FCC PART 15, SUBPART C
TEST REPORT

for

902-928 MHz FM STEREO TRANSMITTER MODULE
Model: xTV-9T
FCC ID: P98-TX902

Prepared for

ENERCISE, INC.
3835-R E. THOUSAND OAKS BLVD. #307
WESTLAKE VILLAGE, CA 91362

Prepared by: 

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Approved by: 

RUBY A. HALL

COMPATIBLE ELECTRONICS INC.
2337 TROUTDALE DRIVE
AGOURA, CALIFORNIA 91301
(818) 597-0600

DATE: APRIL 3, 2002

	REPORT BODY	APPENDICES					TOTAL
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GENERAL REPORT SUMMARY

This electromagnetic emission report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form except in full, without the written permission of Compatible Electronics.

This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Device Tested: 902-928 MHz FM Stereo Transmitter Module
Model: xTV-9T
S/N: None

Product Description: This is an FM Stereo Transmitter Module.

Modifications: The EUT was modified in order to meet the specifications. Please see list located in Appendix B.

Manufacturer: Enercise, Inc.
3835-R E. Thousand Oaks Blvd. #307
Westlake Village, CA 91362

Test Dates: March 19, 20 & 26, 2002

Test Specifications: EMI requirements
FCC CFR Title 47, Part 15 Subpart C
Test Procedure: ANSI C63.4: 1992.

Test Deviations: The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 450 kHz - 30 MHz.	Complies with the limits of FCC CFR Title 47, Part 15 Subpart C 15.207 *Highest reading = 35.60 dBuV with (a combined uncertainty of) u_c = 0.27 dB
2	Radiated RF Emissions, 4 MHz - 9230 MHz.	Complies with the limits of FCC CFR Title 47, Part 15 Subpart C 15.205, 15.209 and 15.249. *Highest reading = 67.60 dBuV with (a combined uncertainty of) u_c = 1.33 dB

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the 902-928 MHz FM Stereo Transmitter Module Model: xTV-9T. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 1992. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined in FCC CFR Title 47, Subpart C 15.205, 15.207, 15.209 and 15.249.

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 2337 Troutdale Drive, Agoura, California 91301.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Enercise, Inc.

Tony Garcia	President

Compatible Electronics Inc.

Andre D. Khan	Test Technician
Joey J. Madlangbayan	Test Engineer
Ruby A. Hall	Lab Manager

2.4 Date Test Sample was Received

The test sample was received on March 19, 2002.

2.5 Disposition of the Test Sample

The test sample remains at Compatible Electronics, Inc.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

SPEC	TITLE
FCC CFR Title 47, Part 15 Subpart C.	FCC Rules – Intentional Radiators.
CISPR 16 1993	Specification for radio disturbance and immunity measuring apparatus and methods.
ANSI C63.4 1992	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration - EMI

The EUT was set-up in a tabletop configuration. An external audio signal was connected to the base module, which fed its signal to the EUT. The EUT was continuously transmitting throughout the test.

The highest emissions were found when the EUT was running in the above configuration. The cables were moved to maximize the emissions. The final radiated and conducted data was taken in this mode of operation. All initial investigations were performed with the spectrum analyzer in manual mode scanning the frequency range continuously. The cables were bundled and routed as shown in the photographs in Appendix D.

4.1.1 Photograph of Test Configuration - EMI

4.1.2 Cable Construction and Termination

Cable 1 This is a 2 meter standard RCA cable that connects the CD Player to the Base Module of the EUT. There is a ¼" stereo phone plug at the CD Player end and two RCA plugs at the Base module end. The cable was bundled to a length of 1 meter.

