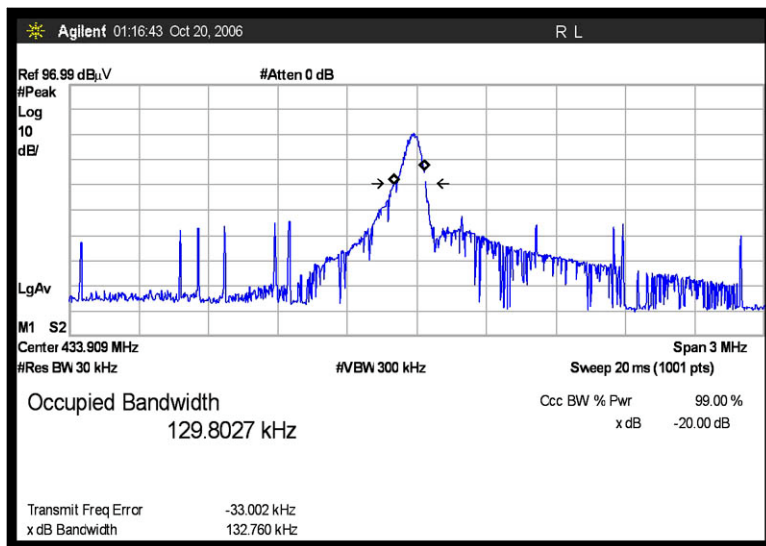




## Plots



## L-TG 700



## W-TG 700

**FCC 15.231(e) ALTERNATIVE LIMIT**

**Test Setup Photos**



## Test Data Sheets

Test Location: CKC Laboratories, Inc. • 4933 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)  
 Customer: **Wavetrend**  
 Specification: **FCC 15.231(e) Fundamental**  
 Work Order #: **87490** Date: 2/29/2008  
 Test Type: **Maximized Emissions** Time: 14:46:55  
 Equipment: **RFID Active Tag** Sequence#: 1  
 Manufacturer: Wavetrend Tested By: Mike Wilkinson  
 Model: L-TG 700  
 S/N: None

### Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/03/2007	01/03/2009	02660
HP 8447D Preamp	1937A02604	03/14/2007	03/14/2009	00099
Chase CBL6111C Bilog	2456	12/30/2006	12/30/2008	01991
Cable 10' 40 GHz Gore	NA	04/23/2007	04/23/2009	ANP04290
Cable 2' 40 GHz Astrolab	NA	01/15/2008	01/15/2010	AN03011
Cable 2' 40 GHz Astrolab	NA	01/15/2008	01/15/2010	AN03008
3M SITE CABLE 20GHZ	NA	03/23/2006	03/23/2008	SITED3M1

### Equipment Under Test (\* = EUT):

Function	Manufacturer	Model #	S/N
RFID Active Tag*	Wavetrend	L-TG 700	None

### Support Devices:

Function	Manufacturer	Model #	S/N
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### Test Conditions / Notes:

EUT is a 433.92 MHz RFID transmitter operating under 15.231a & 15.231e. EUT is set to transmit continuously. EUT is powered by internal battery only. EUT was placed on the test site in the worst case position which was horizontal. Frequency range investigated was Carrier. The temperature was 70°F and the humidity was 40%. Averaged readings reflect the application of a duty cycle correction factor derived from measurements that show 7.5 ms pulse on time in 100ms and calculated as follows:  $20\log 0.075 = -22.5\text{dB}$ .

### Transducer Legend:

T1=ANT AN01991 25-1000MHz	T2=AMP AN00099
T3=Cable WL Gore 10' 40 GHz AN P004290	T4=CAB-AN03008-40GHZ-2FT
T5=CAB-AN03011-40GHZ-2FT	T6=CAB-SITED3M1 9k - 20G
T7=22.5 dB15.35 Duty Cycle Correction	

### Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	433.961M	92.5	+16.7	-27.4	+1.1	+0.2	+0.0	62.7	72.6	-9.9	Horiz
Ave			+0.2	+1.9	-22.5						
^	433.972M	92.5	+16.7	-27.4	+1.1	+0.2	+0.0	85.2	72.6	+12.6	Horiz
			+0.2	+1.9							
3	433.971M	80.9	+16.7	-27.4	+1.1	+0.2	+0.0	51.1	72.6	-21.5	Vert
Ave			+0.2	+1.9	-22.5						
^	433.971M	80.9	+16.7	-27.4	+1.1	+0.2	+0.0	73.6	72.6	+1.0	Vert
			+0.2	+1.9	+0.0						

Test Location: CKC Laboratories, Inc. • 4933 Sierra Pines Dr. • Mariposa, CA 95338 • 1-800-500-4EMC (4362)

