



Certelecom Laboratories Inc.

Safety - EMI - Telecom - ISO Guide 25

ENGINEERING TEST REPORT

ON:

**THE HEATH ZENITH COMPANY
"SL-6132-TX TRANSMITTER"**

FCC ID: BJ4-61WRC32TX

**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**

PROJECT NO.: 8R00566.1

TESTED FOR:

**HEATH ZENITH COMPANY
455 RIVERVIEW DRIVE
BENTON HARBOR, MI
USA**

TESTED BY:

**CERTELECOM LABORATORIES INC.
3325 RIVER ROAD, R.R. 5
OTTAWA, ONTARIO K1V 1H2**



NVLAP LAB CODE: 100351-0

MAY 1998

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This report applies only to the items tested.

EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJA-61WRC32TX

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EQUIPMENT: SL-6132-TX Transmitter
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EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

Section 1. Summary of Test Results

Manufacturer: Heath Zenith

Model No.: SL-6132-TX

Serial No.: None

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.

Abstract:

Name of Test	Paragraph Number	Results
Transmission Requirements	15.231(a)	Complies
Radiated Emissions	15.231(b)	Complies
Occupied Bandwidth	15.231(c)	Complies
Frequency Tolerance	15.231(d)	Not Applicable
Periodic Alternate Field Strength Requirements	15.231(e)	Not Applicable
Powerline Conducted Emissions	15.207	Not Applicable

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

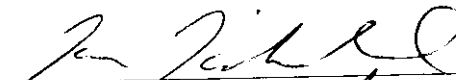
THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST
SPECIFICATIONS HAVE BEEN MADE.

See Above

NVLAP[®]

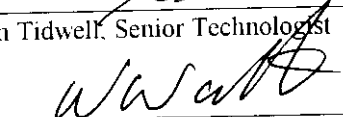
NVLAP LAB CODE: 100351-0

TESTED BY:


Tom Tidwell, Senior Technologist

DATE: 28 May 1998

APPROVED BY:


W. Waterhouse, RF Engineering Lab Manager

DATE: 28 May 1998

EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Model Number: SL-6132-TX

Serial Number: None

☐ Production Unit ☒ Pre-Production Unit

Frequency Range: 315 MHz (Fixed)

Operating Frequency(ies) of Sample: 315 MHz

Type of Emission: Pulse code Modulation

Emission Designator: 583K3L1D

Supply Power Requirement: 9 Vdc Battery

Duty Cycle Calculation: Max. RF on Time = 55.5 ms in 100 ms
(2921 x 19 μ sec pulses)
 $20 \text{ Log } \frac{55.5\text{ms}}{100\text{ms}}$
Duty Cycle dB = -5 dB

EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

Description of E.U.T.

The E.U.T. is a 315 MHz remote control transmitter designed to be used with the SL-6139-RX receiver but can be used with other Heath Zenith receivers that use the same modulation system.

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.

EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJJ-61WRC32TX

Theory of Operation

The SL-6132-TX transmitter is a fixed tuned transmitter. Three modulation frequencies are selectable (28 kHz, 30 kHz or 32 kHz). The device is to be used to remotely control lighting, appliances and other AC loads.

EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

Justification

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

The following combinations were investigated to establish worst case configuration:

- (1) The E.U.T. was tested in 3 orthogonal axis since it is hand held.

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) For the purpose of testing the E.U.T. was strapped to transmit continuously.

EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

Section 3. Equipment Configuration

Equipment Configuration List:

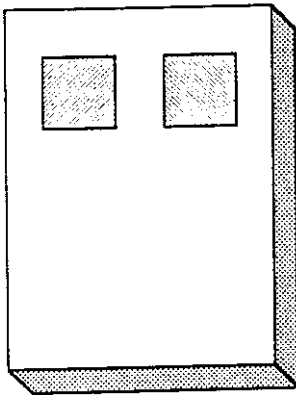
Item	Description	Model No.	Serial.	Rev.
(A)	Remote Control Transmitter	SL-6132	None	

Inter-connection Cables:

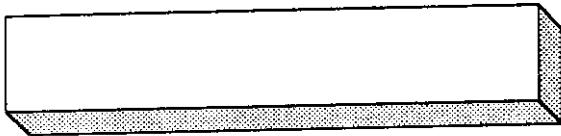
None

EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

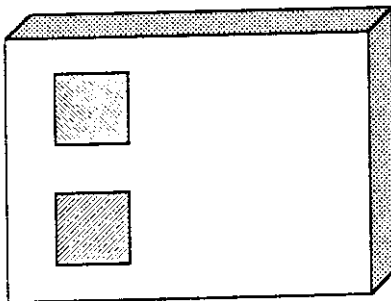
Configuration of the Equipment Under Test (E.U.T)



Configuration #1



Configuration #2



Configuration #3

EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

Section 4. Transmission Requirements

NAME OF TEST: Transmission Requirements	PARA. NO.: 15.231(a)
TESTED BY: Tom Tidwell	DATE: May 20, 1998

Test Conditions: Test Voltage: 9 Vdc
 Temperature: 26 °C
 Humidity: 37 %

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.

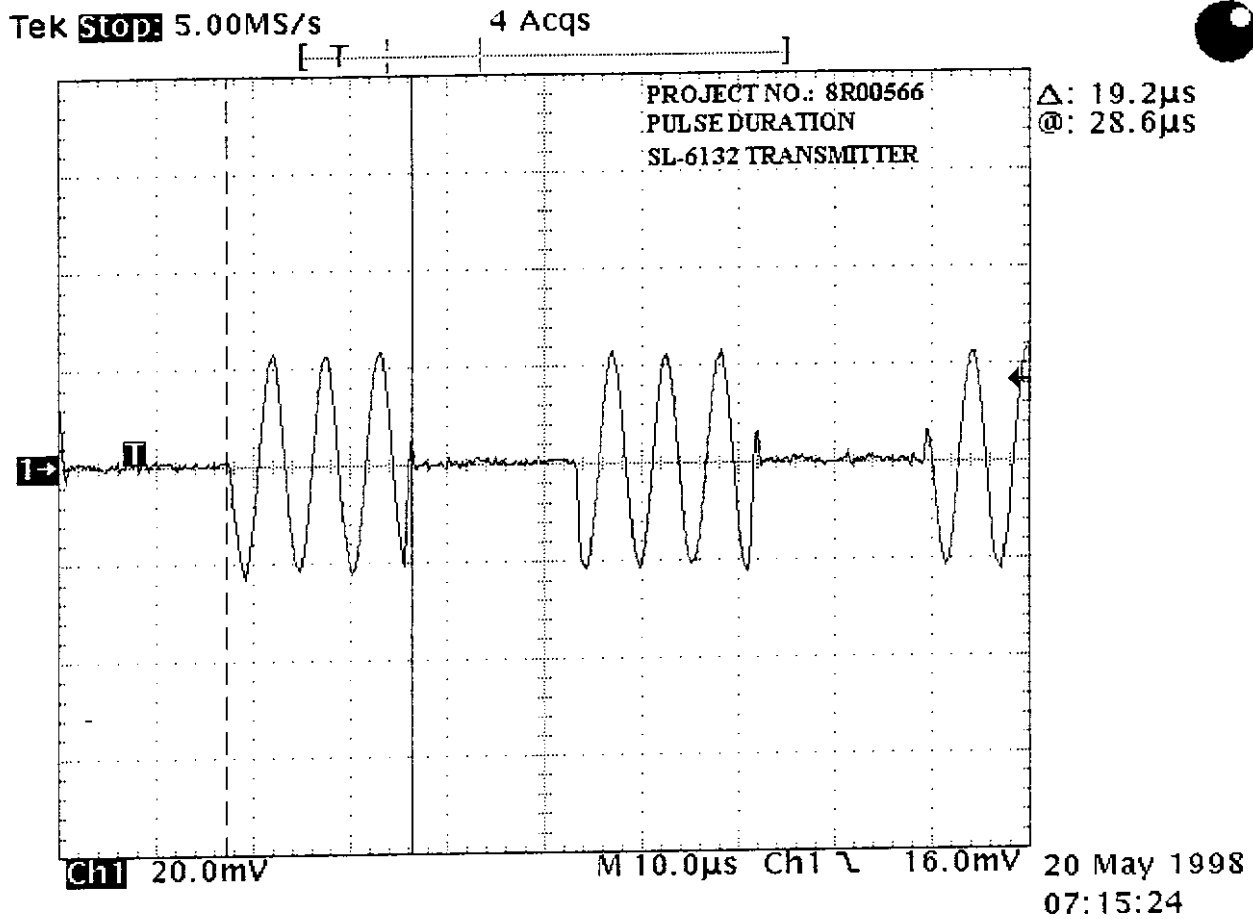
Test Data: Compliance was determined by verification of technical
specifications and a functional test on the equipment.

EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

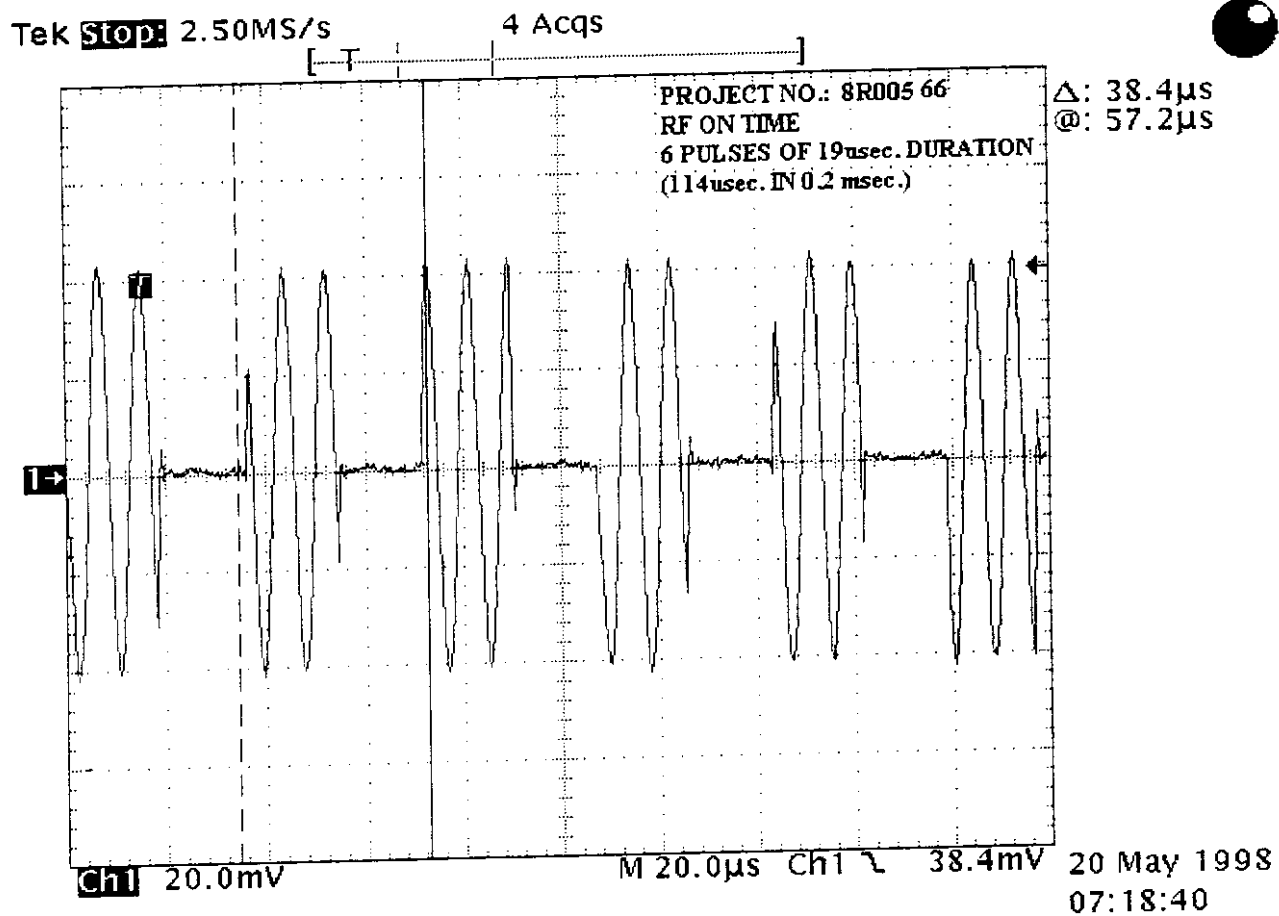
Rationale for Compliance with Transmission Requirements

