

KTL Test Report: 0L0237RUS1

Applicant: The Purchasing Department

Equipment Under Test: TX-3314S
(E.U.T.)

FCC ID: O4TTX3314S

In Accordance With: **FCC Part 15, Subpart C**
For Low Power Transmitters Operating Periodically
In The Band 40.66 - 40.77 MHz And Above 70 MHz

Tested By: KTL Dallas, Inc.
802 N. Kealy
Lewisville, TX 75057-3136

Authorized By: 
Tom Tidwell, Wireless Group Manager

Date: 8/7/00

Total Number of Pages: 30

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Section 1. Summary of Test ResultsModel No.: **TX-3314S**Sample No.: **S02**General: **All measurements are traceable to national standards.**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.231. All tests were conducted using measurement procedure ANSI C63.4-1992. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.



New Submission



Production Unit



Class II Permissive Change



Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.**THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.**

See "Summary of Test Data".

**NVLAP LAB CODE: 100351-0**

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This report applies only to the items tested.

KTL Dallas, Inc.

FCC PART 15, SUBPART C
FOR LOW POWER TRANSMITTERS

EQUIPMENT: **TX-3314S**

FCC ID.: **04TTX3314S**

PROJECT NO.: **0L0237RUS1**

Summary Of Test Data

Name of Test	Paragraph No.	Results
Transmission Requirements	15.231(a)	Complies
Radiated Emissions	15.231(b)	Complies
Occupied Bandwidth	15.231(c)	Complies
Frequency Tolerance	15.231(d)	N/A(1)
Periodic Alternate Field Strength Requirements	15.231(e)	N/A(2)
Powerline Conducted Emissions	15.207	N/A(3)

Footnotes For N/A's:

- (1) The unit does not operate in the designated band for this requirement.
- (2) The device meets the requirements of 15.231(a).
- (3) The device is DC (battery) powered

Section 2. Equipment Under Test (E.U.T.)**General Equipment Information**

Frequency Range:	433 - 434 (Fixed at 433 MHz nominal)
Operating Frequency(ies) of Sample:	434 MHz
Type of Emission:	Pulse Code Modulation
Emission Designator:	430KL1D
Supply Power Requirement:	12 Volt Alkaline battery
Duty Cycle Correction Factor:	-6.9 dB

KTL Dallas, Inc.

FCC PART 15, SUBPART C
FOR LOW POWER TRANSMITTERS

EQUIPMENT: **TX-3314S**

FCC ID.: **04TTX3314S**

PROJECT NO.: **0L0237RUS1**

Description of E.U.T.

The device is a key fob remote transmitter that is momentarily activated by pressing a button.

Modifications Incorporated in E.U.T.

The EUT has not been modified from what is described by the brand name and unique type identification stated above.

Justification

The E.U.T. was configured for testing as per typical installation.

The following combinations were investigated to establish worst case configuration:

- (1) Lying flat
- (2) Standing vertically on its side.
- (3) Standing vertically on its end.

Exercise Program

The E.U.T. exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

Exercise mode:

- (1) Continuous transmit, Black button depressed.
- (2) Continuous transmit, Green button depressed.

EQUIPMENT: **TX-3314S**FCC ID.: **04TTX3314S**PROJECT NO.: **0L0237RUS1**

Section 3. Equipment Configuration

Equipment Configuration List:

Item	Description	Model No.	Serial.	Rev.
(A)	Remote transmitter	TX-3314S	None	N/A
(B)				
(C)				
(D)				
(E)				
(F)				
(G)				

Inter-connection Cables:

There are no detachable cables or wires to transmitter.

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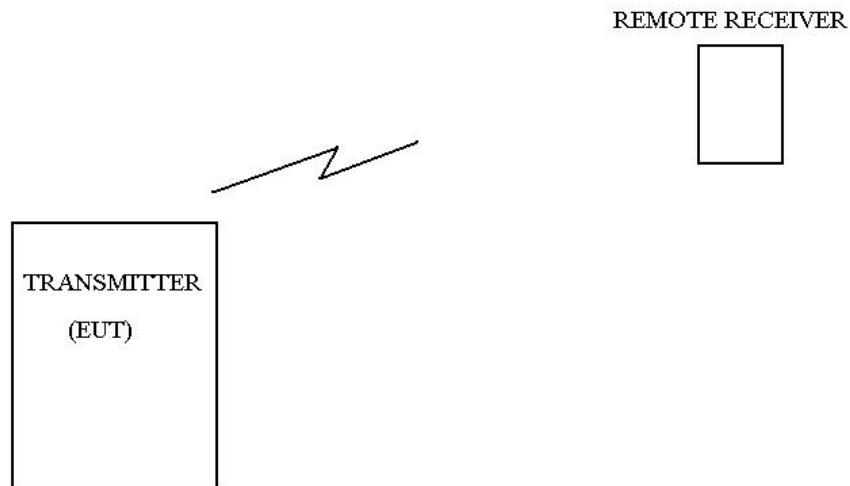
FCC PART 15, SUBPART C
FOR LOW POWER TRANSMITTERS

EQUIPMENT: **TX-3314S**

FCC ID.: **04TTX3314S**

PROJECT NO.: **0L0237RUS1**

Configuration of the Equipment Under Test (E.U.T)



EQUIPMENT: **TX-3314S**FCC ID.: **04TTX3314S**PROJECT NO.: **0L0237RUS1****Section 4. Transmission Requirements**

NAME OF TEST: Transmission Requirements	PARA. NO.: 15.231(a)
TESTED BY: Kevin Rose	DATE: 7/18/00

Minimum Standard: 15.231(a) Continuous transmissions such as voice, video or data transmissions are not permitted.

15.231(a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds after being released.

15.231(a)(2) A transmitter activated automatically shall cease transmission within 5 seconds of activation.

