

ROGERS LABS, INC.

4405 West 259th Terrace
Louisburg, KS 66053
Phone / Fax (913) 837-3214

**ENGINEERING TEST REPORT
FOR
APPLICATION of
GRANT of CERTIFICATION**

**FOR
CFR 47, PART 15C - INTENTIONAL RADIATORS**

For

AMBIENT RECORDING GmbH
Konradinistr. 3
D-81543 Munich Germany
Chris Price,

TIMECODE TRANSMITTER
Model: BBTX915
Frequency 914.5 MHz
FCC ID#: PDZ ACDTXRX915

Test Date: November 16, 2000

Certification Date: November 16, 2000

Certifying Engineer: *Scot D Rogers*

Scot D. Rogers
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FORWARD:

The following is submitted for consideration in obtaining a Grant of Certification for low power intentional radiators per CFR Paragraph 15.249.

Name of Applicant:

AMBIENT RECORDING GmbH
Konradinstr. 3
D-81543 Munich Germany

Model: BBTX915 TIMECODE TRANSMITTER

FCC I.D.: PDZ ACDTXRX915

Frequency Range: 914.5 MHz

Operating Power: Less than 50 mV/m @ 3 Meters (94 dB μ V/m @ 3 meters)

1) Applicable Standards & Test Procedures

a) In accordance with the Federal Communications Code of Federal Regulations, dated October 1, 1999, Part 2, Subpart J, Paragraphs 2.907, 2.911, 2.913, 2.925, 2.926, 2.1031 through 2.1057, and Part 15C Paragraph 15.249 the following is submitted:

b) Test procedures used are the established Methods of Measurement of Radio-Noise Emissions as described in the ANSI 63.4-1992 Document.

2.1033(b) Application for Certification

(1) Manufacturer: AMBIENT RECORDING GMBH
Konradinstr. 3
D-81543 Munich Germany

(2) Identification: Model: BBTX915 TIMECODE TRANSMITTER
FCC I.D.: PDZ ACDTXRX915

(3) Instruction Book:
Refer to Exhibit for Instruction Manual.

(4) Description of Circuit Functions:
Refer to Exhibit for Circuit Description.

(5) Block Diagram with Frequencies:
Refer to Exhibit for Block Diagram.

(6) Report of Measurements:
Follows in this Report.

(7) Photos: Construction, Component Placement, etc.:
Refer to Appendix of this report for Photographs of equipment.

(8) No Peripheral Equipment was Necessary.

(9) Transition Provisions of 15.37 are not being requested.

(10) Direct Sequence Spread Spectrum:
Not Applicable.

(11) Not Applicable. The EUT is not a Scanning Receiver.

(12) Not Applicable. The EUT does not operate in the 59-64
GHz frequency band.

2) Equipment Tested

<u>EUT</u>	<u>FCC I.D.#</u>
BBTX915	PDZ ACDTXRX915

3) Equipment Function and Testing Procedures

The EUT is a 914.5 MHz radio transmitter used to transmit clock data for use in the recording industry. The BBTX915 TIMECODE TRANSMITTER is a wireless link used for time coding recorded information. The unit operates only from nine-volt battery cells and has no provision to connect to utility power. Therefore no powerline conducted emissions measurements were made. The unit was attached to a time code generator for testing purposes and while measuring the maximum output power.

4) Equipment and Cable Configurations

Conducted Emission Test Procedure

The unit operates only from nine-volt battery cells and has no provision to connect to utility power. Therefore no powerline conducted emissions measurements were made.

Radiated Emission Test Procedure:

The EUT was placed on a rotatable 1 x 1.5-meter wooden platform, 0.8 meters above the ground plane at a distance of 3 meters from the FSM antenna. EMI energy was maximized by equipment placement, raising and lowering the FSM antenna, changing the antenna polarization, and by rotating the

turntable. Each emission was maximized before data was taken using a spectrum analyzer. Refer to photos in Appendix for EUT placement.

5) List of Test Equipment

A Hewlett Packard 8591EM Spectrum Analyzer was used as the measuring device for the emissions testing of frequencies below 1 GHz. A Hewlett Packard 8562A Spectrum Analyzer was used as the measuring device for testing the emissions at frequencies above 1 GHz. The analyzer settings used are described in the following table. Refer to Appendix for a complete list of Test Equipment.