- 15.231(a)(1) : The transmitter is deactivated immediately upon release of the transmit button.
- 15.231(a)(2) : Not Applicable
- 15.231(a)(3) : The transmitter does not transmit at regular intervals.
- 15.231(a)(4) : Not Applicable

EQUIPMENT: SL-6132-TX Transmitter
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EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX



EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX**Section 5. Radiated Emissions**

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.231(b)
TESTED BY: Tom Tidwell	DATE: May 19, 1998

Test Conditions: Test Voltage: 9 Vdc
 Temperature: 27 °C
 Humidity: 37 %

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 (microvolts/m) = $(56.82 \times F) - 6136$

* Linear interpolation with frequency F in MHz

For 260 - 470 MHz: FS (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 ($\mu\text{V/m}$ @ 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 69.9 dB $\mu\text{V/m}$ @ 3m at 315 MHz. This is 5.7 dB below the specification 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.

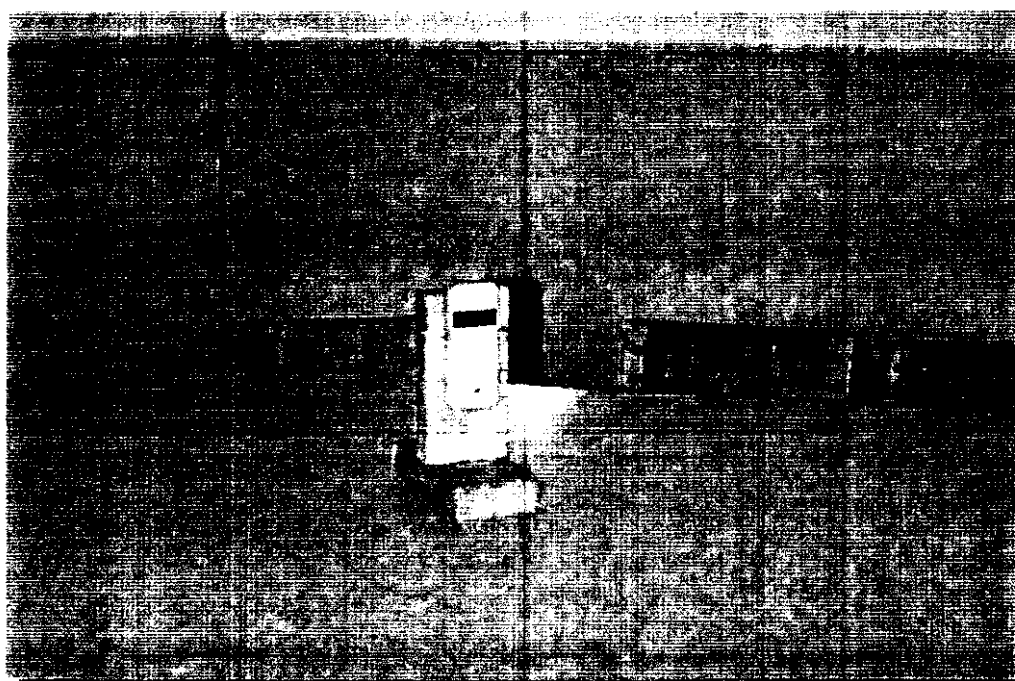
In the case of handheld equipment, the E.U.T. is rotated in three planes to obtain worst-case results.