Cable 2 This is a 2 meter coax cable that connects the Transmitter Module to the Base Module of the EUT. It was used for testing proposes only to separate the individual modules. The cable was bundled to a length of 1 meter.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

#	EQUIPMENT TYPE	MANUFACTURER	MODEL	SERIAL NUMBER
1	902-928 MHz FM STEREO TRANSMITTER MODULE (EUT)	ENERCISE, INC.	xTV-9T	NONE FCC ID: P98-TX902
2	CD PLAYER	JVC	XL-P84CR	123M2777
	AC ADAPTER (EUT)	RADIO SHACK	CAT. NO. 273-1773	NONE
	AC ADAPTER (CD PLAYER)	RADIO SHACK	CAT. NO. 273-1757	NONE

5.2 EMI Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Spectrum Analyzer	Hewlett Packard	8566A	1904A00188	Jan. 28, 2002	Jan. 28, 2003
Quasi-Peak Adapter	Hewlett Packard	85650A	2043A00276	Jan. 28, 2002	Jan. 28, 2003
Transient Limiter	Com Power	HZ560	Asset# 3549	Feb. 07, 2002	Feb. 07, 2003
LISN	Com Power	LI-215	12037	Oct. 30, 2001	Oct. 30, 2002
LISN (Accessory)	Com Power	LI-115	02030	Oct. 30, 2001	Oct. 30, 2002
Preamplifier	Com Power	PA-102	01249	Apr. 06, 2001	Apr. 06, 2002
Biconical Antenna	Com Power	AB-100	01535	Apr. 02, 2001	Apr. 02, 2002
Log Periodic Antenna	Com Power	AL-100	A101	Apr. 06, 2001	Apr. 06, 2002
Horn Antenna	A. R. A.	DRG 118/A	1015	Dec. 18, 2001	Dec. 18, 2002
Microwave Amplifier	Com Power	PA-122	25137	Apr. 25, 2001	Apr. 25, 2002
Antenna Mast	Com Power	AM-400	N/A	N/A	N/A
Turntable	Com Power	TT-106A	N/A	N/A	N/A
Computer	Hewlett Packard	Pavilion 4530	US91912022	N/A	N/A
Printer	Hewlett Packard	C6427B	MY066160TW	N/A	N/A
(Software) Radiated Emissions Transmitter Data Program	Compatible Electronics	DOC No: EMI_PART15TX-B-0-50	Rev. A	N/A	N/A
(Software) Conducted Emissions Program	Compatible Electronics	SR21	Version 2.1	N/A	N/A
(Software) Radiated Emissions Data Capture Program	Compatible Electronics	None	Version 2.0	N/A	N/A

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 7.1.2 of this report for EMI test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.

7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1 RF Emissions

7.1.1 Conducted Emissions Test

The Spectrum Analyzer was used as a measuring meter along with the quasi-peak adapter. The data was collected with the Spectrum Analyzer in the peak detect mode with the "Max Hold" feature activated. The quasi-peak was used only where indicated in the data sheets. A 10 dB attenuation pad was used for the protection of the Spectrum Analyzer input stage, and the Spectrum Analyzer offset was adjusted accordingly to read the actual data measured. The LISN output was read by the Spectrum Analyzer. The output of the second LISN was terminated by a 50 ohm termination. The effective measurement bandwidth used for the conducted emissions test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4: 1992. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The initial test data was taken in manual mode while scanning the frequency ranges of 0.45 MHz to 1.6 MHz, 1.6 MHz to 5 MHz and 5 MHz to 30 MHz. The conducted emissions from the EUT were maximized for operating mode as well as cable placement. Once a predominant frequency (within 12 dB of the limit) was found, it was more closely examined with the spectrum analyzer span adjusted to 1 MHz.

The final data was collected under program control by the computer in several overlapping sweeps by running the Spectrum Analyzer at a minimum scan rate of 10 seconds per octave. The final test data is located in Appendix E.

7.1.2 Radiated Emissions Test

The spectrum analyzer was used as a measuring meter along with a quasi-peak adapter. A Preamplifier was used to increase the sensitivity of the instrument. The Spectrum Analyzer was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps. This final reading is then recorded into the a Computer data recording program, which takes into account the cable loss, amplifier gain and antenna factors, so that a true reading is compared to the true limit. The quasi-peak was used only for those readings, which are marked accordingly on the data sheets. The effective measurement bandwidth used for the radiated emissions test was 120 kHz.