HP 8591 EM ANALYZER SETTINGS		
CONDUCTED EMISSIONS:		
RBW	AVG. BW	DETECTOR FUNCTION
9 kHz	30 kHz	Peak / Quasi Peak
RADIATED EMISSIONS:		
RBW	AVG. BW	DETECTOR FUNCTION
120 kHz	300 kHz	Peak / Quasi Peak
HP 8562A ANALYZER SETTINGS		
RBW	VIDEO BW	DETECTOR FUNCTION
100 kHz	100 kHz	PEAK
1 MHz	1 MHz	Peak / Average

<u>EQUIPMENT</u>	<u>MFG.</u>	<u>MODEL</u>	<u>CAL. DATES</u>	<u>DUEDATE</u>
LISN	Comp. Design	1762	10/00	10/01
Antenna	ARA	BCD-235-B	10/00	10/01
Antenna	EMCO	3147	10/00	10/01
Antenna	EMCO	3143	4/00	4/01
Analyzer	HP	8591EM	7/00	7/01

6) Units of Measurements

Conducted EMI: Data is in dB μ V; dB referenced to one microvolt.

Radiated EMI: Data is in dB μ V/m; dB/m referenced to one microvolt per meter.

7) Test Site Locations

Conducted EMI: The AC powerline conducted emissions tests were performed in a shielded screen room located at Rogers Labs, Inc., 4405 W. 259th Terrace, Louisburg, KS.

Radiated EMI: The radiated emissions tests were performed at Rogers Labs, Inc. 3 meters Open Area Test Site (OATS).

Site Approval: Refer to Appendix for FCC Site Approval Letter, Reference 31040/SIT 1300F2, Dated February 6, 1998.

8) SUBPART B – UNINTENTIONAL RADIATORS

Conducted EMI

The unit operates only from nine-volt battery cells and has no provision to connect to utility power. Therefore no powerline conducted emissions measurements were made.

Radiated EMI

The EUT was arranged in a typical equipment configuration and operated through all of its various modes. Preliminary testing was performed in a screen room with the EUT

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Phone/Fax: (913) 837-3214

Ambient Recording GmbH

MODEL: Timecode Transmitter

Test #: 001113

FCCID#: PDZ ACDTXRX915

Test to: FCC Parts 2 and 15c

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positioned 1 meter from the FSM. Radiated emissions measurements were performed to identify the frequencies, which produced the highest emissions. Plots were made of the frequency spectrum from 30 MHz to 1000 MHz for the preliminary testing. The highest radiated emission was then re-maximized at this location before final radiated emissions measurements were performed. Final data was taken with the EUT located at the OATS at a distance of 3 meters between the EUT and the receiving antenna. The frequency spectrum from 30 MHz to 10,000 MHz was searched for radiated emissions. Measured emission levels were maximized by EUT placement on the table, rotating the turntable through 360 degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna position between horizontal and vertical polarization. Antennas used were Broadband Biconical from 30 to 200 MHz, Log Periodic from 200 MHz to 5 GHz and or a Biconilog from 30 to 1000 MHz, and pyramidal horns and or mixers from 4 GHz to 10 GHz, notch filters and appropriate amplifiers.

Sample Calculations:

RFS = Radiated Field Strength

$\text{dB}\mu\text{V}/\text{m} @ 3\text{m} = \text{dB}\mu\text{V} + \text{A.F.} - \text{Amplifier Gain}$

$\text{dB}\mu\text{V}/\text{m} @ 3\text{m} = 45.4 + 5.2 - 35$

$= 15.6$

Data: Conducted (6 Highest Emissions)

Frequency In MHz	Level L1 In dB μ V	Level L2 in dB μ V	FCC Limit in dB μ V
N/A	N/A	N/A	48.0

The EUT is battery power, therefore no conducted emissions testing was performed.

Data: General Radiated (6 Highest Emissions)

Frequency in MHz	FSM Horz. (dB μ V)	FSM Vert. (dB μ V)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dB μ V/m)	RFS Vert. @ 3m (dB μ V/m)	FCC Class B Limit @ 3m (dB μ V/m)
60.0	45.4	48.9	5.2	35	15.6	19.1	40.0
64.1	38.3	48.4	6.2	35	9.5	19.6	40.0
111.0	33.4	36.5	7.1	35	5.5	8.6	40.0
114.0	38.4	36.2	6.8	35	10.2	8.0	40.0
116.0	35.3	36.5	6.8	35	7.1	8.3	40.0
118.0	32.8	35.3	6.9	35	4.7	7.2	40.0

Other emissions present had amplitudes at least 10 dB below the limit.

Summary of Results for Conducted Emissions

The EUT is battery operated and requires no conducted emissions testing. The conducted emissions for the EUT meet the requirements for FCC Part 15B CLASS B Digital Devices.

Summary of Results for Radiated Emissions

The radiated emissions for the EUT meet the requirements for FCC Part 15B CLASS B Digital Devices. The EUT had a 20.4 dB minimum margin below the limit. Other emissions were present with amplitudes at least 20 dB below the limit.

Statement of Modifications

No modifications to the EUT were required for the unit to meet the FCC Part 15B CLASS B emissions standards. There were no deviations to the specifications.