Test Data - Radiated Emissions

Notes:
B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn. D/P = Dipole
* Re-measured using dipole antenna.
() Denotes failing emission level.
(1) 120 kHz, Q-Peak, (2) 10 kHz Peak (3) 100 kHz RBW, 300 kHz VBW, (4) 300 kHz RBW, 1 MHz VBW,
(5) 1 MHz RBW, 1 MHz VBW, (6) 1 MHz RBW, 10 Hz VBW, (7) 3 MHz RBW, 3 MHz VBW

RADIATED PHOTOGRAPHS (Worst Case)

FRONT VIEW



EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

Section 6. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 15.231(c)
TESTED BY: Tom Tidwell	DATE: May 19, 1998

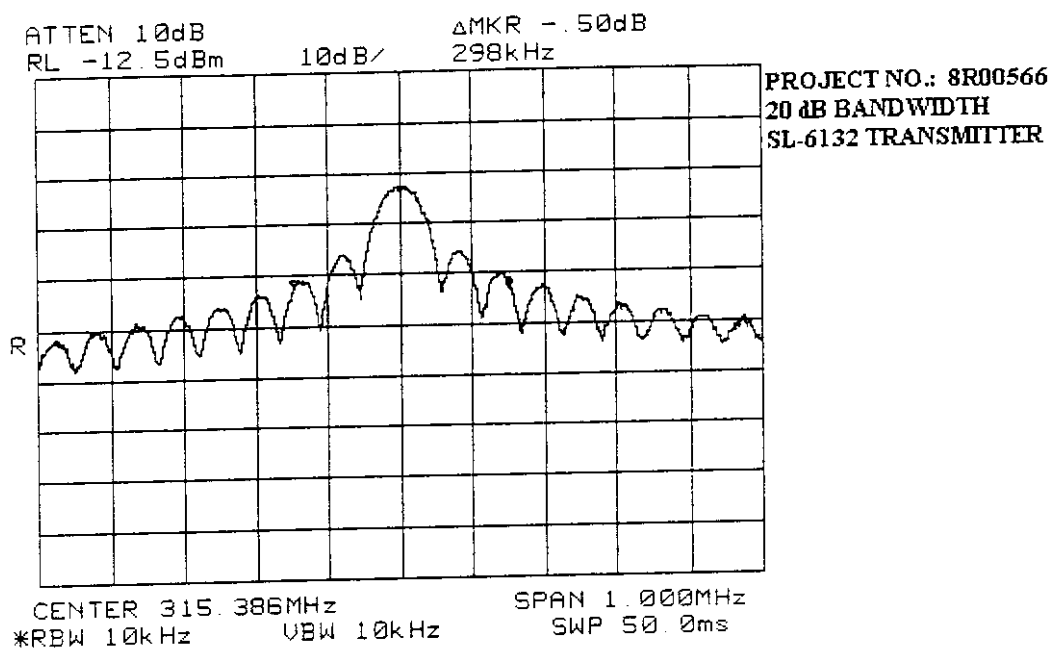
Test Conditions: Test Voltage: 9 Vdc
 Temperature: 25 °C
 Humidity: 37 %

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.

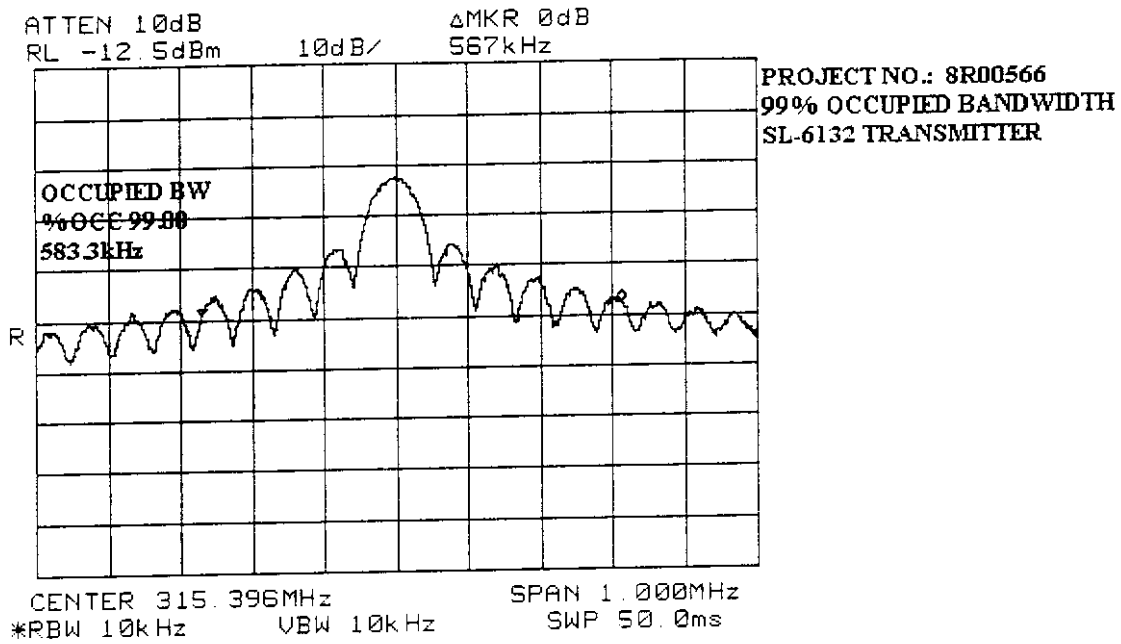
Test Results: Complies. See attached graph.