15.231(a)(3) Periodic transmissions at regular pre-determined intervals are not permitted. However polling or supervisory transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.

15.231(a)(4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm.

Test Results: [Complies](#)

Test Data: [Compliance was determined by verification of technical specification and a functional test on the equipment.](#)

Rationale for Compliance with Transmission Requirements

The EUT transmits a unique code but does not transmit any data information.

15.231(a)(1) : The transmission is de-activated within 24.4 μ sec. after the user releases the tx button. See graph on page 16.

15.231(a)(2) : The transmitter is not activated automatically.

15.231(a)(3) : The transmitter only transmits when the TX button is pressed. There are no automatic transmissions at pre-determined intervals.

15.231(a)(4) : The transmitter is for remote actuation and thus transmits a short burst when activated by the user.

EQUIPMENT: **TX-3314S**
FCC ID.: **04TTX3314S**PROJECT NO.: **0L0237RUS1**

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Test Plot: Duty Cycle Correction	
Page <u>1</u> of <u>4</u>	Complete <input checked="" type="checkbox"/> Preliminary <input type="checkbox"/>
Job No.: 0L0237R	Date: 07/18/00
Specification: CFR 47, PART 15.231	Temperature(°C): 22
Tested By: Kevin Rose	Relative Humidity(%) 50
E.U.T.: REMOTE TRANSMITTER	
Configuration: TRANSMIT	
Serial Number: A52450	
Location: Lab 1	RBW: 500 kHz
Detector Type: Peak	VBW: 500 kHz
Test Equipment Used	
Antenna: 802	Directional Coupler: #N/A
Pre-Amp: #N/A	Cable #1: 1081
Filter: #N/A	Cable #2: #N/A
Receiver: 1036	Cable #3: #N/A
Attenuator #1: #N/A	Cable #4: #N/A
Attenuator #2: #N/A	Mixer: #N/A
Additional equipment used:	
Measurement Uncertainty: +/- .7 dB	
Date: 18.JUL.2000 10:33:50 Notes: WIDE PULSE=1.343 mS BLACK BUTTON DEPRESSED	

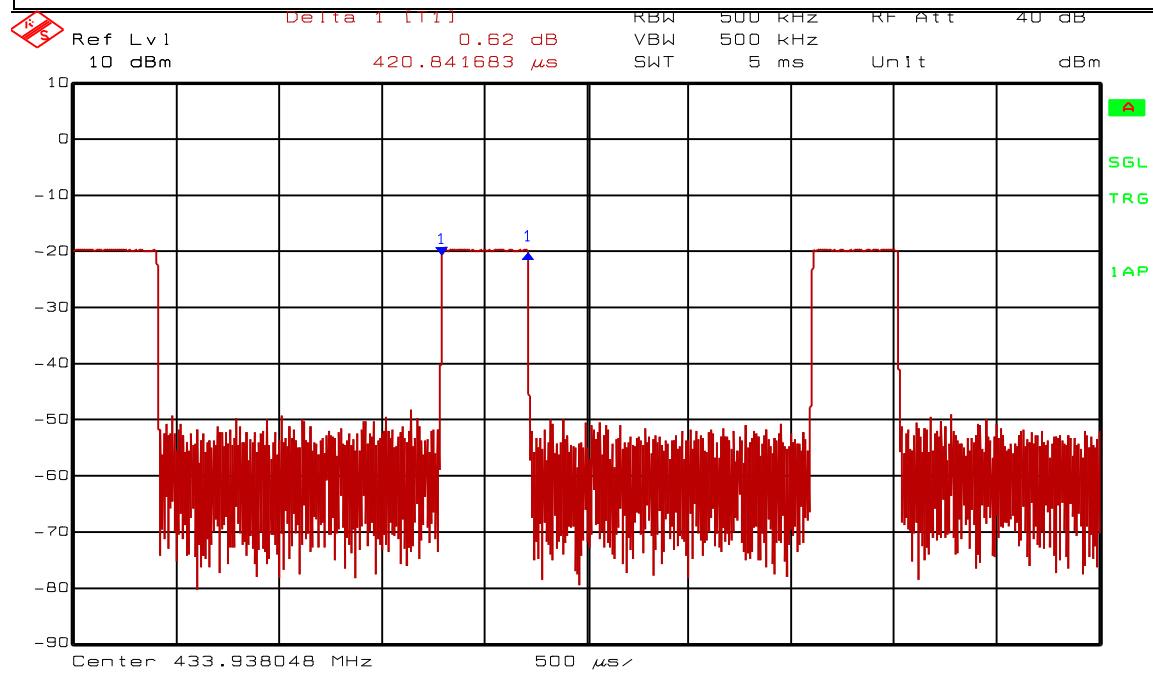
EQUIPMENT: **TX-3314S**
FCC ID.: **04TTX3314S**PROJECT NO.: **0L0237RUS1**

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Test Plot: Duty Cycle Correction

Page <u>2</u> of 4		Complete <input checked="" type="checkbox"/> X
Job No.:	0L0237R	Date: 7/18/00
Specification:	CFR 47, PART 15.231	Temperature(°C): 1/22/00
Tested By:	Kevin Rose	Relative Humidity(%): 2/19/00
E.U.T.:	REMOTE TRANSMITTER	
Configuration:	TRANSMIT	