Customer: **Wavetrend**  
 Specification: **FCC 15.231(e) Fundamental**  
 Work Order #: **87490** Date: 2/29/2008  
 Test Type: **Maximized Emissions** Time: 14:59:59  
 Equipment: **RFID Active Tag** Sequence#: 2  
 Manufacturer: Wavetrend Tested By: Mike Wilkinson  
 Model: W-TG 700  
 S/N: None

**Test Equipment:**

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/03/2007	01/03/2009	02660
HP 8447D Preamp	1937A02604	03/14/2007	03/14/2009	00099
Chase CBL6111C Bilog	2456	12/30/2006	12/30/2008	01991
Cable 10' 40 GHz Gore	NA	04/23/2007	04/23/2009	ANP04290
Cable 2' 40 GHz Astrolab	NA	01/15/2008	01/15/2010	AN03011
Cable 2' 40 GHz Astrolab	NA	01/15/2008	01/15/2010	AN03008
3M SITE CABLE 20GHZ	NA	03/23/2006	03/23/2008	SITED3M1

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
RFID Active Tag*	Wavetrend	W-TG 700	None

**Support Devices:**

Function	Manufacturer	Model #	S/N
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**Test Conditions / Notes:**

EUT is a 433.92 MHz RFID transmitter operating under 15.231a & 15.231e. EUT is set to transmit continuously. EUT is powered by internal battery only. EUT was placed on the test site in the worst case position which was horizontal. Frequency range investigated was Carrier. The temperature was 70°F and the humidity was 40%. Averaged readings reflect the application of a duty cycle correction factor derived from measurements that show 3.1 ms pulse on time in 100ms and calculated as follows:  $20\log 0.031 = -30.1\text{dB}$ .

**Transducer Legend:**

T1=ANT AN01991 25-1000MHz	T2=AMP AN00099
T3=Cable WL Gore 10' 40 GHz AN P004290	T4=CAB-AN03008-40GHZ-2FT
T5=CAB-AN03011-40GHZ-2FT	T6=CAB-SITED3M1 9k - 20G
T7=30.1 dB15.35 Duty Cycle Correction	

**Measurement Data:**

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	T5	T6	T7		Table	dBμV/m	dBμV/m	dB	Ant
1	433.900M	90.8	+16.7	-27.4	+1.1	+0.2	+0.0	53.4	72.6	-19.2	Horiz
	Ave		+0.2	+1.9	-30.1						
^	433.900M	90.8	+16.7	-27.4	+1.1	+0.2	+0.0	83.5	72.6	+10.9	Horiz
			+0.2	+1.9							
3	433.909M	80.0	+16.7	-27.4	+1.1	+0.2	+0.0	42.6	72.6	-30.0	Vert
	Ave		+0.2	+1.9	-30.1						
^	433.909M	80.0	+16.7	-27.4	+1.1	+0.2	+0.0	72.7	72.6	+0.1	Vert
			+0.2	+1.9							

