

FCC PART 15 CLASS B
EMI MEASUREMENT AND TEST REPORT

FOR

HANDAN BroadInfoCom Co., Ltd.
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MODEL: V-2500

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This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: Digital Satellite Set-top Box V-2500
Test Date: <u>October 6, 2000</u>	
Tested By: <u>S. H. Hong - Test Engineer</u>	
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1 - General Information

1.1 Test Facility

The open area test site used by Thru Lab. & Engineering to collect radiated and conducted emissions measurement data is located in the 389 JeArm-Rhi, HyangNam-Myun, HwaSung-Gun, KyungKi-Do, Korea.

Test sites at Thru Lab. & Engineering has been fully described in reports submitted to the Federal Communication Commission and the details of the reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The test facility also complies with the radiated and AC line conducted test site criterion in ANSI C63.4-1992.

The Federal Communications Commission has the reports on file and is listed under Registration Number 92583. Thru Lab. & Engineering is a Test Facility. The scope of the accreditation covers the FCC Method - 47 CFR Part 15 or 18 of the Commission's Rules.

1.2 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-1992, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9kHz to 40GHz.

All radiated and conducted emissions measurements were performed at Thru Lab. & Engineering. The radiated testing was performed at an antenna-to-EUT distance of 3 meters

1.3 Test Equipment List

Description	Model Number	Serial Number	Manufacturer	Cal. Due Date
EMI Test Receiver	ESVS 10	830489/001	Rohde & Schwarz	2001.05.17.
Spectrum Analyzer	R3261C	71720189	Advantest	2001.10.04.
Biconical Antenna	94455-1	0977	Eaton	2001.05.17.
Log Periodic Antenna	3146	2051	EMCO	2001.05.17.
Dipole Antenna	TDA-25/TDS25.1/2	176/200/200	Electro Metrics	2001.10.4.
LISN	KNW-242	8-923-2	Kyoritsu	None
LISN	8012-50-R-24	8379121	Solar	None
Plotter	7475A	2210A 02802	Hewlett Packard	None
Signal Generator	SMS	8721651100	Rohde & Schwarz	None

1.4 Product Description for Equipment Under Test (EUT)

HANDAN BroadInfoCom Co., Ltd.'s V-2500 or the "EUT" as referred to in this report is Digital Satellite Set-top Box.

Main Features of EUT are:

- MPEG-2 Video (MP@ML)
- MPEG-1 Audio Layer 1 and Layer 2
- MPEG-2 Digital & Fully DVD Compliant
- Capable of receiving unencrypted free digital programs
- Viaccess embedded with 1 smartcard slot
- Variety of LNB polarity control; 13/18V, 0/22kHz tone
- On-screen display with 256 colors full-resolution
- LD Quality Video, CD Quality Audio
- Plug & Play installation
- Parental lock, Installation & Edit lock, Receiver lock
- Favorite channel function
- Power recovery function
- 64-steps Volume control
- User friendly OSG menu with full function
- IR remote control
- Last channel memory function
- Variable aspect ratio (4:3, 16:9) with Pan vector
- EPG for on screen channel information
- RS232C port for additional information service and updating IRD control software
- Receiver-to-Receiver function for program and data transmission
- Over-the-Air software program downloadable
- SCPC/MCPC receivable from C/Ku-band satellites
- Displays signal level to setup the satellite antenna with ease
- Multi-lingual function according to the satellite and broadcasting service provider
- DiSEqC 1.0 compatible

1.5 Equipment Under Test (EUT)

Description	Model Number	Serial Number	Manufacturer	Remarks
Digital Satellite Set-top Box	V-2500	none	Digital Power Communications Co., Ltd.	

1.6 Support Equipment

Description	Model Number	Serial Number	Manufacturer	Remarks
VCR	DVR-4088	3 10D20 12 14	Daewoo Electronics	
Terminator	none	none	Generic	75ohms

1.7 External I/O Cabling

Description	Length(m)	Port/From	To/Port	Remarks
Video Cable	2.0	Video/EUT	VCR/Video	Shielded
Audio Cable	2.0	Audio(L/R)/EUT	VCR/Audio(L/R)	Shielded
Antenna Cable	1.0	LNB In/EUT	Terminator	Shielded

2 - System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

The following ports were provided by the Digital Satellite Set-top Box : one LNB Input connector (LNB IN), one IF output connector (IF OUT), one composite video output connector (VIDEO), two audio output jacks (AUDIO L/R), one S-Video jack (S-VIDEO) and one serial console port (SERIAL PORT).