Broadband biconical, log periodic and horn antennas were used as transducers during the measurement. The biconical antenna was used from 30 MHz to 300 MHz, the log periodic antenna was used from 300 MHz to 1 GHz and the horn antenna was used from 1 GHz to 9.230 GHz. The frequency spans were wide (30 MHz to 88 MHz, 88 MHz to 216 MHz, 216 to 300 MHz, 300 MHz to 1 GHz and 1 GHz to 9.230 GHz) during preliminary investigations. The final data was taken with a frequency span of 1 MHz. Furthermore, the frequency span was reduced during the preliminary investigations as deemed necessary.

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4: 1992. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength).

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a test distance of 3 meters to obtain final test data. The final automated and manual emissions are listed in Appendix E.

7.1.3 RF Emissions Test Results

The fundamental and up to the 10th harmonic emissions are within the specifications.

ENERCISE, INC.
902-928 MHz FM Stereo Transmitter Module

RADIATED EMISSIONS – SPURIOUS

The Frequency Band from 4MHz to 5GHz was specifically scanned. No spurious emissions were found.

RF Energy from the EUT at 3 meters (µV/m) is below the limits in the following ranges listed below.

4.125-4.128	<70	167.72-173.2	<150
4.17725-4.17775	<70	240-285	<200
4.20725-4.20775	<70	322-335.4	<200
6.215-6.218	<70	399.9-410	<200
6.26775-6.26825	<70	608-614	<200
6.31175-6.31225	<70	960-1240	<500
8.291-8.294	<70	1300-1427	<500
8.362-8.366	<70	1435-1626.5	<500
8.37625-8.38675	<70	1645.5-1646.5	<500
8.41425-8.41475	<70	1660-1710	<500
12.29-12.293	<70	1718.8-1722.2	<500
12.51975-12.52025	<70	2200-2300	<500
12.57675-12.57725	<70	2310-2390	<500
13.36-13.41	<70	2483.5-2500	<500
16.42-16.423	<70	2655-2900	<500
16.69475-16.69525	<70	3260-3267	<500
16.80425-16.80475	<70	3332-3339	<500
25.5-25.67	<70	3345.8-3358	<500
37.5-38.25	<100	3600-4400	<500
73-74.6	<100	GHz	
74.8-75.2	<100	4.5-5.15	<500
108-121.94	<100		
123-138	<150		
149.9-150.05	<150		
156.52-156.52	<150		
162.01-167.17	<150		

RADIATED EMISSION – BAND EDGE

The emission from the lowest and highest channel of the EUT lies within the bandwidth of 902-928MHz. See Appendix E for the plots.

8. CONCLUSIONS

The 902-928 MHz FM Stereo Transmitter Module Model: xTV-9T meets all of the requirements of the FCC CFR, Title 47, Part 15, Subpart C 15.205, 15.207, 15.209 and 15.249.

APPENDIX A

LABORATORY ACCREDITATIONS

LABORATORY ACCREDITATIONS

Compatible Electronics has the following agency accreditations:

National Voluntary Laboratory Accreditation Program - Lab Code: 200063-0

Voluntary Control Council for Interference - Registration Numbers: R-826, C-862, R-653 and C-669

Bureau of Standards and Metrology Inspection - Reference Number: SL2-IN-E-1031

Compatible Electronics is recognized or on file with the following agencies:

Federal Communications Commission

Industry Canada

Radio-Frequency Technologies (Competent Body)

Conformity Assessment Body for the EMC directive under the US/EU MRA appointed by NIST.

APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass the FCC Part 15 subpart C specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

Modifications:

1) Added a 100ohm resistor at the antenna output.

2) Changed R24 resistor value to 1.5kohms.

3) Changed R26 resistor value to 330ohms.

APPENDIX C

ADDITIONAL MODELS COVERED UNDER THIS REPORT

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST	902-928 MHz FM STEREO TRANSMITTER MODULE Model: XTV-9T

There were no additional models covered under this report.