Test Data: See attached graph.

EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX



EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX



EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

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:

Test Conditions:

Test Voltage: _____ VAC
Temperature: _____ °C
Humidity: _____ %

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 frequency tolerance shall be maintained for a temperature variation of -10 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 25 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.

EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX**Section 8. Periodic Alternate Field Strength Requirements**NAME OF TEST: Periodic Alternate Field Strength Requirements PARA. NO.: 15.231(d)
TESTED BY: DATE:**Test Conditions:**Test Voltage: _____ VAC
Temperature: _____ °C
Humidity: _____ %**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 the field strength table in paragraph (b) of this section is replaced by the following.

Fundamental Frequency (Hz)	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: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

Section 9. Powerline Conducted Emissions

NAME OF TEST: Powerline Conducted Emissions

PARA. NO.: 15.207

TESTED BY:

DATE:

Test Conditions:

Test Voltage: _____ VAC

Temperature: _____ °C

Humidity: _____ %

Minimum Standard:

Frequency(MHz)	Maximum Powerline Conducted RF Voltage	
	μ V	dB μ V
0.45 - 30.0	250	48

Test Results:

Complies/Does Not Comply. 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.

Measurement Data:

[illegible]

NOT APPLICABLE

EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

Conducted Photographs (Worst Case Configuration)

