STATEMENT OF ATTESTATION

Model: W3BR Remote Control Transmitter

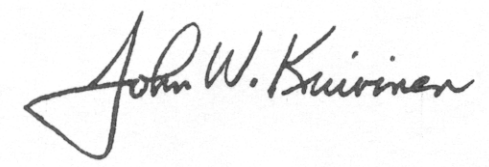
FCC ID: EF4 WAE00007

The equipment under test is a low powered remote control transmitter used with the Linear Westinghouse brand retail garage door operators. It is designed to send remote control signals to a garage door receiver. No supervisory signals or low battery functions are provided by this transmitter.

This equipment has been tested in accordance with the requirements contained in the appropriate Commission regulations. To the best of my knowledge, these tests were performed using measurement procedures consistent with industry or commission standards and demonstrate that the equipment complies with the appropriate standards. Each unit manufactured, imported or marketed, as defined in the Commission's regulations, will conform to the sample(s) tested within the variations that can be expected due to quantity production and testing on a statistical basis.

I further certify that the necessary measurements were made by Linear Corporation, 2055 Corte Del Nogal, Carlsbad, California. 92009.

Certified by:



_____ _ March 7, 2002_

John W. Kuivinen, P.E. Date

Regulatory Compliance Engineer

Summary of Test Results
in accord with FCC Rules Part 15 and C63.4-1992

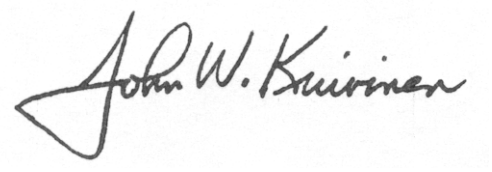
Equipment Model:	WAE00007
Transmitter Tested to C63.4-1992 Section:	FCC Rules 15.231
Field Strength at a distance of 3 meters:	4030 uV/Mtr (-3.6 dB below limit) @ 318 MHz
Peak to Average Ratio:	15.5 dB - Fixed Duty Cycle
Test Conditions:	Radiated (Sections 11 & 13)
Transmitter: Transmitter Frequency:	318 MHz Nominal (Factory Tuned Only)
Bandwidth (20 dB down)	< 0.010% of Center Freq.
Frequency Tolerance:	N/A (Nominal +/- 0.5 MHz)
Frequency Stability:	N/A (Nominal +/- 0.5 MHz)
Transmitter Spurious at 3 meters: (Worst Harmonic)	380 uV/Mtr (-4.1 dB below limit)
Frequency:	1272 MHz
Momentary Operation (Yes/No)	Yes
Holdover time after manual release:	0.0 seconds

Duration of transmission after activation: 10 seconds maximum on any single manual activation

Attestation:

The radio apparatus identified in the application has been subject to all the applicable test conditions specified in FCC Rules Part 15 and all of the requirements of the Standard have been met.

Regulatory Compliance Engineer



John W. Kuivinen, P.E. _____ Date: _March 7, 2002

Radio Standard Specification
Low Power Communication Devices
C63.4-1992 and FCC Rules Part 15

1.0 General:

1.2, Exclusions to TV Broadcast Freq.	Complies

2.0 Related Documents:

Reference Documents for Application:	CFR 47, FCC Rules Part 15

3.0 Test Equipment:

Supply Voltage:	Two #2016 3 volt lithium batteries
Test Equipment List	See Section 6
Signal Detector:	Peak with 15.5 dB peak to average conversion.

4.0 Certification and Test Results:

Summary of Results per	See Page 1 of this Report

5.0 General Technical Requirements:

5.1 Testing Methods:	Peak Signal pulse position modulated A1D signal.
5.1 Reference Standard:	C63.4-1992 (FCC Procedure)
5.2 Modulation:	Pulse Position 30K0 A1D, AM Modulation
5.3 Type of Antenna:	Integral to Transmitter Case - Tuned Loop
5.4 External Controls:	Push Buttons No user serviceable parts except for replacement of batteries.
5.5 Accessories:	NONE
5.6 TX Bandwidth:	<0.010 % (See Section 8)
5.7 Equipment Labels:	See Section 2
5.8 Manual Disclaimer:	See attached draft copy of manual
5.9 Usage Restrictions:	Digital Pulse Code Only