APPENDIX D

DIAGRAMS, CHARTS AND PHOTOS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

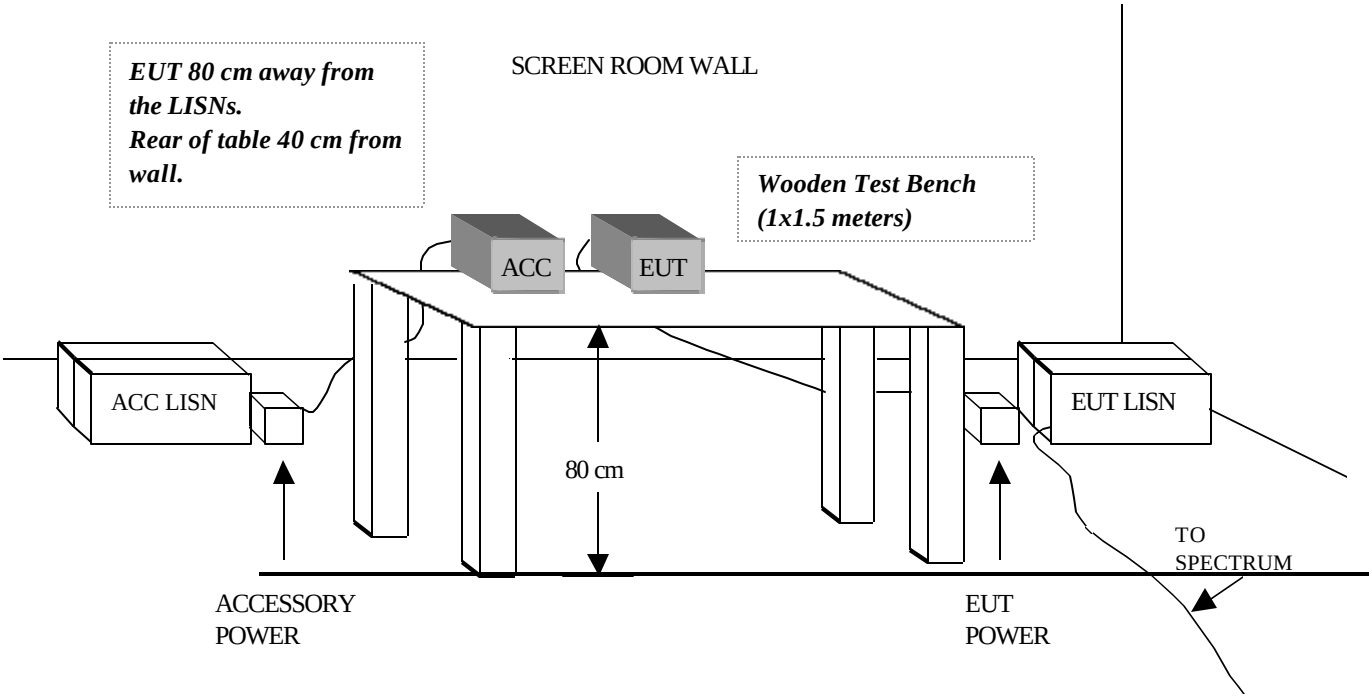
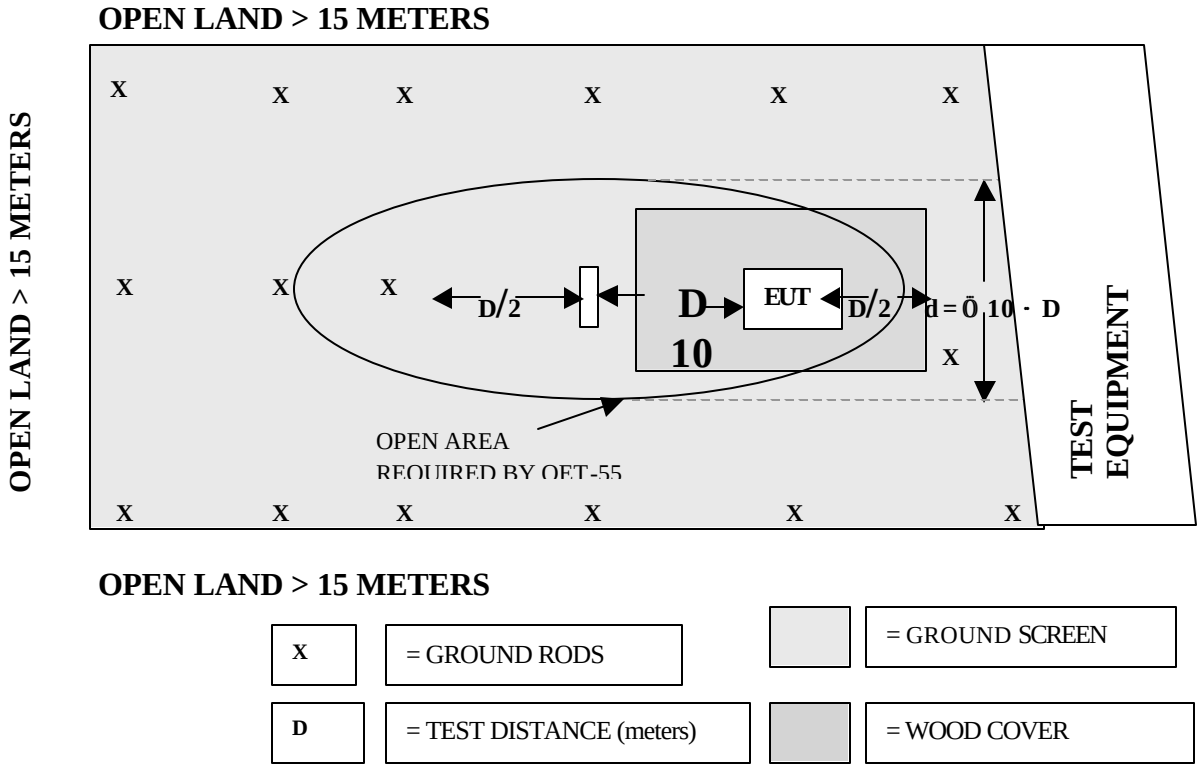