Date: 18.JUL.2000 10:55:48

Notes:	NARROW PULSE=.421 mS

EQUIPMENT: **TX-3314S**
FCC ID.: **04TTX3314S**PROJECT NO.: **0L0237RUS1**

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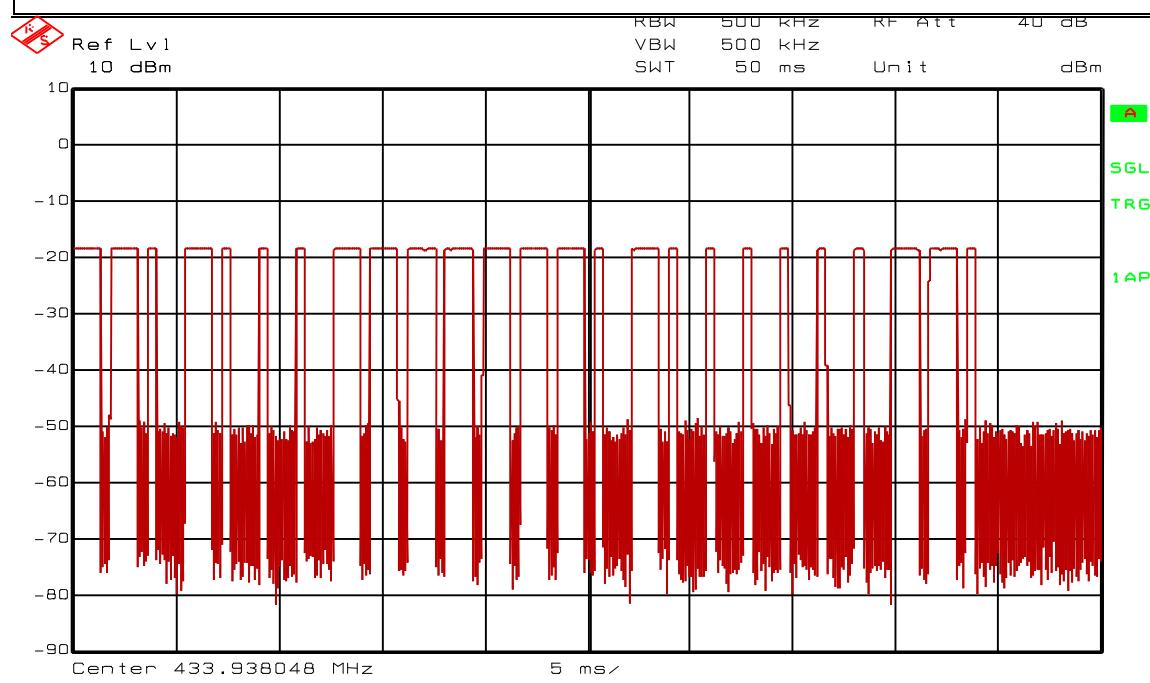
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Test Plot: Duty Cycle Correction

Page 3 of 4

Job No.: 0L0237R Date: 7/18/00
 Specification: CFR 47, PART 15.231 Temperature(°C): 1/22/00
 Tested By: Kevin Rose Relative Humidity(%): 2/19/00
 E.U.T.: REMOTE TRANSMITTER
 Configuration: TRANSMIT

Complete X
 Preliminary _____



Notes:

ONE COMPLETE PULSE TRAIN
 13 WIDE PULSES AND 12 NARROW PULSES

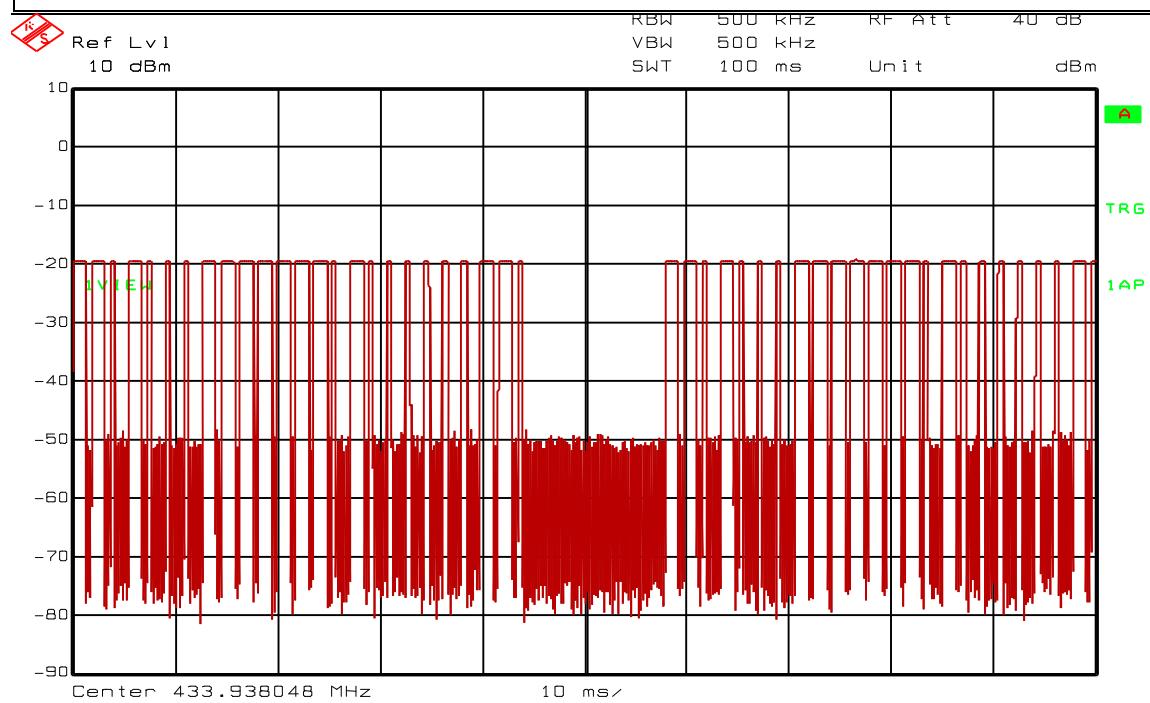
EQUIPMENT: **TX-3314S**
FCC ID.: **04TTX3314S**PROJECT NO.: **0L0237RUS1**