6.0 Transmitter Characteristics and Tests:	
6.1 Momentary Operated Devices:	Complies
6.1(a) Types of Signals:	Manual Push to Transmit
6.1(a) Automatic Activation:	N/A
6.1(a) Five Second Max. upon release:	Complies
6.1(b) Field Strengths:	Table 1 318 MHz = 6167 uV/Mtr at 3 meters.
6.1(c) Bandwidth (20 dB down)	<0.010 % Complies
6.1(d) Frequency Stability	N/A per regulations +/- 0.500 MHz Maximum Error
6.1(e) Reduced Field Strength	N/A
6.2 Non-Momentary Operated Devices:	N/A
6.2.1 Frequency Bands:	Refer to Table 1
6.3 Restricted Bands:	Complies
6.5 Pulsed Operation:	Complies (15.5 dB Peak/Average) See Section 8
6.6 Wireline Conducted Emissions:	N/A
7.0 Receivers	N/A
8.0 Self Certification:	N/A
9.0 AC Wireline Conducted Emissions:	N/A
10.0 Terminated Measurement Method:	N/A
11.0 Radiated Measurement Method:	See Section 8
11.1 Measuring Distance:	Complies
11.2 Open Field Test Site:	Complies, C63.4-1992
11.3 Equipment Test Platform:	See Section 8
11.4 Measurement Method:	Complies, See Section 8
12.0 DC Power Consumption Methods:	N/A
13.0 Near Field Measurement for < 30 MHz:	N/A
14.0 Test Report Submission:	See Attached

REPORT OF MEASUREMENTS

LINEAR CORPORATION
FCC ID: EF4 WAE00007
Model: W3BR Remote Control Transmitter

The enclosed documents reflect the requirements contained generally within the code of Federal Regulations, Title 47, Parts 2 and 15 as most recently published October 1, 2001 and all other applicable revisions made by the Commission since that time.

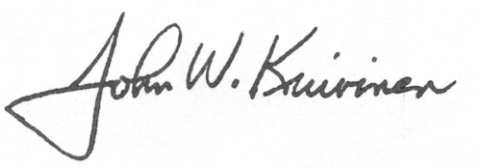
The specific rule sections for which the enclosed documents demonstrate compliance or rely upon to demonstrate compliance with the Commission's application and technical standards are as follows:

15.201-15.207, 15.231, Subpart C, Intentional Radiators.

Test Procedure C63.4-1992, Section 13, Measurement of Intentional Radiators was used for the testing of this device.

In accord with Section 2.948 of the Commission's Rules, a Test Site submittal is on file with the commission and a Letter of Acceptance dated March 23, 2001 (File 90767) is a portion of the Commission's records.

All of the information contained within this documentation is true, correct, and complete to the best of my knowledge.



_____ __ March 7, 2002 _
John W. Kuivinen, P.E. Date
Regulatory Compliance Engineer

DURATION OF RF TRANSMISSIONS

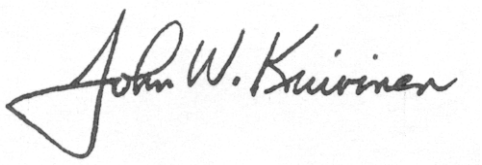
W3BR

REMOTE CONTROL TRANSMITTER

This transmitter is manually activated. It is used only for remote control of a garage door operator. As such it may be operated continuously by the user (FCC Rules 15.231(a)(4)). However, due to battery constraints and an accidental continuous activation causing interference to the system, the maximum manually activated transmission for a single press of a pushbutton is 10 seconds.

When the push button is released the transmitter ceases transmitting immediately. FCC Rules 15.231 (a)(1) allows no longer than 5 seconds upon the release of a manually activated transmitter.