FIGURE 2: PLOT MAP AND LAYOUT OF RADIATED SITE



COM-POWER AB-100

BICONICAL ANTENNA

S/N: 1535

CALIBRATION DATE: APRIL 2, 2001

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	15.2	120	9.8
35	13.2	125	11.0
40	14.7	140	11.2
45	12.7	150	12.0
50	12.7	160	13.1
60	10.3	175	14.2
70	8.2	180	14.7
80	8.1	200	15.9
90	7.8	250	15.4
100	9.0	300	18.6

COM-POWER AL-100

LOG PERIODIC ANTENNA

S/N: A101

CALIBRATION DATE: APRIL 6, 2001

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
300	12.80	700	19.00
400	16.40	800	22.18
500	16.30	900	21.50
600	18.00	1000	23.40

COM-POWER PA-102

PREAMPLIFIER

S/N: 1249

CALIBRATION DATE: APRIL 6, 2001

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	36.7	300	36.4
40	36.6	350	36.5
50	36.5	400	36.2
60	36.6	450	36.0
70	36.8	500	36.0
80	36.7	550	36.0
90	36.7	600	35.8
100	36.5	650	35.7
125	36.7	700	36.1
150	36.6	750	35.6
175	36.6	800	35.4
200	36.8	850	35.8
225	36.7	900	35.3
250	36.5	950	35.0
275	36.2	1000	35.1

COM-POWER PA-122

PREAMPLIFIER

S/N: 25137

CALIBRATION DATE: APRIL 25, 2001

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
1000	35.3	7000	32.1
1100	34.7	7500	33.9
1200	34.3	8000	32.7
1300	34.0	8500	33.3
1400	33.8	9000	30.4
1500	33.9	9500	31.4
1600	33.5	10000	28.1
1700	33.3	11000	30.8
1800	33.5	12000	30.1
1900	35.2	13000	29.1
2000	34.4	14000	32.2
2500	33.5	15000	30.0
3000	33.2	16000	31.2
3500	33.2	17000	32.5
4000	33.1	18000	30.3
4500	32.4	19000	30.1
5000	32.4	20000	30.7
5500	33.6	21000	29.2
6000	33.7	22000	26.7
6500	33.7		