## FCC 15.231(e) DURATION BETWEEN TRANSMISSION

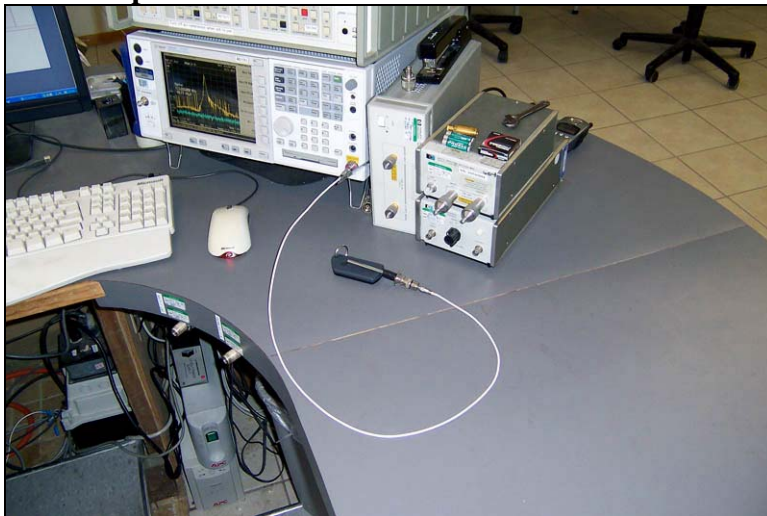
### Test Equipment

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/03/2007	01/03/2009	02660

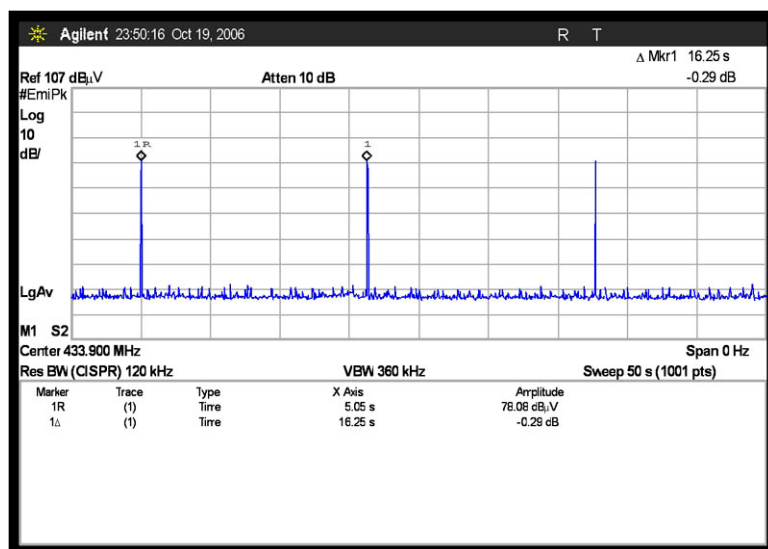
### Test Conditions

EUT is a 433.92 MHz RFID transmitter operating under 15.231a & 15.231e. EUT is set to transmit continuously. EUT is powered by internal battery only. EUT was placed on the test site in the worst case position which was horizontal.

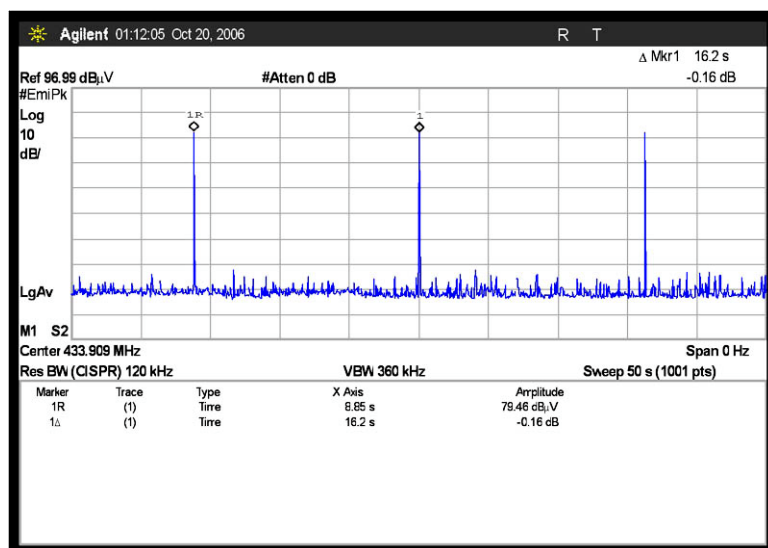
### Test Setup Photos



## Plots



## L-TG 700



## W-TG 700



## DUTY CYCLE CORRECTION

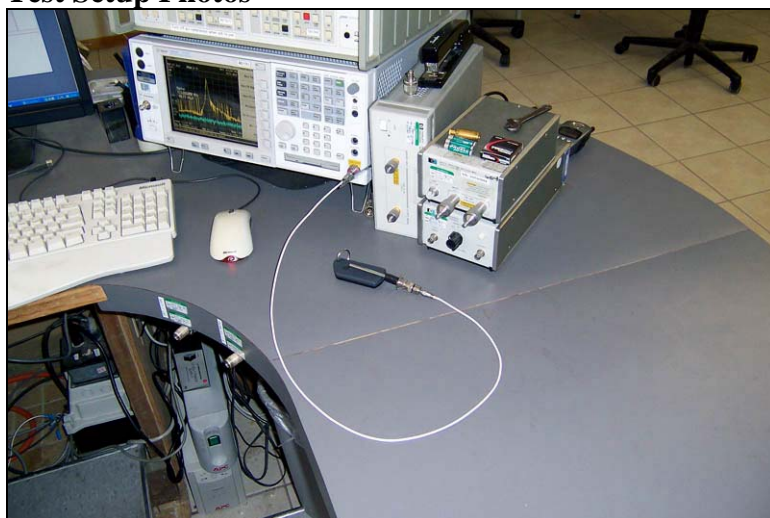
### Test Equipment

Function	S/N	Calibration Date	Cal Due Date	Asset #
Agilent E4446A SA	US44300407	01/03/2007	01/03/2009	02660