Signed:



John W. Kuivinen, P.E.
Regulatory Compliance Engineer

TESTING INSTRUMENTATION AND EQUIPMENT LIST

SPECTRUM ANALYZERS:

H.P.	HP8562A	1KHz to 22GHz		
	S/N 2913A03742		Calibrated	12/01
			Due	12/02

ANTENNAS:

(2)	Ailtech DM105A T1	20-200 MHz		Tuned Dipole
	S/N 93412-105 and 93412-114	Calibrated 3/13/01	Due:	3/13/02
(2)	Ailtech DM105A T2	140-400 MHz	Tuned Dipole	
	S/N 93413-113 and 93413-117	Calibrated 3/13/01	Due:	3/13/02
(2)	Ailtech DM105A T3	400-1000 MHz	Tuned Dipole	
	S/N 93413-105 and 93414-111	Calibrated 3/13/01	Due	3/13/02
(2)	AH Systems SAS-200/511	1-12.4 GHz		Log Periodic
	S/N 118 and 124, P/Ns 2069			
(1)	AH Systems SAS-200/540	20-330 MHz		Biconical
	S/N 367 P/N 2052			

INSTRUMENTATION:

H.P.	HP8656B RF Generator	100 KHz - 99O MHz	
	S/N A4229590	Calibrated	3/13/01
		Due	3/13/02
Solar Electronics Line Impedance Stabilization Network, Type			
	8012-50-R-24-BNC	Calibrated:	3/13/01
	S/N 8379585	Due:	3/13/02
HP 8447D	Broadband preamplifier, 0.1-1300 MHz		
	S/N 2443A03660	Calibrated: 3/13/01	
		Due: 3/13/02	
Mini-Circuits	ZFL-2000 broadband preamplifier, 10-3000 MHz		
	S/N Lin 001	Calibrated: 3/13/01	
		Due: 3/13/02	

ACCESSORIES:

(2) Ailtech Rulers calibrated in MHz
4 Meter ABS Antenna Mast and Trolley
Tektronix C5C Scope Camera
Eighty Centimeter Tall, Motorized Wooden Turntable
BNC to BNC Cables - as-required

(2) 25' RG-214/U Low-loss Coaxial Cable
S/N- LIN001 & LIN002 Calibrated: 3/13/01
Due: 3/13/02

(2) 3' RG-55/U Low-loss Coaxial Cable, calibarated as part of the preamplifiers. Automatically taken into account when used with the above itemized range preamplifiers.

MEASUREMENT OF RADIO FREQUENCY EMISSION
OF CONTROL AND SECURITY ALARM DEVICES
FCC RULES PART 15, C63.4-1992 TEST PROCEDURE

I. INTRODUCTION

As part of a continuing series of quality control tests to ensure compliance with all applicable Rules and Regulations, this enclosure details the test procedures for certain radio control devices. Testing was performed at a test site located on the property of Linear Corporation, 2055 Corte del Nogal, Carlsbad, California 92009.

II. MEASUREMENT FACILITY DESCRIPTION

The test facility is a specially prepared area adequately combining the desirability of an interference free location with the convenience of nearby 120 volt power outlets, thus completely eliminating the incidence of inverter hash, so often a problem with field measurements.

III. DESCRIPTION OF SUPPORTING STRUCTURES

For Measuring Equipment - The antenna is supported on a trolley that can be raised and lowered on a mast by means of remote control to any level between 1 meter and 4 meters above the ground. For measurements at 3 meters, an antenna height (center of dipole) of about 1 meter generally yields the greatest field strength. For measurements at 1 meter, an antenna height equal to the device under test generally yields the greatest field strength. Usually, horizontal polarization yields the greatest field strength for both 1 and 3 meter measurements.

For Equipment Under Test (EUT): The equipment to be tested is supported by a wooden turntable at a height of eighty centimeters. A two axis swivel at the top of the turntable permits the unit under test to be manually oriented in the position of maximum received signal strength. The turntable can be rotated by remote control.

Test Configuration - All transmitters were located eighty centimeters above ground, at a distance of three meters from the antenna. They were each oriented for maximum radiation by rotating the turntable. The antenna was then moved vertically along the mast for optimum reception in both horizontal and vertical planes. Where no emissions were found, the antenna was also moved to one meter distance to improve system sensitivity.

All receivers were located eighty centimeters above ground, at a distance of three meters from the antenna. They were each oriented for maximum radiation by rotating the turntable. The antenna was then moved vertically along the mast for optimum reception in both horizontal and vertical planes. Generally, emissions were very close to the observed spectrum analyzer noise floor, making accurate measurement difficult because of the analyzer detector's characteristic of adding signal and noise. To better observe and measure emissions well above the noise floor, the antenna was moved in to one meter. This provides a theoretical 9.54 dB improvement in received field strength, but a possible shift from far field to near field antenna characteristics may introduce an unknown error in measurement.