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Test Plot: Duty Cycle Correction

Page <u>4</u> of 4		Complete <input checked="" type="checkbox"/>
Job No.:	0L0237R	Date: 7/18/00
Specification:	CFR 47, PART 15.231	Temperature(°C): 1/22/00
Tested By:	Kevin Rose	Relative Humidity(%) 2/19/00
E.U.T.:	REMOTE TRANSMITTER	
Configuration:	TRANSMIT	



Date: 18.JUL.2000 10:52:27

Notes:	2 pulse trains
	20 log (34.92 mS + 10.10 mS = 45.02 mS Total / 100 mS)
	6.9 Duty cycle Correction

EQUIPMENT: **TX-3314S**FCC ID.: **04TTX3314S**PROJECT NO.: **0L0237RUS1**

Transmitter Release Time



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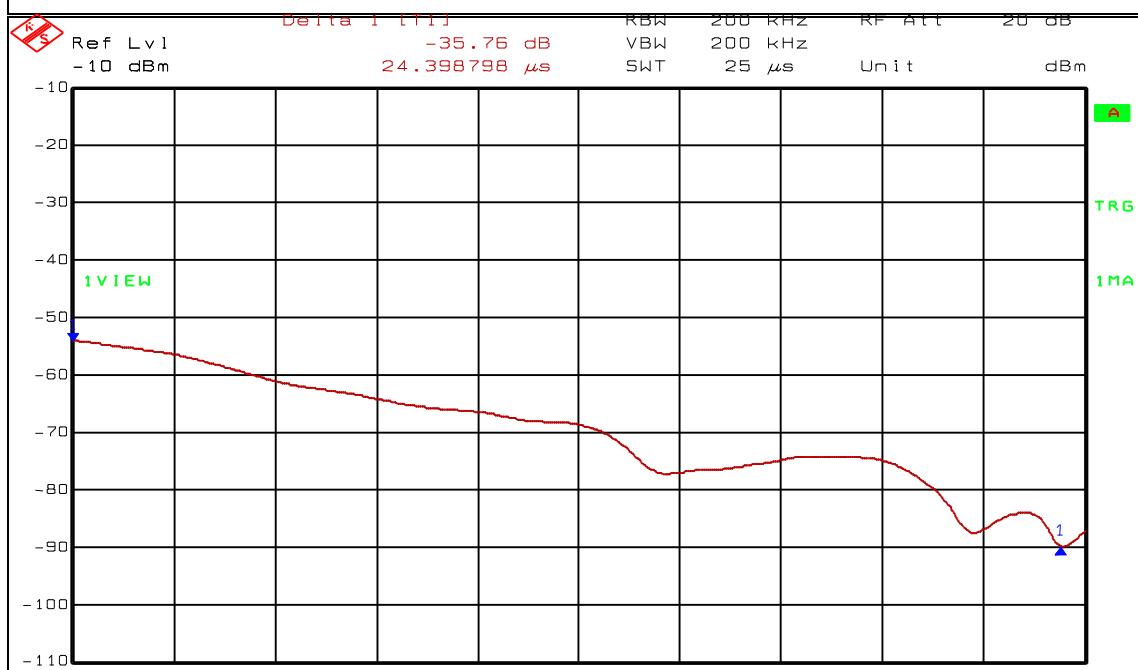
Test Plot: Transmitter Release TimePage 1 of 1 Complete X

Job No.: 0L0237R Date: 08/05/00
 Specification: 15.231 Temperature(°C): 22
 Tested By: David Light Relative Humidity(%): 50
 E.U.T.: TX-3314S
 Configuration: Transmit and release
 Sample Number: S03
 Location: Lab 1 RBW: 200 kHz
 Detector Type: Peak VBW: 200 kHz

Test Equipment Used

Antenna: 802 Directional Coupler: #N/A
 Pre-Amp: #N/A Cable #1: 1081
 Filter: #N/A Cable #2: #N/A
 Receiver: 1036 Cable #3: #N/A
 Attenuator #1: #N/A Cable #4: #N/A
 Attenuator #2: #N/A Mixer: #N/A

Additional equipment used:
 Measurement Uncertainty: +/- .7 dB



Notes: _____

Section 5. Radiated Emissions

NAME OF TEST: Radiated Emissions

PARA. NO.: 15.231(b)

TESTED BY: **Kevin Rose**DATE: **7/27/00****Minimum Standard:****Permissible Field Strength Limits (Momentarily Operated Devices)**

Fundamental Frequency (MHz)	Field Strength of Fundamental Microvolts/Meter at 3 meters; (watts)	Field Strength of Unwanted Emissions Microvolts/Meter at 3 meters; (watts)
40.66 - 40.70	2,250	225
70-130	1, 250	125
130-174	1,250 to 3,750*	125 to 375
174-260 (note 1)	3,750	375
260-470 (note 1)	3,750 to 12,500*	375 to 1,250
Above 470	12,500	1,250

Notes:

# Use quasi-peak or averaging meter.	For 130 - 174 MHz: $FS \text{ (microvolts/m)} = (56.82 \times F) - 6136$
* Linear interpolation with frequency F in MHz	For 260 - 470 MHz: $FS \text{ (microvolts/m)} = (41.67 \times F) - 7083$

Any emissions that fall within the restricted bands of 15.205 shall not exceed the following limits:

Frequency (MHz)	Field Strength (mV/m @ 3m)	Field Strength (dB @ 3m)
30 - 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
Above 960	500	54.0

Test Results:

Complies. The worst-case emission level is 77.9 dB μ V/m @ 3m at 433.9 MHz in the horizontal polarization. This is 3.1 dB below the specification limit of 81 dB μ V/m. This emission is the fundamental transmit emission. The worst-case spurious emission level is 49.8 dB μ V/m @ 3m at 1.3 GHz. This is 4.2 dB below the 54 dB μ V/m limit.