The test was performed with a VCR for the final qualification test. The composite video output connector and audio output jacks provided by the EUT were also tested.

2.2 EUT Exercise Program

No exercising program needed during radiated and conducted testing. The test was performed in a manner similar to a typical use.

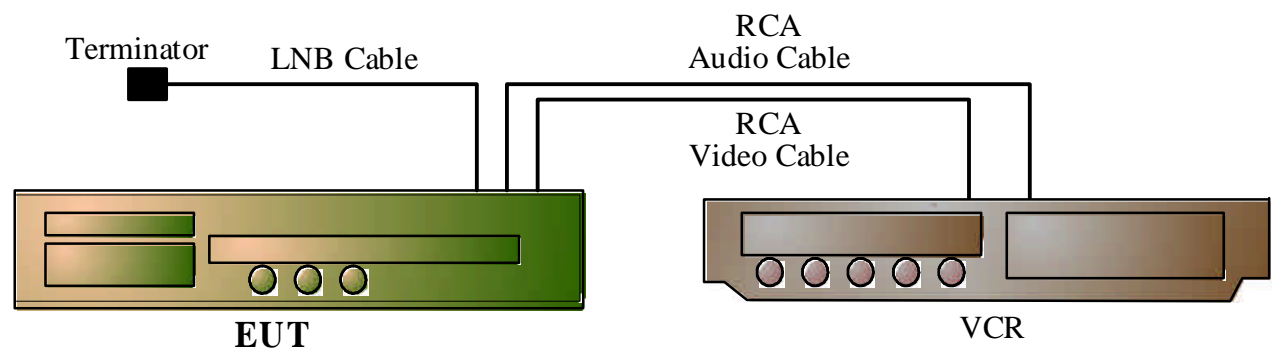
2.3 Special Accessories

As shown in section 2.5, all interface cables used for compliance testing are shielded as normally supplied or by use respective component manufacturers.