9) Subpart C - Intentional Radiators

As per CFR Part 15, Subpart C, paragraph 15.249 the following information is submitted.

15.203 Antenna Requirements

The unit is produced with a permanently attached one-quarter wave length antenna. The antenna is not replaceable or user serviceable. The requirements of 15.203 are met; there are no deviations or exceptions to the specification.

Restricted Bands of Operation Per 15.205

Spurious emissions falling in the restricted frequency bands of operation were measured at the OATS. The EUT utilizes frequency, determining circuitry, which generates harmonics falling in the restricted bands. Emissions were checked at the OATS, using appropriate antennas or pyramidal horns, amplification stages, and a spectrum analyzer. No other significant emission was observed which fell into the restricted bands of operation.

Sample Calculations:

$$\begin{aligned} \text{RFS (dB}\mu\text{V/m @ 3m)} &= \text{FSM(dB}\mu\text{V)} + \text{A.F. (dB)} - \text{Gain(dB)} \\ &= 30.5 + 29.9 - 25 \\ &= 35.4 \end{aligned}$$

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Test to: FCC Parts 2 and 15c

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Data 15.205**Radiated Emissions In Restricted Bands:**

Emission Frequency (MHz)	FSM Horz. (dB μ V)	FSM Vert. (dB μ V)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dB μ V/m)	RFS Vert. @ 3m (dB μ V/m)	Limit @ 3m (dB μ V/m)
2743.5	30.5	30.5	29.9	25	35.4	35.4	54
3658.0	32.5	31.8	37.0	25	44.5	43.8	54
4572.5	31.8	31.5	41.0	25	47.8	47.5	54

No other emissions found in the restricted bands.

15.209 Radiated Emissions Limits; General Requirements**Radiated EMI**

The EUT was arranged in a typical equipment configuration and operated through all of its various modes. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Radiated emissions measurements were performed to identify the frequencies, which produced the highest emissions. Emissions checked in the screen room from 30 to 10,000 MHz and plots were made of the frequency spectrum from 30 MHz to 1000 MHz for the preliminary testing. The highest radiated emission was then re-maximized at this location before final radiated emissions measurements were performed. Final data was taken with the EUT located at the open field test site at a distance of 3 meters between the EUT and the receiving antenna. The frequency spectrum from 30 MHz to 10,000 MHz was searched for radiated emissions. Measured emission levels were maximized by EUT placement on the table, rotating the turntable through

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360 degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna polarization between horizontal and vertical. Antennas used were Broadband Biconical from 30 MHz to 200 MHz, Log Periodic from 200 MHz to 5 GHz, Biconilog from 30 MHz to 1000 MHz, and/or Pyramidal Horns from 4 GHz to 10 GHz.

Sample Calculations:

RFS = Radiated Field Strength

$\text{dB}\mu\text{V}/\text{m} @ 3\text{m} = \text{dB}\mu\text{V} + \text{A.F.} - \text{Amplifier Gain}$

$$\begin{aligned}\text{dB}\mu\text{V}/\text{m} @ 3\text{m} &= 45.4 + 5.2 - 35 \\ &= 15.6\end{aligned}$$

Data 15.209:

General Radiated (6 Highest Emissions):

Frequency in MHz	FSM Horz. (dB μ V)	FSM Vert. (dB μ V)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dB μ V/m)	RFS Vert. @ 3m (dB μ V/m)	FCC Class B Limit @ 3m (dB μ V/m)
60.0	45.4	48.9	5.2	35	15.6	19.1	40.0
64.1	38.3	48.4	6.2	35	9.5	19.6	40.0
111.0	33.4	36.5	7.1	35	5.5	8.6	40.0
114.0	38.4	36.2	6.8	35	10.2	8.0	40.0
116.0	35.3	36.5	6.8	35	7.1	8.3	40.0
118.0	32.8	35.3	6.9	35	4.7	7.2	40.0

Other emissions present had amplitudes at least 10 dB below the limit.

Summary of Results for Radiated Emissions:

The radiated emissions for the EUT meet the requirements for FCC Part 15C Intentional Radiators. The EUT had a 20.4 dB minimum margin below the limits. Other emissions were present with amplitudes at least 10 dB below the FCC Limits.

15.249 Operation in the Band 902-928 MHz

The power output was measured on an open field test site @ 3 meters. Data was taken per Paragraph 2.1046(a) and 15.249.

(a) The EUT was placed on a wooden turntable 0.8 meters above the ground plane and at a distance of 3 meters from the FSM antenna. The amplitude of the carrier frequency was measured using a spectrum analyzer. The amplitude of the emission was then recorded from the analyzer display.