A.R.A DRG-118/A

HORN ANTENNA

S/N: 1015

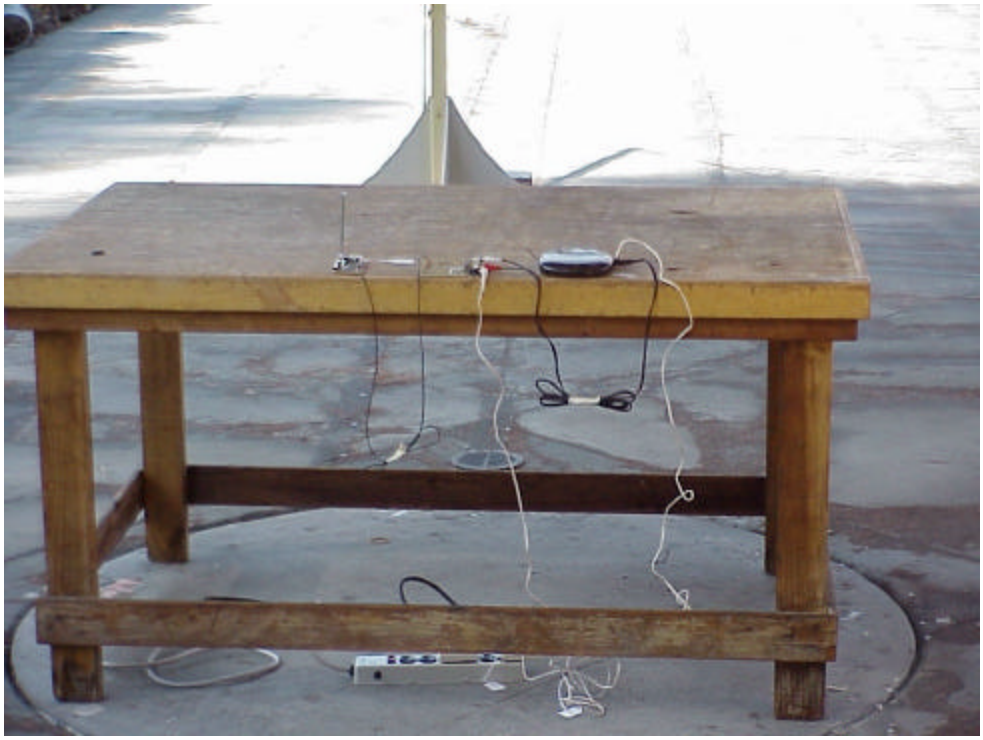
CALIBRATION DATE: DECEMBER 18, 2001

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
1000	25.8	10000	41.3
1500	26.9	10500	42.1
2000	30.9	11000	42.2
2500	30.2	11500	43.6
3000	31.8	12000	44.0
3500	32.4	12500	42.2
4000	31.9	13000	40.7
4500	31.6	13500	40.9
5000	33.3	14000	39.7
5500	31.8	14500	44.7
6000	38.2	15000	42.4
6500	38.2	15500	45.1
7000	38.3	16000	42.8
7500	38.4	16500	42.6
8000	39.5	17000	45.9
8500	38.8	17500	49.2
9000	40.9	18000	42.4
9500	40.2		

FRONT VIEW

ENERCISE, INC.
902-928 MHz FM STEREO TRANSMITTER MODULE
Model: xTV-9T
FCC PART 15 SUBPART C - RADIATED EMISSIONS – 3-19-02

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



REAR VIEW

ENERCISE, INC.
902-928 MHz FM STEREO TRANSMITTER MODULE
Model: xTV-9T
FCC PART 15 SUBPART C - RADIATED EMISSIONS – 3-19-02

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

FRONT VIEW

ENERCISE, INC.
902-928 MHz FM STEREO TRANSMITTER MODULE
Model: xTV-9T
FCC PART 15 SUBPART C - CONDUCTED EMISSIONS – 3-26-02

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

ENERCISE, INC.
902-928 MHz FM STEREO TRANSMITTER MODULE
Model: xTV-9T
FCC PART 15 SUBPART C - CONDUCTED EMISSIONS – 3-26-02

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

APPENDIX E

DATA SHEETS