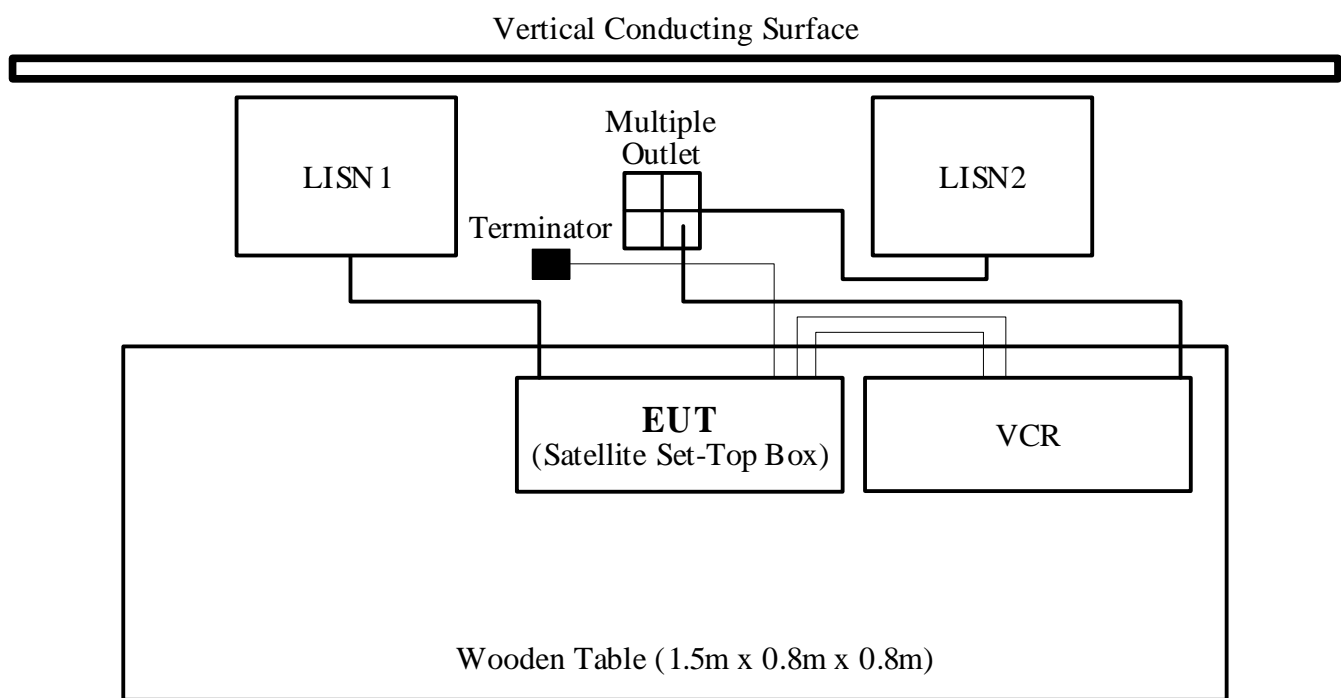
2.4 Schematics/Block Diagram

The EUT schematic or block diagram is presented in [Appendix B](#) as reference.

2.5 Configuration of Test System



2.6 Conducted Emissions Test Setup Block Diagram



3 - Conducted Emissions Test

3.1 EUT Setup

The measurement was performed in the screen room of test site, using the same setup per ANSI C63.4- 1992 measurement procedure.

The EUT was placed on the center and back edge of the wooden test table. The VCR was placed on one side of the EUT. The rear of the EUT and peripherals were flushed with the rear and sides of the tabletop.

Spacing between the EUT and VCR was approximately 10 centimeters.

The power code of the EUT and VCR was connected to a 110VAC, 60Hz power source.

3.2 Test Equipment Setup

The spectrum analyzer was configured during the conduction test in as follows:

Start Frequency	450kHz
Stop Frequency	30MHz
Sweep Speed	Auto
IF Bandwidth	100kHz
Video Bandwidth	100kHz

3.3 Test Procedure

During the conducted emissions test, the EUT power cord was connected to the auxiliary outlet of the LISN 1 and all other peripherals power cords connected to the multiple outlet adapter of the LISN2.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emissions was found to be marginal (less than 4dBuV). Quasi-peak readings are distinguished with a "QP".

The configuration used for final test data was with EUT power supply. The final test data for this test configuration is recorded in the table listed under section 3.5 of this report.

3.4 Summary of Test Results

According to the data in section 3.5, the EUT, complied with the FCC Part 15 conducted margin for a Class B device, with the worst margin reading of:

-10.8dB at **12.272MHz** in the Neutral mode with the power supply.

3.5 Conducted Emissions Test Data

Line Conducted Emissions				FCC Part15 Class B		
Frequency (MHz)	Amplitude (dBuV)	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit		Margin (dB)
				(dBuV/m)	(uV/m)	
0.949	36.4	QP	N	48.0	250	- 11.6
1.024	35.8	QP	L	48.0	250	- 12.2
10.104	35.7	QP	L	48.0	250	- 12.3
11.271	35.2	QP	N	48.0	250	- 12.8
13.055	35.6	QP	N	48.0	250	- 12.4
13.272	37.2	QP	N	48.0	250	- 10.8

3.6 Plot of Conducted Emissions Test Data

Plot(s) of conducted emissions test data for AC adapter is presented in [Appendix A](#) of this report as reference.

4 - Radiated Emissions Test

4.1 EUT Setup

The radiated emissions tests were performed in the open area 3 meters test site, using the setup accordance with ANSI C63.4-1992. The specification used was the FCC Part 15 Class B limits.

The EUT was placed on the center of the wooden test table. The VCR was placed on one side of the EUT. Spacing between the EUT and VCR was approximately 10 centimeters.

Additionally, the power code of the EUT and VCR was connected to a 110VAC, 60Hz power source.

4.2 Test Equipment Setup

During the radiated emissions test, the EMI test receiver was set with the following configurations:

Start Frequency	Manual
Stop Frequency	Manual
IF Bandwidth	120kHz
Sweep Time	10msec
Sweep Speed	Auto

4.3 Test Procedure

For the radiated emissions test, the EUT and all support equipment power cords was connected to the AC floor outlet since the power supply used in the system did not provide an accessory power outlet.

Maximizing procedure was performed on the six (6) highest emissions to verify that the EUT complied with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emissions was found to be marginal (less than 4dBuV), and are distinguished with a "QP" in the data table.

Additionally, composite video output connector, L/R audio output connectors, and LNB antenna input connector were also tested.

4.4 Summary of Test Results

According to the data in section 4.5, the EUT, complied with the FCC Part 15 Class B standards, and had the worst margin of:

-10.2dB at 188.99MHz in the Horizontal polarization.