SIDE VIEW

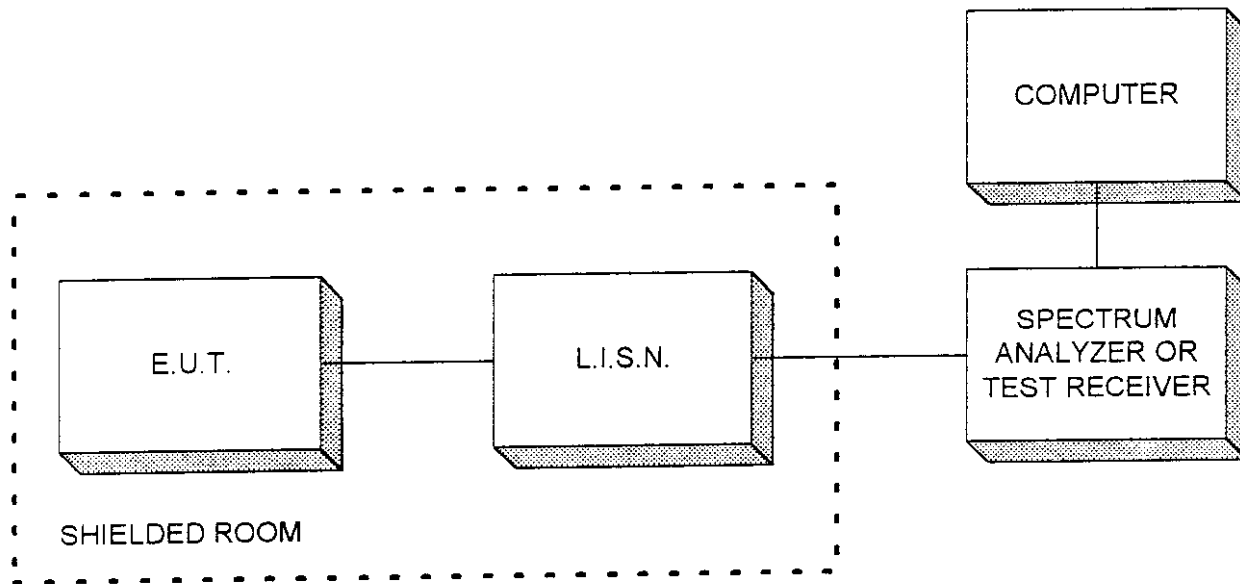
NOT APPLICABLE

FRONT VIEW

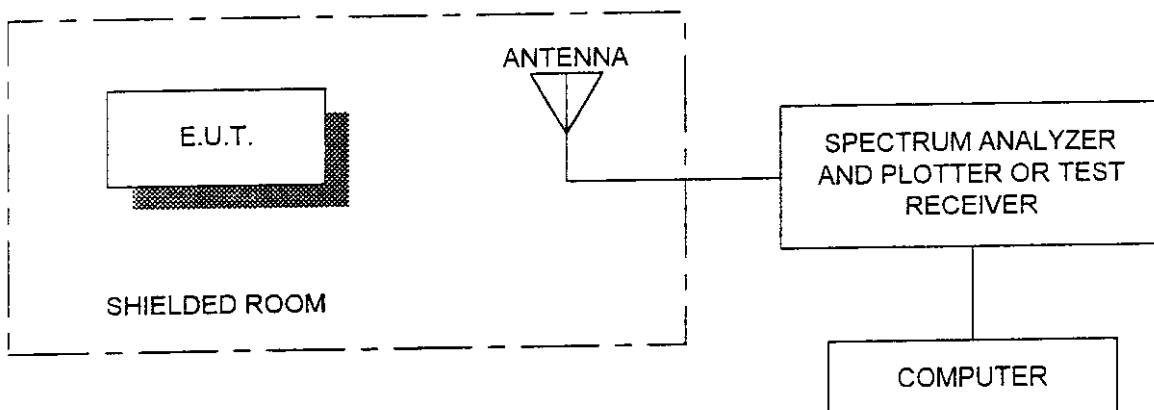
EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