All transmitters and receivers tested are typical of production units.

A Hewlett-Packard spectrum analyzer consisting of an 8562A mainframe is used for the field strength meter. A set of Ailtech DM-105 series dipoles are used for the receiving antennas up to 1 GHz. An A.H. Systems model SAS-200/511 log periodic antenna is used from 1 to 5 GHz. Since the published antenna factor includes the small amount of balun loss, this factor is not included in the equations for correcting measured values. The cable loss is added to the raw data. For measurements up to 1 GHz, a Hewlett-Packard 8447D broadband RF preamplifier is inserted between the antenna cable and spectrum analyzer input to ensure adequate system sensitivity while measuring.

From 1 GHz to 3 GHz, a Mini-Circuits ZFL-2000 broadband RF preamplifier is used instead of the HP 8447D. In many cases, the antenna is moved in to a distance of 1 meter to enhance test range sensitivity after the 3 meter data is observed. A theoretical 9.54dB improvement is realized. Please see Excel data spreadsheet for details. For a particular device and frequency, the EUT to antenna distance is specified in the Report of Measurements.

Correction of Measured Values - The spectrum analyzer calibration is in units of dBm absolute. Published antenna factor, measured cable loss and preamplifier gain are in units of dB. All equipment is referenced to a 50 ohm characteristic impedance; therefore, any impedance terms will factor out of any calculations. Also, balun loss is included in the antenna factor, so this term will not appear in any calculation.

To obtain field strength, the reference (50 ohm system) 1 uV = 0 dBuV = -107 dBm is used.

For a given frequency: antenna factor, cable loss, preamplifier gain (if used) and a 9.54 dB gain factor (3 meters to 1 meter field strength conversion) when required are factored into the spectrum analyzer reading, resulting in a field strength in units of dBm.

Field strength reading (dBm) + 107 dB = dBuV, using 0 dBuV = 1 uV/meter at a specified distance as reference.

All of the equipment was calibrated to NBS-traceable factory specifications prior to the date of measurement.

IV **MEASUREMENT PROCEDURE**

Transmitters

1. Set the DIP-switch rockers of the transmitter (if needed) to all ON, jam the button in the ON position, and place the transmitter on the test stand.
2. Tune the antenna (if required).
3. Tune the spectrum analyzer.
4. Adjust the antenna height and polarization for peak field strength.
5. Rotate the turntable to orient the transmitter for the highest reading.
6. Record the observed peak emission.
7. Record the screen image (if required).

Spectrum Analyzer Control Settings:

Tuning:	As required
Bandwidth	100 KHz for Field Strength,
Scan Width:	100 KHz/div (may be different when tuning or adjusting display for photographs)
Input Attenuator:	10 dB
Scan Time:	50 mSec. sweep
Reference Level:	0 dBm
Display Mode:	Log 10 dB/division
Video Filter:	OFF
Scan Mode:	Internal
Scan Trigger:	Auto

Transmitter Duty Cycle Calculations and Time Domain Information

Megacode Data Format

Worst case duty cycle is computed because binary-coded pulse position type A1D modulation is used. Data rate is assumed to be 1 mSec pulses in any 6 mSec time window.

Modulation rate is fixed at 167 bits per second.

During transmission, the transmitter sequentially emits a group of 24 pulses in the form of a pulse-keyed carrier. Each pulse (transmitter on time) has a maximum duration of one millisecond (mSec). There are a total of 25 bit positions in a full data window.

REAL TIME ANALYSIS:

Refer to second page for timing diagram. From time zero twenty five-bit positions are included with position 25 not used.

Each of the remaining twenty-four information pulses occupy a maximum 1 millisecond duration position within a 6 millisecond wide bit frame. Total elapsed time: 150 milliseconds.