(b) Emissions radiated outside of the specified bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in 15.209, whichever is the lesser attenuation. The amplitudes of each spurious emission were measured at a distance of 3 meters from the FSM antenna at the OATS. The amplitude of each spurious emission was maximized by varying the FSM antenna height, polarization, and by rotating the turntable. A Biconilog Antenna was used for measuring emissions from 30 to 1000 MHz, a Log Periodic

Antenna for 200 to 5000 MHz, Pyramidal Horn Antennas from 4 GHz to 10 GHz. Emissions were measured in dB μ V/m @ 3 meters.

Sample calculation.

$$\begin{aligned} \text{dB}\mu\text{V/m} @ 3\text{m} &= \text{FSM} + \text{A.F.} & \mu\text{V/M} &= 10^{(\text{dB}\mu\text{V/M})/20} \\ &= 70.2 + 23.2 & &= 46,773.5 \\ &= 93.4 \end{aligned}$$

Emission Frequency (MHz)	FSM Horz. (dB μ V)	FSM Vert. (dB μ V)	Ant. Factor (dB)	Amp. Gain (dB)	RFS Horz. @ 3m (dB μ V/m)	RFS Vert. @ 3m (dB μ V/m)	Limit @ 3m (dB μ V/m)
914.5	70.2	65.5	23.2	0	93.4	88.7	94
1829.0	42.0	31.3	29.4	25	46.4	35.7	54
2743.5	30.5	30.5	29.9	25	35.4	35.4	54
3658.0	32.5	31.8	37.0	25	44.5	43.8	54
4572.5	31.8	31.5	41.0	25	47.8	47.5	54

Note: Level was measured @ 3 meter site.

Refer to Figures showing plots taken in the screen room from the spectrum analyzer at a distance of 1 meter. The 902 and 928 MHz band edges are protected due to the 914.5 MHz frequency of operation.