Section 10. Block Diagrams

Conducted Emissions

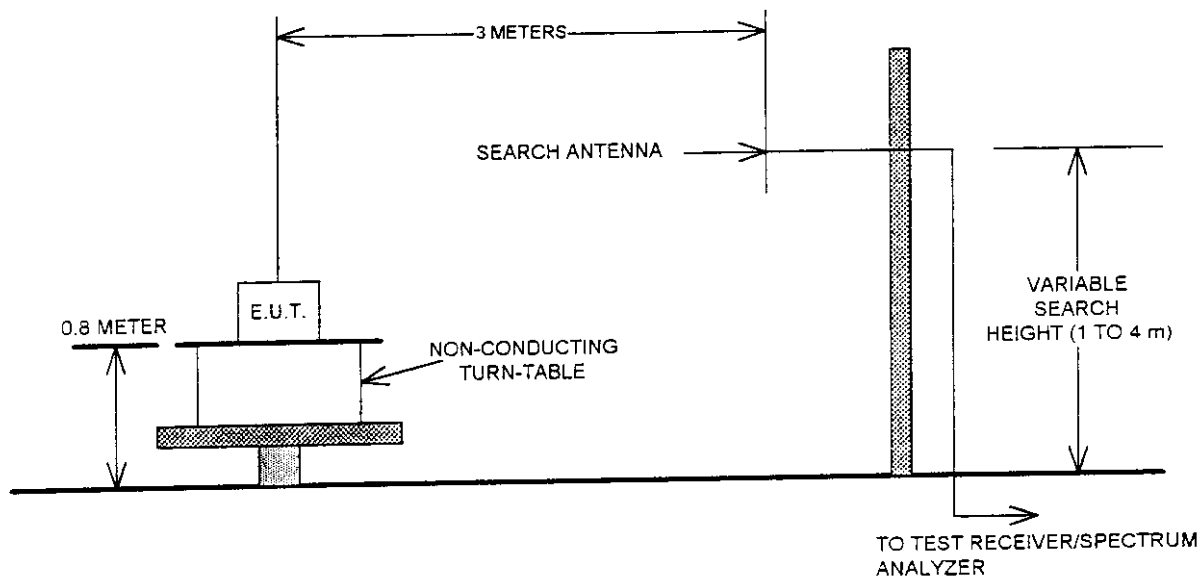


Radiated Prescan



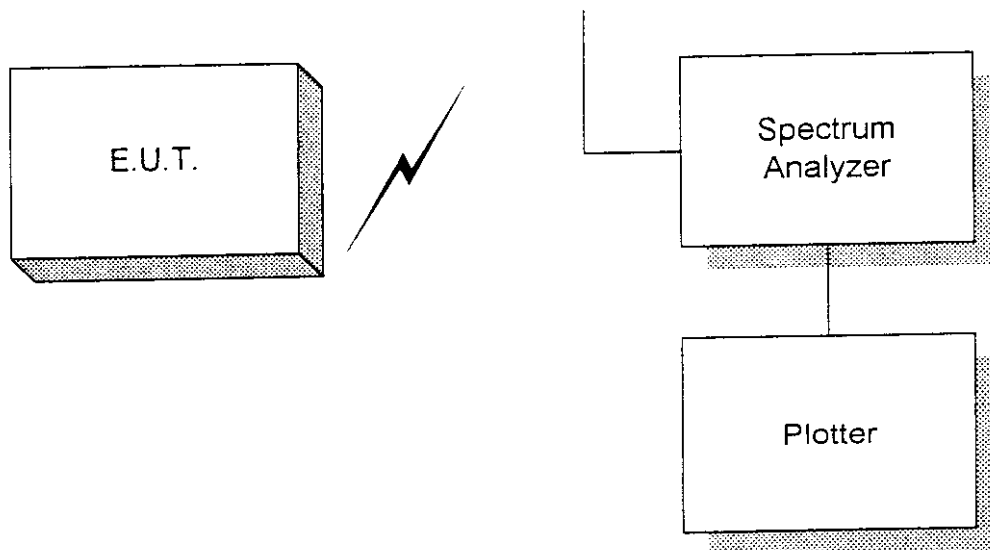
EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

Outdoor Test Site For Radiated Emissions



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

Occupied Bandwidth



EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX**Section 11. Test Equipment List**

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.	
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	865366	Feb. 27/98	Feb. 27/99	
1 Year	Spectrum Analyzer-1	Hewlett Packard	8566B	2311A02238	Sept. 30/97	Sept. 30/98	
1 Year	Spectrum Analyzer-2	Hewlett Packard	8566B	1950A00400	Oct. 3/97	Oct. 3/98	
1 Year	Spectrum Analyzer Display-2	Hewlett Packard	85662A	1950A01177	Oct. 3/97	Oct. 3/98	
1 Year	Quasi Peak Adaptor-2	Hewlett Packard	85650A	2251A00620	Aug. 19/97	Aug. 19/98	
1 Year	Multimeter	Fluke	29	67902059	June 1/97	Jun 1/98	
1 Year	Receiver	Rohde & Schwarz	ESH3	892473/002	July 25/97	July 25/98	
2 Year	Horn Antenna	EMCO #2	3115	4336	Oct. 30/97	Oct. 30/99	
1 Year	Dipole Antenna Set	EMCO	3121C	1029	Oct. 28/97	Oct. 28/98	
1 Year	Biconical (2) Antenna	EMCO	3109	9503-2894	April 24/97	April 24/98	
1 Year	Digital Storage Oscilloscope	Tektronix	TDS544A	B012005	July 24/97	July 24/98	

NA: Not Applicable
NCR: No Cal Required

KTL - Certelec Laboratories Inc.

FCC PART 15, SUBPART C
FOR LOW POWER TRANSMITTERS
PROJECT NO.: 8R00566.1
ANNEX A

EQUIPMENT: SL-6132-TX Transmitter
FCC ID: BJ4-61WRC32TX

ANNEX A
RESTRICTED BANDS

EQUIPMENT: SL-6132-TX Transmitter
*FCC ID: BJ4-61WRC32TX***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			