DUTY CYCLE ANALYSIS:

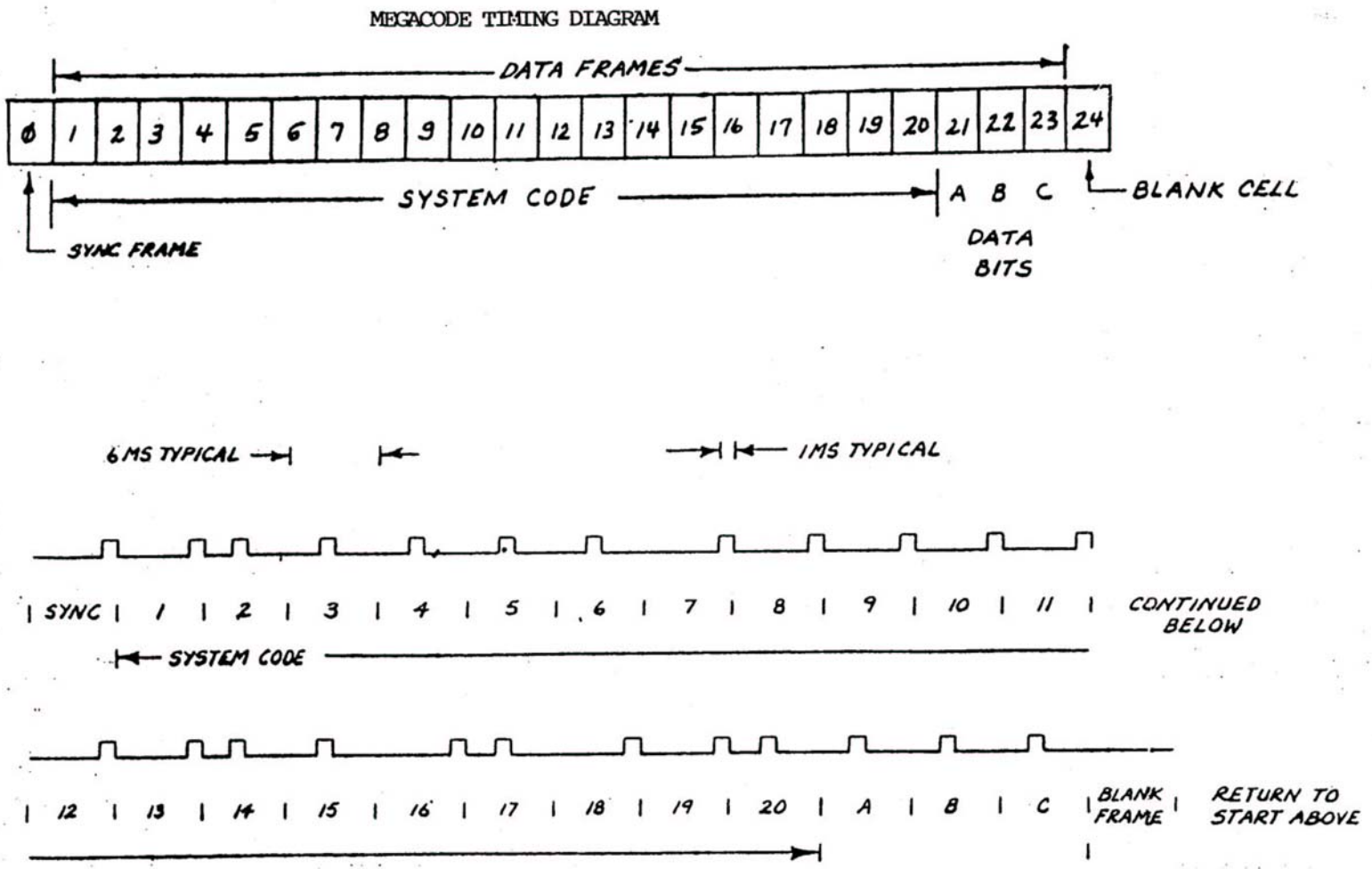
$\frac{\text{24 pulses x 1mSec/pulse}}{\text{150 mSec (data word)}}$ = 0.160 ($20 \log$ voltage) = -15.9 dB peak/average

This calculation is based on a standard data frame of 150 mSec which is representative of actual operation.

In compliance with rules 15.35(c) the following duty cycle factor is used for all field strength calculations. A 100 mSec time window is selected with the "worst case" on time ratio.