Test Data:

See attached table.

Above 1 GHz a spectrum analyzer and low noise amplifier are used to measure emission levels. The spectrum analyzer resolution bandwidth was set to 1 MHz and video bandwidth was 3 MHz.

In the case of handheld equipment, the E.U.T. is rotated in three planes to obtain worst-case results.

EQUIPMENT: **TX-3314S**FCC ID.: **04TTX3314S**PROJECT NO.: **0L0237RUS1****Test Data - Radiated Emissions**

Client Name:	The Purchasing Department	Job #:	0I0237r	Date:	7/27/00						
EUT Model:	TX-3314S	Serial #:	A52450	Time:	1:45 AM						
EUT Config.:	Transmitting			Staff:	Kevin Rose						
Test Specification:	CFR47 Part 15.231			Test #:	spurious emissions						
Rod Ant. #:		Cable #:	C1A	Detect. Type:	Peak						
Bicon Ant. #:		Preamp #:	na	Res. BW (kHz):	100						
Log Ant. #:	G2017	Limiter #:	na	Video BW (kHz):	100						
Bilog Ant. #:		Atten. #:	na	Temp. (deg. C):	27						
Dipole Ant. #:		Detector #:	1036	Humidity (%):	45						
				Location:	A OATS						
				Distance (m):	3						
				EUT Voltage (V):	12						
				EUT Freq. (Hz):	dc						
				Photo ID:	0I0237r spurious emissions						
Emission Frequency (MHz)	Ant. Pol. (H/V)	Det. Atten. (dB)	Meter Reading (dBuV)	Antenna Factor (dB)	Path Loss (dB)	DUTY CYCLE (dB)	Corrected Reading (dBuV/m)	Spec. Limit (dBuV/m)	CR/SL Diff. (dB)	Pass Fail Marginal	Notes
433.9	H	0.0	61.6	17.2	6.0	6.9	77.9	81.0	-3.1	PASS	
867.9	H	0.0	34.4	21.4	8.2	6.9	57.1	61.0	-3.9	PASS	
433.9	V	0.0	42.2	17.2	6.0	6.9	58.5	81.0	-22.5	PASS	
867.9	V	0.0	22.4	21.4	8.2	6.9	45.1	61.0	-15.9	PASS	

EQUIPMENT: **TX-3314S**FCC ID.: **04TTX3314S**PROJECT NO.: **0L0237RUS1**

<u>Radiated Emissions</u>								
Page <u>1</u> of <u>1</u>								
Job No.: 0L0237r	Date: 8/8/00							
Specification: CFR 47, Part 15.231	Temperature(°C): 22							
Tested By: Kevin Rose	Relative Humidity(%) 50							
E.U.T.: TX-3314S								
Configuration: transmitting								
Sample Number: 2								
Location: AC 3	RBW: 1 MHz							
Detector Type: Peak	VBW: 1 MHz							
<u>Test Equipment Used</u>								
Antenna: 993	Directional Coupler: #N/A							
Pre-Amp: 1016	Cable #1: 1484							
Filter: #N/A	Cable #2: 1485							
Receiver: 1464	Cable #3: 1043							
Attenuator #1 #N/A	Cable #4: #N/A							
Attenuator #2: #N/A	Mixer: #N/A							
Additional equipment used:								
Measurement Uncertainty: +/- 3.2 dB								
Frequency (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp Gain (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Delta (dB)	Comment
1.300	62.67	23	2.63	31.6	49.8	54	-4.2	H
1.735	53.5	26	3.17	32.9	42.9	61	-18.1	H
2.169	42.5	28.7	3.96	33.1	35.2	61	-25.8	H
2.6	36.7	29.2	4.37	33.3	30.1	61	-30.9	H nf
1.300	53.2	23	2.63	31.6	40.3	54	-13.7	V
1.735	40.7	26	3.17	32.9	30.1	61	-30.9	V
2.169	42	28.7	3.96	33.1	34.7	61	-26.3	V
2.6	36.5	29.2	4.37	33.3	29.9	61	-31.1	V nf
Scanned to 10th Harmonic - 6.9 dB subtracted from corrected reading for duty cycle correction								

KTL Dallas, Inc.

FCC PART 15, SUBPART C
FOR LOW POWER TRANSMITTERS

EQUIPMENT: **TX-3314S**

FCC ID.: **04TTX3314S**

PROJECT NO.: **0L0237RUS1**

Radiated Photographs (Worst Case Configuration)

FRONT VIEW



REAR VIEW



EQUIPMENT: **TX-3314S**FCC ID.: **04TTX3314S**PROJECT NO.: **0L0237RUS1****Section 6. Occupied Bandwidth**

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.231(c)
TESTED BY: Kevin Rose	DATE: 7/18/00

Minimum Standard: 15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Results: Complies. The 20 dB bandwidth is .4308 MHz (.099% of 433.4 MHz).

Test Data: See attached graph.

$$433.4 \text{ MHz} \times .25\% = 1.08 \text{ MHz maximum 20 dB BW}$$

EQUIPMENT: **TX-3314S**
FCC ID.: **04TTX3314S**PROJECT NO.: **0L0237RUS1**

KTL Dallas, Inc.