ACTV DET: PEAK
MEAS DET: PEAK QP
MKR 118.5 MHz
26.17 dB μ V

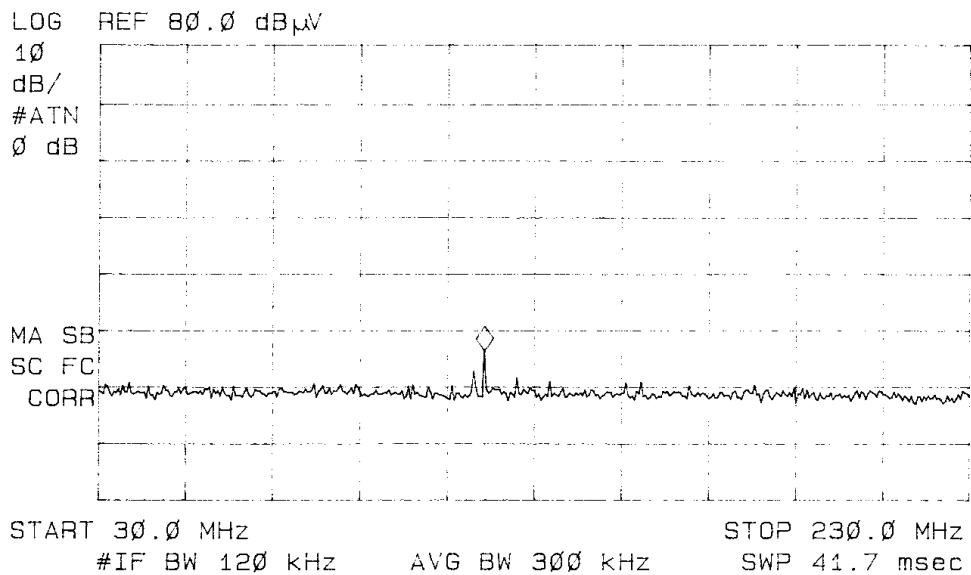


Figure 1 Emissions @ 1 Meter in Screen Room

REF LEVEL ACTV DET: PEAK
9Ø.Ø dBµV MEAS DET: PEAK QP
MKR 915 MHz
77.17 dBµV

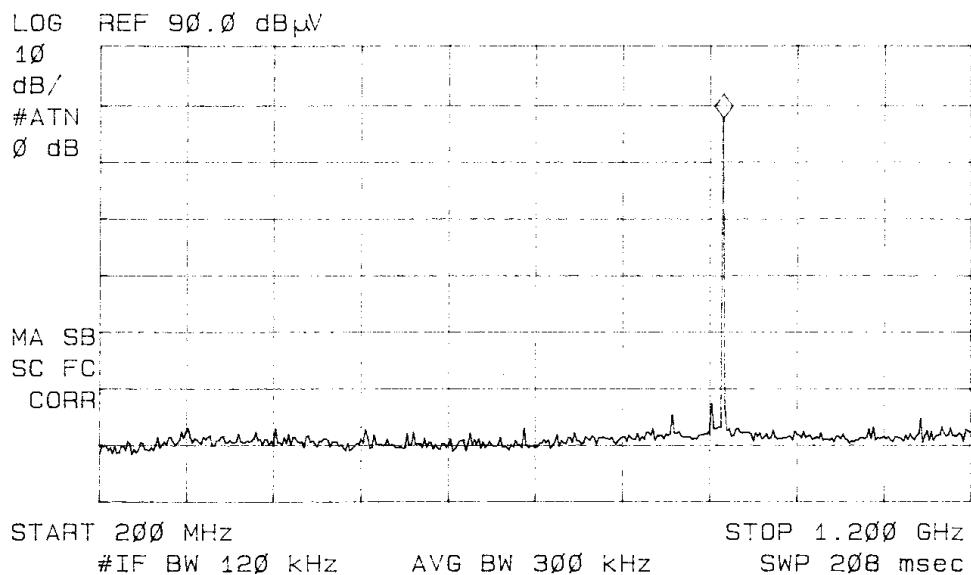


Figure 2 Emissions @ 1 Meter in Screen Room

MARKER
914.61 MHz
70.36 dB μ V

ACTV DET: PEAK
MEAS DET: PEAK QP
MKR 914.61 MHz
70.36 dB μ V

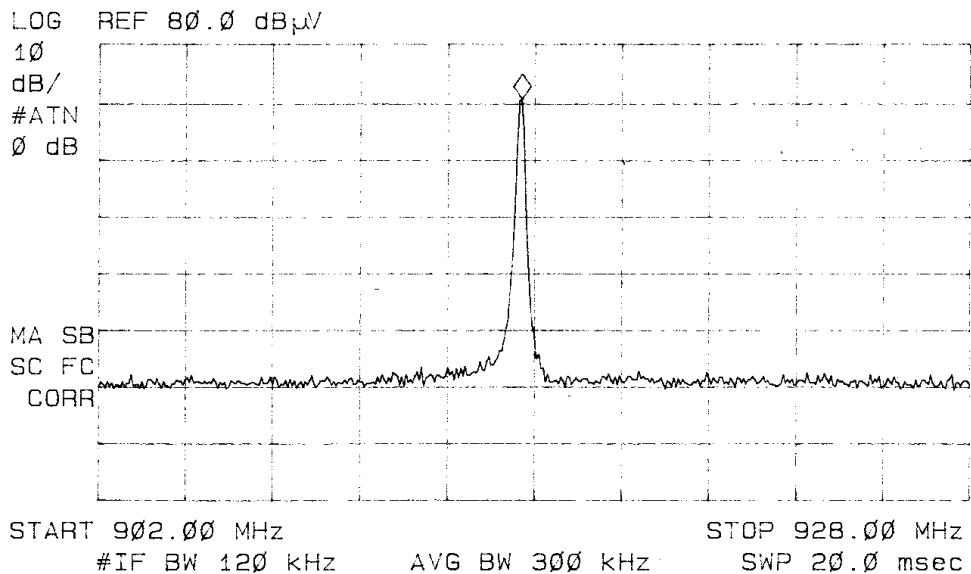


Figure 3 Emissions @ 1 Meter in Screen Room

Radiated Emissions of Intentional Radiator

The EUT had a 0.6 dB margin below the limit at the fundamental frequency of operation and 6.2 dB margin below the limit for the harmonic emissions. The radiated emissions for the EUT meet the requirements for FCC Part 15C Intentional Radiators. There are no measurable emissions in the restricted bands other than those recorded in this report. Other emissions were present with amplitudes at least 10 dB below the FCC Limits. The specification of 15.249 are met, there are no deviations or exceptions to the requirements.