$\frac{\text{16.7 mSec total on time}}{\text{100 mSec on time/ frame}}$ = 0.167 Sec on time during worst case 100 mSec time interval

0.167 ($20 \log$ voltage) = -15.5 dB for FCC peak to average conversion



LINEAR CORPORATION
FCC ID: EF4 WAE00007

REPORT OF MEASUREMENTS

Applications for control,security alarm,door opener or remote switch

Description: 318.000 MHz transmitter 167 BPS MegaCode

DATE: 02/25/2002

ITEM TESTED: WAE00007 - W3BR Transmitter - Sample No. 1
MANUFACTURER: Linear Corp.
TRADE NAME: Westinghouse
PRODUCT ID: EF4 WAE00007

DISTANCE AT WHICH MEASURED: 3 meters, DUT 0.8 meter above ground
REFERENCE: 15.231(a,b,c)
MEASUREMENT PROCEDURE: C63.4-1992 INTENTIONAL RADIATORS

RADIATION: per 15.205

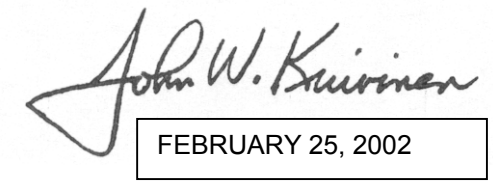
A	B	C		D		E	G	H	I	J	K	L	M	N	O	P	Q
Tuned Frequency MHz	Emission Frequency MHz	Ambient Level dBm		FCC Limit dBm		Meter Reading dBm	Antenna Factor dB	Cable Loss dB	Amp Gain dB	Dist Fac dB	Duty Cycle dB	Field Strength dBm/mtr	dBuV/mtr	uV/M	FCC Limit uV/M	dB:FCC	FREQ. MHz
318.00	318.00	-98.40		-8.37		-12.0	18.6	1.2	27.2	0.00	15.5	-34.90	72.10	4027.17	6117.00	-3.63	318.00
	636.00	-89.80		-36.97		-48.0	26.0	1.7	26.5	0.00	15.5	-62.30	44.70	171.79	611.70	-11.03	636.00
	954.00	-85.90		-40.87		-47.9	29.4	2.2	26.5	0.00	15.5	-58.30	48.70	272.27	611.70	-7.03	954.00
	1272.00	-88.70		-38.07		-42.2	26.8	2.6	27.1	0.00	15.5	-55.40	51.60	380.19	611.70	-4.13	1272.00
	1590.00	-79.10		-47.67		-62.6	28.7	3.0	19.8	0.00	15.5	-66.20	40.80	109.65	611.70	-14.93	1590.00
	1908.00	-77.40		-49.37		-59.7	30.0	3.3	19.7	0.00	15.5	-61.60	45.40	186.21	611.70	-10.33	1908.00
	2226.00	-85.14	*	-42.33	*	#N/A	30.8	3.6	18.3	9.54	15.5	#N/A	#N/A	#N/A	611.70	#N/A	2226.00
	2544.00	-84.04	*	-61.73	*	#N/A	31.7	3.8	0.0	9.54	15.5	#N/A	#N/A	#N/A	611.70	#N/A	2544.00
	2862.00	-82.94	*	-62.83	*	#N/A	32.4	4.2	0.0	9.54	15.5	#N/A	#N/A	#N/A	611.70	#N/A	2862.00
	3180.00	-82.04	*	-63.73	*	#N/A	33.1	4.4	0.0	9.54	15.5	#N/A	#N/A	#N/A	611.70	#N/A	3180.00

The spectrum was searched from 25 to 3500 MHz
No other emissions were observed except those shown on this page.