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Fax: (972) 436-2667**Test Plot: Occupied Bandwidth**Page 1 of 1

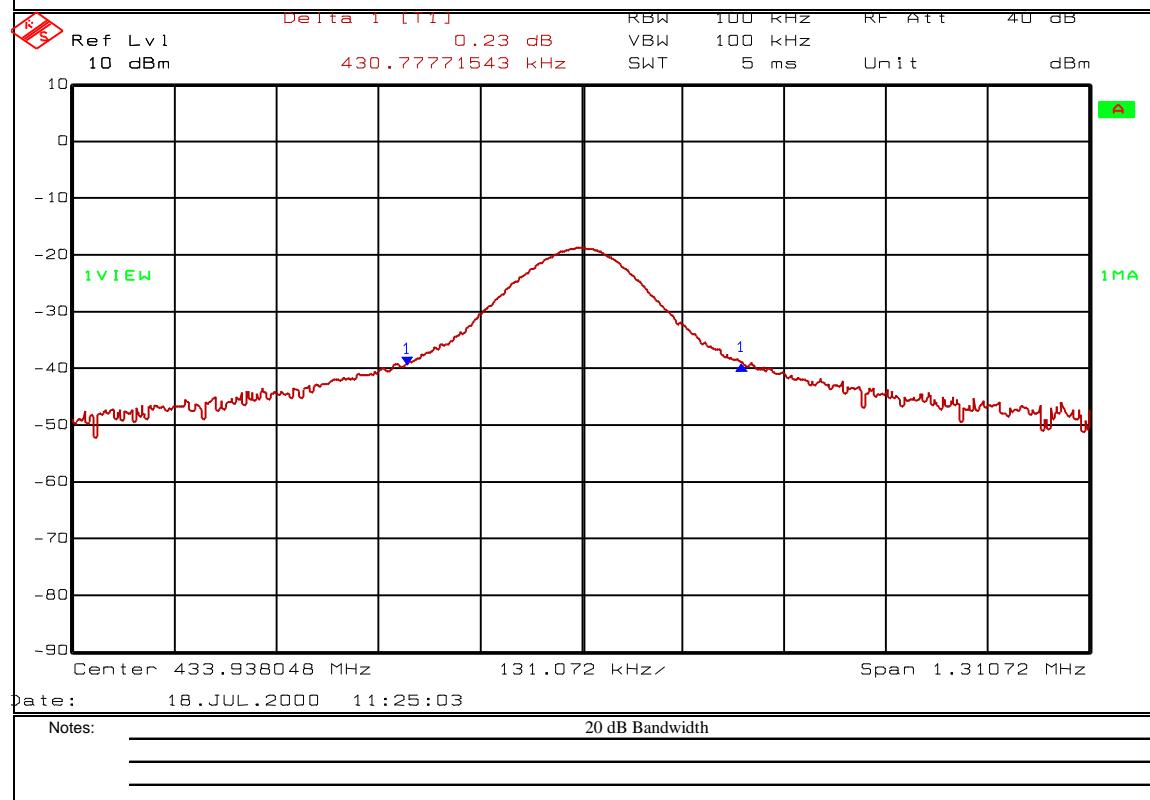
Date: 07/18/00

Complete X
Preliminary _____

Job No.: 0L0237R Date: 07/18/00
 Specification: CFR 47, Part 15.231 Temperature(°C): 22
 Tested By: David Light Relative Humidity(%) 50
 E.U.T.: Momentary Transmitter
 Configuration: Continuous transmit
 Serial Number: A52450
 Location: Lab 1 RBW: 100 kHz
 Detector Type: Peak VBW: 100 kHz

Test Equipment Used

Antenna: 802 Directional Coupler: #N/A
 Pre-Amp: #N/A Cable #1: 1082
 Filter: #N/A Cable #2: #N/A
 Receiver: 1036 Cable #3: #N/A
 Attenuator #1: #N/A Cable #4: #N/A
 Attenuator #2: #N/A Mixer: #N/A
 Additional equipment used: _____
 Measurement Uncertainty: +/- .7 dB



EQUIPMENT: **TX-3314S**FCC ID.: **04TTX3314S**PROJECT NO.: **0L0237RUS1****Section 7. Frequency Tolerance
Devices in the Frequency Band 40.66 - 40.77 MHz**

NAME OF TEST: Frequency Tolerance

PARA. NO.: 15.231(d)

TESTED BY:

DATE:

Minimum Standard: 15.231(d) For devices operating within the frequency band 40.66 - 40.70 MHz, the bandwidth of the emission shall be confined within the band edges and the frequency tolerance of the carrier shall be $\pm 0.01\%$. This requirement shall be maintained for a temperature variation of -20 degrees to +50 degrees C at normal supply voltage and for a variation in the primary power supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test Results: Complies/Does Not Comply. See attached graph and data.

Test Data: See attached graph.

Not Applicable

Section 8. Periodic Alternate Field Strength Requirements

NAME OF TEST: Periodic Alternate Field Strength Requirements PARA. NO.: 15.231(e)

TESTED BY:

DATE:

Minimum Standard:

15.231(e) Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except that the field strengthsable in paragraph (b) of this section is replaced by the following.

Not Applicable

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	1,000	100
70 - 130	500	50
130 - 174	500 to 1,500	50 to 150
174 - 260	1,500	150
260-470	1,500 to 5,000	150 to 500
Above 470	5,000	500

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

Test Results: Complies/Does Not Comply.**Test Data:** See attached table.