Statement of Modifications

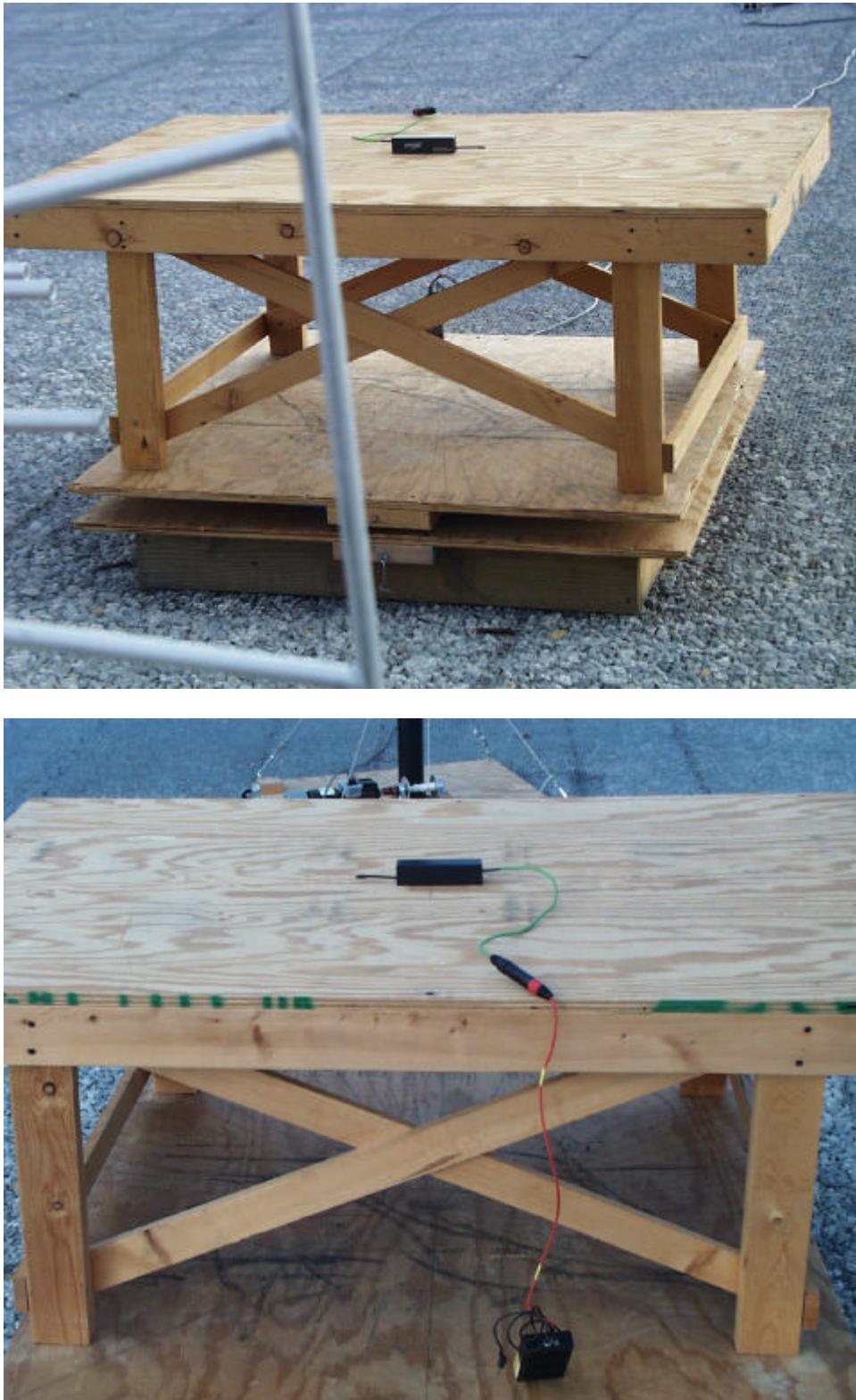
No modifications to the EUT were required for the unit to meet the FCC Part 15B CLASS B emissions standards. There were no deviations to the specifications.

APPENDIX

Model: BBTX915 TIMECODE TRANSMITTER

1. Photos of Radiated Emissions Test Set Up
2. Photos of Case Front and Back
3. Photo Inside of Case
4. Photos RF PC Board
5. Photo FCC ID Label Location
6. Rogers Qualifications
8. Test Equipment List
9. FCC Site Approval Letter

AMBIENT RECORDING GmbH
MODEL: TIMECODE TRANSMITTER
PHOTOS OF RADIATED EMISSIONS TEST SET UP



ROGERS LABS, INC.
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AMBIENT RECORDING GmbH
MODEL: TIMECODE TRANSMITTER
PHOTOS OF CASE FRONT AND BACK