* NOTE: 1 meter measurement corrected to 3 meters

15.107(d) Conducted Emissions Not Applicable- Battery Powered

TESTED BY DATE

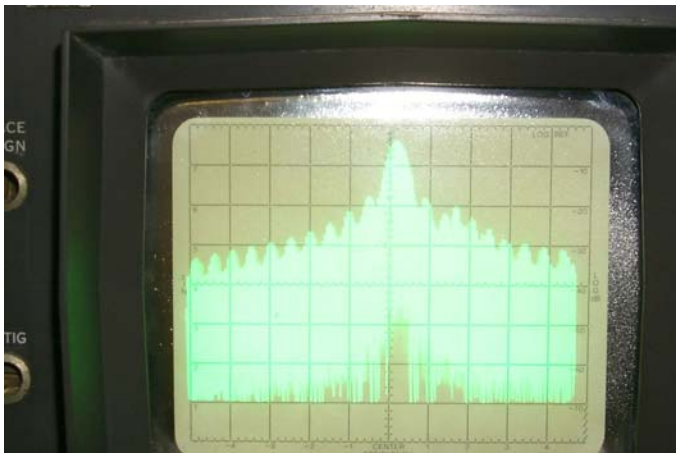


FEBRUARY 25, 2002

ENGINEER DATE

FILE NAME: WAE007_1.XLS DISK NAME: FCC DATA

LINEAR CORPORATION
FCC ID: EF4 WAE00007



DEVICE: W3BR Remote Control Transmitter

PHOTOGRAPH: Occupied Bandwidth

CONDITIONS: Transmitter Fundamental. A1D Modulation - Pulse Position Modulation. Fixed Duty Cycle. L/C Tuned Frequency Determining Element.

SPECTRUM ANALYZER CONTROL SETTINGS

CENTER FREQUENCY: 318 MHz INPUT ATTENUATION: -10 dB

SCAN WIDTH: 2.0 KHz / Div. PREAMPLIFIER GAIN: 0 dB

SCAN TIME: 1.0 Sec / Div. LOG REF. LEVEL: -10 dBm

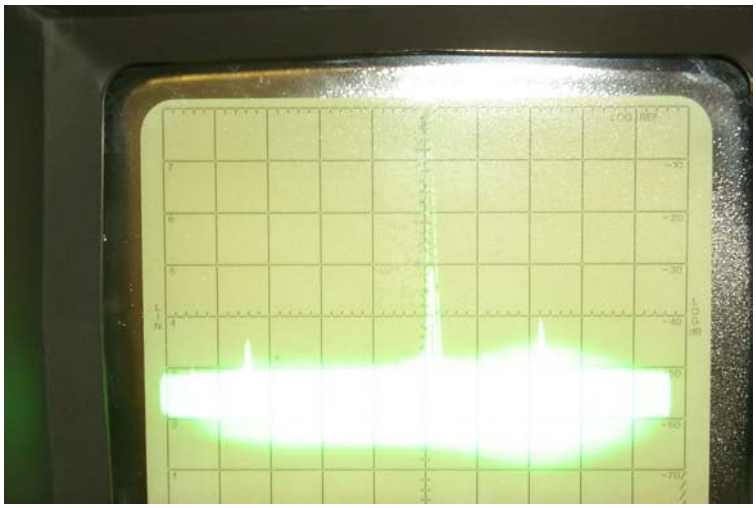
RF BANDWIDTH: 0.3 KHz

ANTENNA: 6" Whip Ant. at Analyzer Input TUNED TO: N/A

ANTENNA DISTANCE: 0.25 Meters ANTENNA HEIGHT: N/A

SYSTEM NOISE FLOOR: N/A

NOTES: Per 15.231(c), Occupied Bandwidth (20 dB down) is less than +/- 8 KHz. This is less than 0.010% of the center frequency. FCC Rules, 15.231(c) devices must be less than 0.25% of center frequency. This device therefore complies with 15.231(c).



DEVICE: W3BR Remote Control Transmitter

PHOTOGRAPH: Transmitter Spurious Emissions +/-25 MHz of the tuned center freq. Peak of RF signal set to zero dB reference line (top of screen). Two signals on sides of carrier frequency are ambient signals (not generated by device under test).

CONDITIONS: Transmitter Fundamental. A1D Modulation, L/C Frequency Determining Element.

SPECTRUM ANALYZER CONTROL SETTINGS

CENTER FREQUENCY: 318 MHz INPUT ATTENUATION: -10 dB

SCAN WIDTH: 5.0 MHz/ Div. PREAMPLIFIER GAIN: 0 dB

SCAN TIME: 1.0 Sec. / Div. LOG REF. LEVEL: -10 dBm

RF BANDWIDTH: 100 KHz

ANTENNA: 6" Whip Antenna on Analyzer Input TUNED TO: N/A

ANTENNA DISTANCE: 0.25 Meters ANTENNA HEIGHT: N/A

SYSTEM NOISE FLOOR: N/A

No emissions occur outside of the of the rated center freq. except for harmonic spurious signals.

LINEAR CORPORATION
FCC ID: EF4 WAE00007