EQUIPMENT: **TX-3314S**FCC ID.: **04TTX3314S**PROJECT NO.: **0L0237RUS1****Section 9. Powerline Conducted Emissions**

NAME OF TEST: Powerline Conducted Emissions	PARA. NO.: 15.207
TESTED BY:	DATE:

Minimum Standard:

Frequency(MHz)	Maximum Powerline Conducted RF Voltage	
	mV	dBm
0.45 - 30.0	250	-8

Test Results:

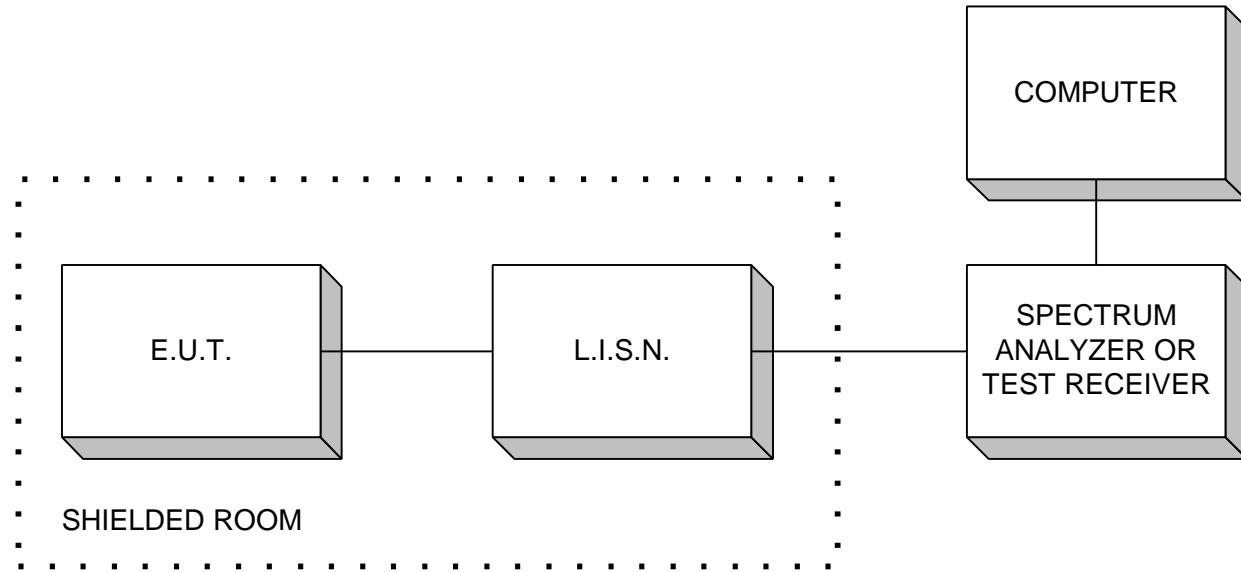
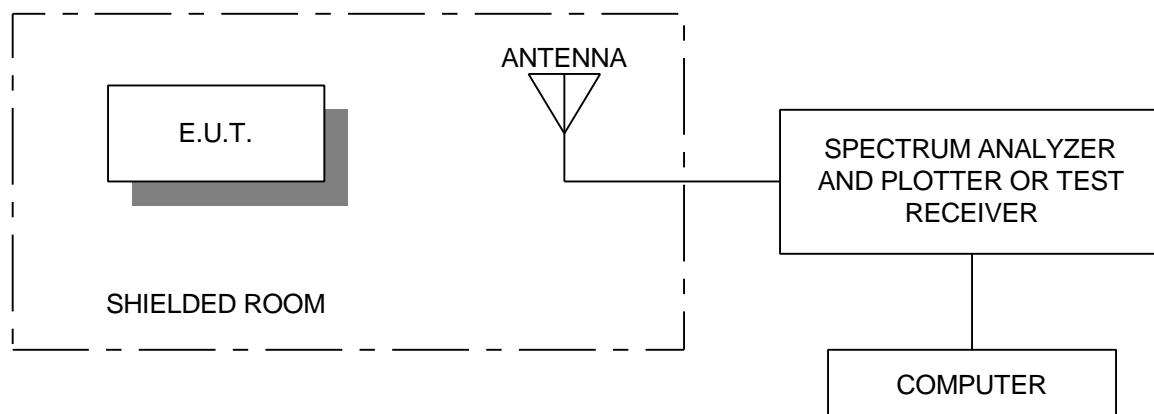
Not Applicable
See attached graphs and table.

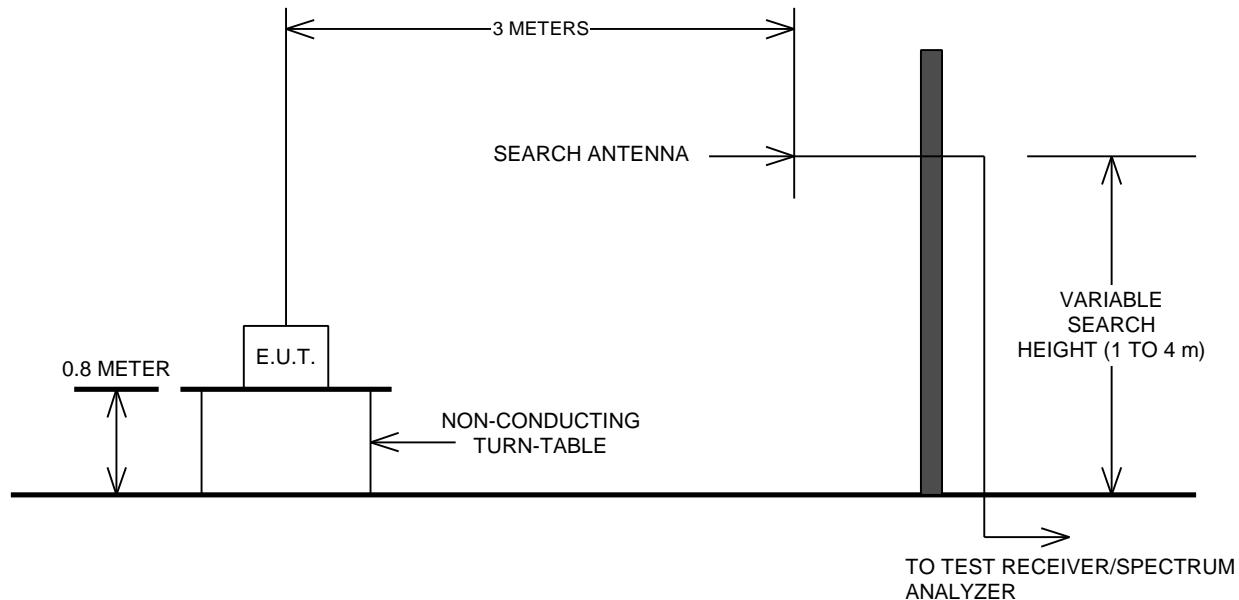
Test Data: See attached graphs and table.**Method Of Measurement: (Procedure ANSI C63.4-1992)**

Measurements were made using a spectrum analyzer with 10 kHz RBW, Peak detector. Any emissions that are close to the limit are measured using a test receiver with 10 kHz bandwidth, CISPR Quasi-Peak detector.