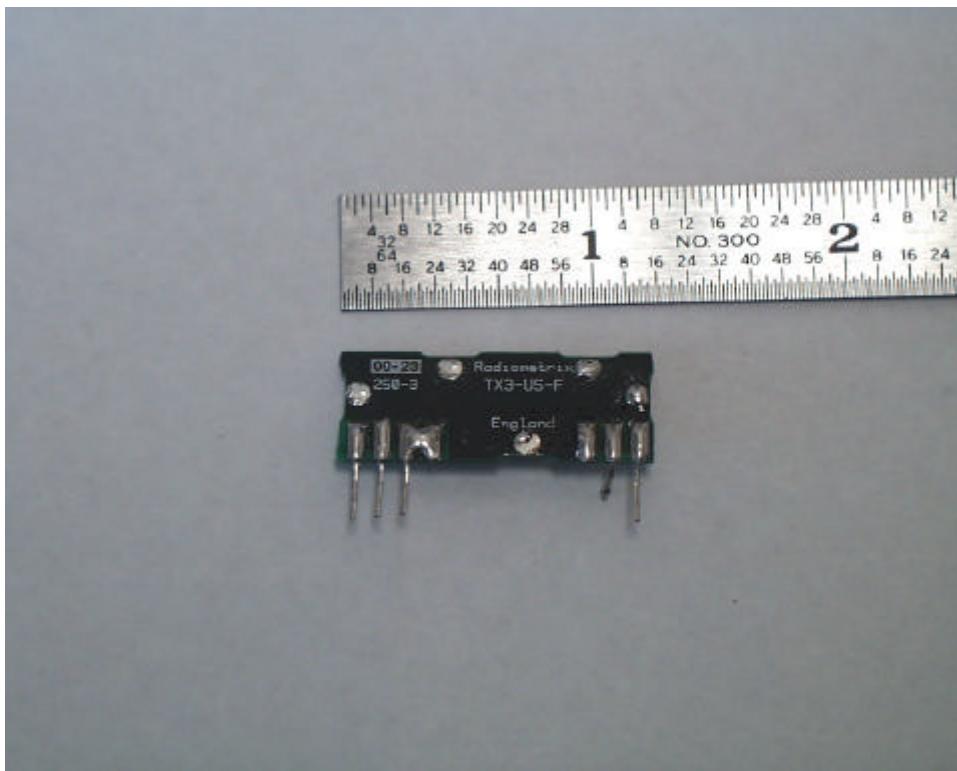
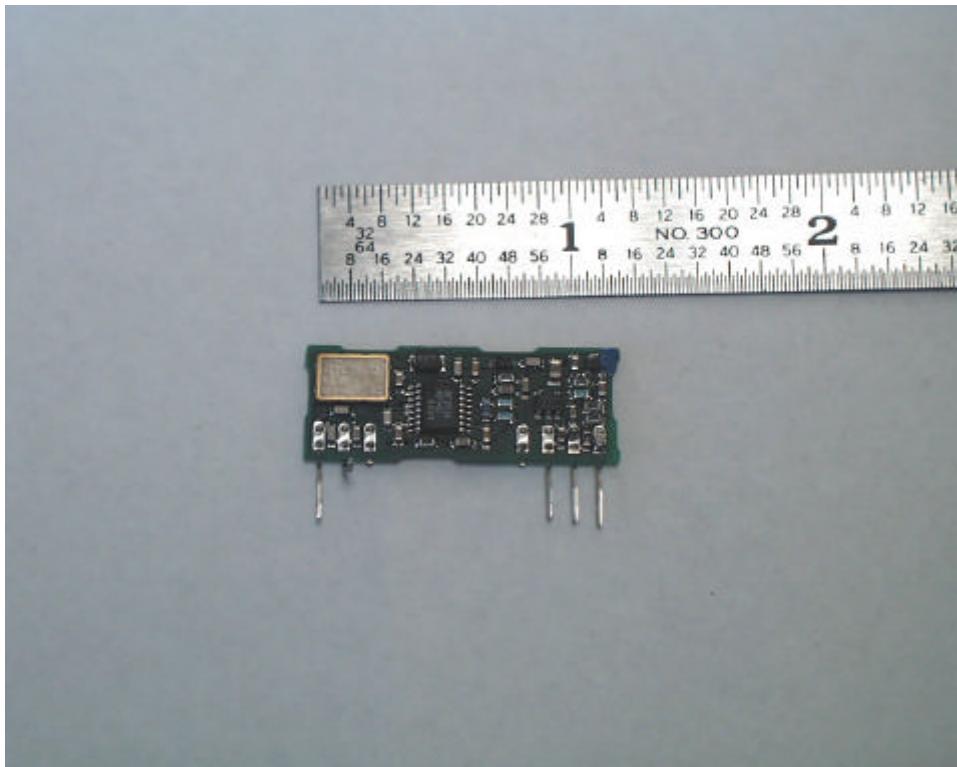
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AMBIENT RECORDING GmbH
MODEL: TIMECODE TRANSMITTER
PHOTO OF INSIDE CASE



AMBIENT RECORDING GMBH
MODEL: TIMECODE TRANSMITTER
PHOTOS OF RF PC BOARD



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AMBIENT RECORDING GMBH
MODEL: TIMECODE TRANSMITTER
PHOTO FCC ID LABEL LOCATION and LABEL



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TEST EQUIPMENT LIST FOR ROGERS LABS, INC.

The test equipment used is maintained in calibration and good operating condition. Use of this calibrated equipment ensures measurements are traceable to national standards.