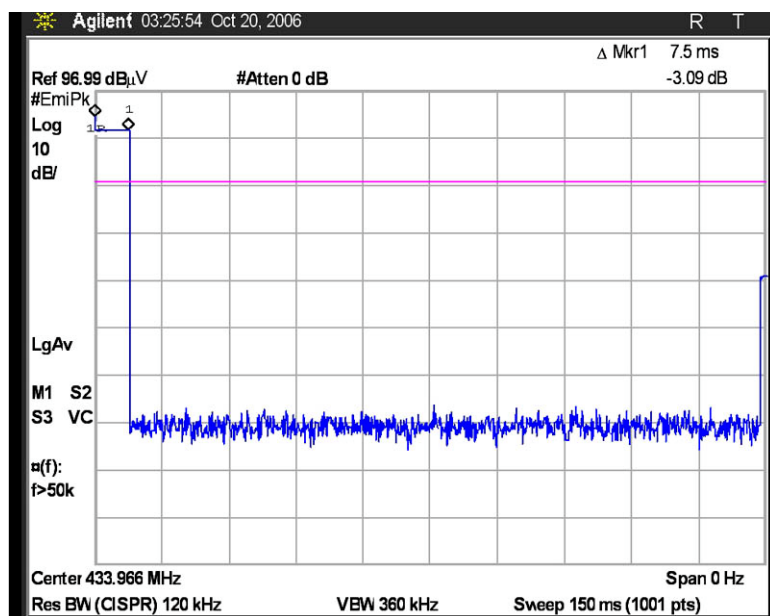
### Test Conditions

EUT is a 433.92 MHz RFID transmitter operating under 15.231a & 15.231e. EUT is set to transmit continuously. EUT is powered by internal battery only. EUT was placed on the test site in the worst case position which was horizontal.

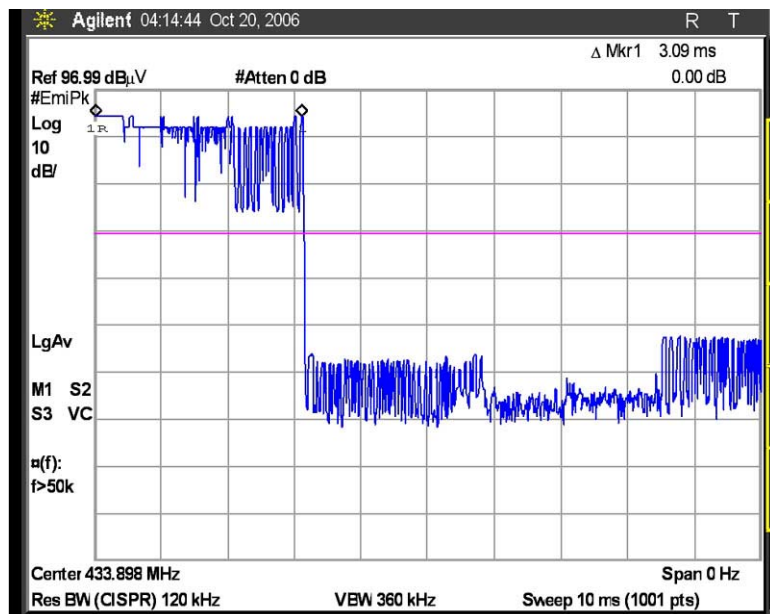
### Test Setup Photos



## Plots

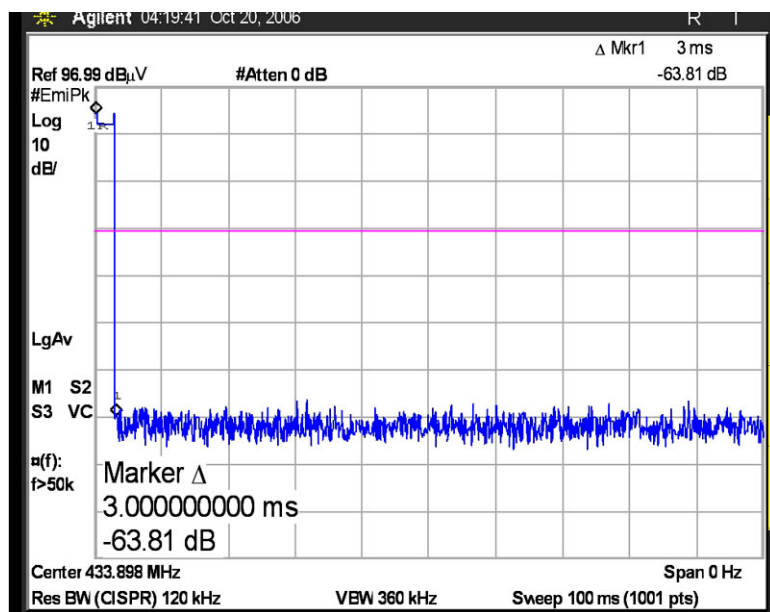


L-TG 700



W-TG 700





W-TG 700