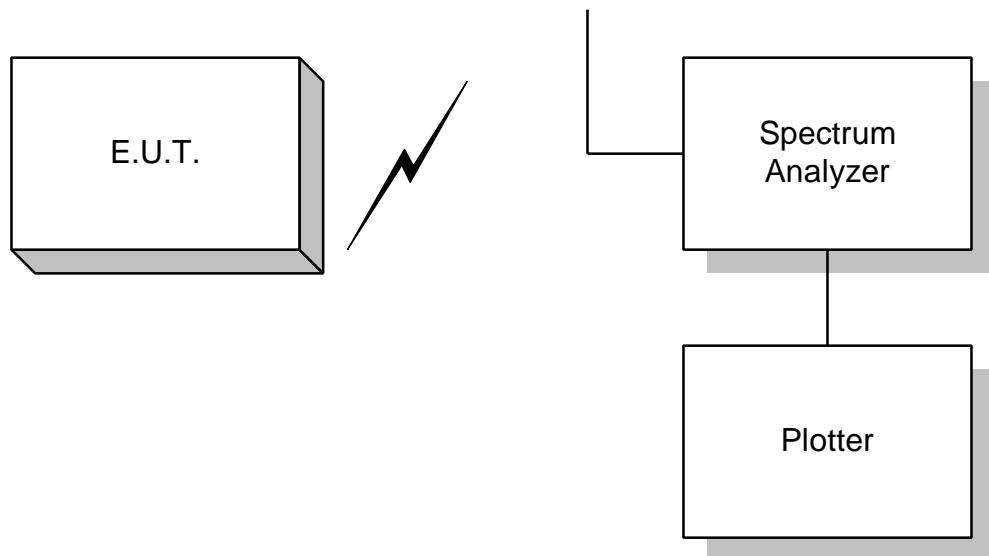
Broadband emissions are identified by switching the receiver detector function from Quasi-Peak to Average. If the amplitude of the emission drops by 6 dB or more then the emission is classified as broadband and the Quasi-Peak level is reduced by a factor of 13 dB.

All emissions within 10 dB of limit have been recorded.

Section 10. Block Diagrams**Conducted Emissions****Radiated Prescan**

Outdoor Test Site For Radiated Emissions

The spectrum was searched up to the 10th harmonic of the fundamental frequency of operation.

Occupied Bandwidth

Section 11. Test Equipment List

<u>KTL ID</u>	<u>Nomenclature</u>	<u>Manufacturer Model Number</u>	<u>Serial Number</u>	<u>Calibration Date</u>
1082	Cable, 2 m	Astrolab 32027-2-29094-72TC	None	5/23/00
1036	Spectrum Analyzer	Rohde & Schwarz FSEK-30	830844/006	6/14/00
802	Near Field Probe	EMCO 7405	0103	CNR
G2017	Antenna Log Periodic	A.H. Systems SAS-200/510	556	2/26/00
G2207	Preamplifier 25 dB	ICC LNA25	398	5/24/00
C1A	Cable 40 m	Unknown	None	12/22/99
0993	Horn Antenna	A.H. Systems SAS-200/571	162	7/16/99*
A-OATS	Outdoor Test Site	N/A	N/A	10/22/99
1016	Preamplifier 30 dB – 1-20 GHz	Hewlett Packard 8449A	2749A00159	5/24/00
1464	Spectrum Analyzer	Hewlett Packard 8563E	3551A04428	11/3/99
1484	Cable	Storm PR90-010-72	None	5/25/00
1485	Cable	Storm PR90-010-216	None	5/25/00
1043	Cable	Astrolab 32027-2-29094K-1M	None	9/30/99

Note: All equipment is Calibrated on a yearly cycle unless otherwise noted.

* Denotes equipment on two year calibration cycle. Between calibrations a functional check is performed .

KTL Dallas, Inc.

FCC PART 15, SUBPART C
FOR LOW POWER TRANSMITTERS

EQUIPMENT: **TX-3314S**

FCC ID.: **04TTX3314S**

PROJECT NO.: **0L0237RUS1**

ANNEX A - RESTRICTED BANDS

EQUIPMENT: TX-3314S**FCC ID.: 04TTX3314S****PROJECT NO.: 0L0237RUS1****Section A****Restricted Bands of Operation**

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.15
0.49 - 0.51	16.69475-16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425-16.80475	960-1240	7.25-7.75
3.020 - 3.026	25.5-25.67	1300-1427	8.025-8.5
4.125 - 4.128	37.5-38.25	1435-1626.6	9.0-9.2
4.17725 - 4.17775	73-74.6	1645.5-1646.5	9.3-9.5
4.20725 - 4.20775	74.8-75.2	1660-1710	10.6-12.7
6.215 - 6.218	108-121.94	1718.8-1722.2	13.25-13.4
6.31175 - 6.31225	123-138	2220-2300	14.47-14.5
8.291 - 8.294	149.9-150.05	2310-2390	15.35-16.2
8.362 - 8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625 - 8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425 - 8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29 - 12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975 - 12.52025	240-285	3345.8-3358	36.43-36.5
12.57675 - 12.57725	322-335.4	3600-4400	Above 38.6
13.36 - 13.41			