<u>List of Test Equipment:</u>	<u>Calibration Date:</u>
Scope: Tektronix 2230	2/00
Wattmeter: Bird 43 with Load Bird 8085	2/00
Power Supplies: Sorensen SRL 20-25, SRL 40-25, DCR 150, DCR 140	2/00
H/V Power Supply: Fluke Model: 408B (SN: 573)	2/00
R.F. Generator: HP 606A	2/00
R.F. Generator: HP 8614A	2/00
R.F. Generator: HP 8640B	2/00
Spectrum Analyzer: HP 8562A,	2/00
Mixers: 11517A, 11970A, 11970K, 11970U, 11970V, 11970W	
HP Adapters: 11518, 11519, 11520	
Spectrum Analyzer: HP 8591 EM	7/00
Frequency Counter: Leader LDC 825	2/00
Antenna: EMCO Biconilog Model: 3143	4/00
Antenna: EMCO Log Periodic Model: 3147	10/00
Antenna: Antenna Research Biconical Model: BCD 235	10/00
Antenna: EMCO Dipole Set 3121C	2/00
Antenna: C.D. B-100	2/00
Antenna: Solar 9229-1 & 9230-1	2/00
Antenna: EMCO 6509	2/00
Audio Oscillator: H.P. 200CD	2/00
R.F. Power Amp 65W Model: 470-A-1000	2/00
R.F. Power Amp 50W M185- 10-500	2/00
R.F. PreAmp CPPA-102	2/00
Shielded Room 5 M x 3 M x 3.0 M (100 dB Integrity)	
LISN 50 µHy/50 ohm/0.1 µf	10/00
LISN Compliance Eng. 240/20	2/00
Peavey Power Amp Model: IPS 800	2/00
Power Amp A.R. Model: 10W 1000M7	2/00
Power Amp EIN Model: A300	2/00
ELGAR Model: 1751	2/00
ELGAR Model: TG 704A-3D	2/00
ESD Test Set 2000i	10/95
Fast Transient Burst Generator Model: EFT/B-100	10/95
Current Probe: Singer CP-105	2/00
Current Probe: Solar 9108-1N	2/00
Field Intensity Meter: EFM-018	10/95
KETEK Ecat Surge Generator	10/99

RETER
11/01/2000

QUALIFICATIONS

of

SCOT D. ROGERS, ENGINEER

ROGERS LABS, INC.

Mr. Rogers has approximately 13 years experience in the field of electronics. Six years working in the automated controls industry and 6 years working with the design, development and testing of radio communications and electronic equipment.

POSITIONS HELD:

Systems Engineer: A/C Controls Mfg. Co., Inc.
6 Years

Electrical Engineer: Rogers Consulting Labs, Inc.
5 Years

Electrical Engineer: Rogers Labs, Inc.
 Current

EDUCATIONAL BACKGROUND:

- 1) Bachelor of Science Degree in Electrical Engineering from Kansas State University.
- 2) Bachelor of Science Degree in Business Administration Kansas State University.
- 3) Several Specialized Training courses and seminars pertaining to Microprocessors and Software programming.

Scot D Rogers
Scot D. Rogers

December 8, 2000
Date

1/11/00

FEDERAL COMMUNICATIONS COMMISSION

7435 Oakland Mills Road
Columbia, MD 21046
Telephone: 301-725-1585 (ext-218)
Facsimile: 301-344-2050

February 6, 1998

IN REPLY REFER TO
31040/SIT
1300F2

Rogers Labs, Inc.
4405 West 259th Terrace
Louisburg, KS 66053

Attention: **Scot D. Rogers**

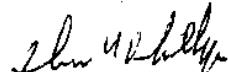
Re: Measurement facility located at above address
(3 and 10 meter site)

Gentlemen:

Your submission of the description of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The description has, therefore, been placed on file and the name of your organization added to the Commission's list of facilities whose measurement data will be accepted in conjunction with applications for certification or notification under Parts 15 or 18 of the Commission's Rules. Our list will also indicate that the facility complies with the radiated and AC line conducted test site criteria in ANSI C63.4-1992. Please note that this filing must be updated for any changes made to the facility, and at least every three years the data on file must be certified as current.

Per your request, the above mentioned facility has been also added to our list of those who perform these measurement services for the public on a fee basis. This list is updated monthly and is available on the Laboratory's Public Access Link (PAL) at 301-725-1072, and also on the Internet at the FCC Website www.fcc.gov/oet/info/database/testsite/.

Sincerely,



Thomas W. Phillips
Electronics Engineer
Customer Service Branch

ROGERS LABS, INC.	Ambient Recording GmbH
4405 W. 259th Terrace	MODEL: Timecode Transmitter
Louisburg, KS 66053	Test #: 001113
Phone/Fax: (913) 837-3214	FCCID#: PDZ ACDTXRX915
	Test to: FCC Parts 2 and 15c
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