4.5 Radiated Emissions Test Result Data

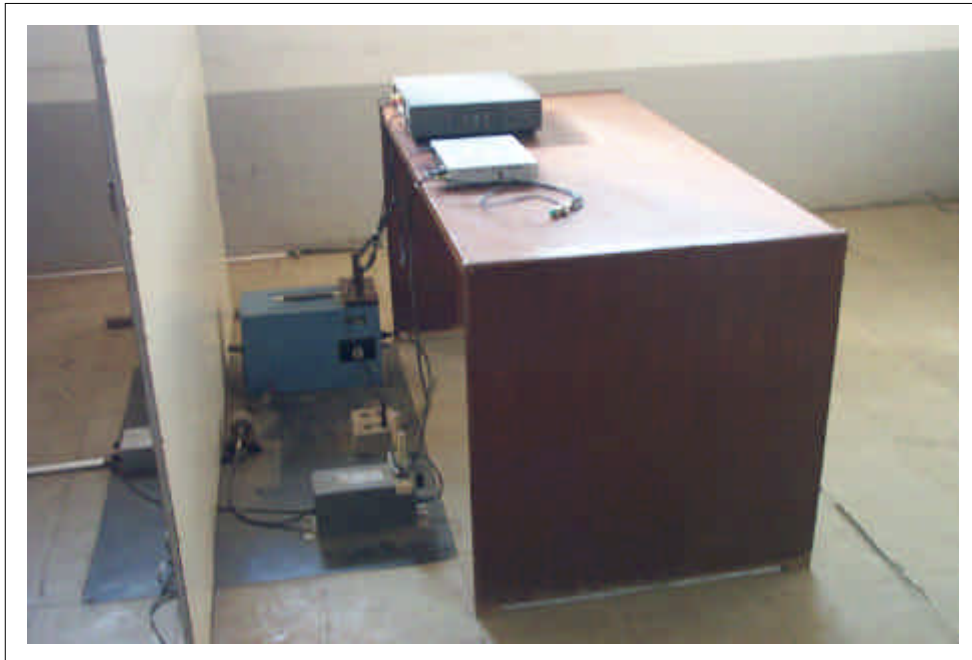
Indicated		Antenna		Table	Correction Factor		Corrected Amplitude	FCC Part15 Class B		
Freq. (MHz)	Ampl. (dBuV/m)	Polar. (H/V)	Height (m)	Angle (deg.)	Ant. (dB)	Cable (dB)	(dBuV/m)	Limit		Margin (dB)
								(dBuV/m)	(uV/m)	
33.55	11.3	H	3.4	250	13.7	0.6	25.6	40.0	100	-14.4
44.03	10.2	H	3.4	240	11.9	0.9	23.0	40.0	100	-17.0
50.33	17.2	V	1.0	240	10.6	1.0	28.8	40.0	100	-11.2
53.99	14.8	V	1.0	250	8.8	1.0	24.6	40.0	100	-15.4
72.00	19.4	V	1.7	250	5.3	1.3	26.0	40.0	100	-14.0
81.00	13.5	V	1.0	270	7.5	1.4	22.4	40.0	100	-17.6
119.99	12.4	H	2.6	90	10.6	1.8	24.8	43.5	150	-18.7
134.99	6.7	H	2.3	270	14.2	1.9	22.8	43.5	150	-20.7
167.99	10.1	H	1.5	80	16.1	2.3	28.5	43.5	150	-15.0
183.99	14.3	H	1.0	80	14.8	2.4	31.5	43.5	150	-12.0
188.99	15.7	H	1.0	260	15.2	2.4	33.3	43.5	150	-10.2
215.99	12.3	H	1.1	90	11.3	2.7	26.3	43.5	150	-17.2
229.49	15.1	H	1.3	100	11.6	2.8	29.5	46.0	200	-16.5
242.99	13.5	H	1.0	290	11.8	2.9	28.2	46.0	200	-17.8
269.99	12.7	H	1.0	90	13.4	3.1	29.2	46.0	200	-16.8
296.98	10.3	H	1.0	110	15.2	3.3	28.8	46.0	200	-17.2
323.98	9.6	H	1.0	120	14.8	3.4	27.8	46.0	200	-18.2
350.98	9.4	H	1.0	270	14.2	3.5	27.1	46.0	200	-18.9

5 - Conducted and Radiated Setup Photographs

5.1 Conducted Emissions Photograph: Front View



5.2 Conducted Emissions Photograph: Side View



5.3 Radiated Emissions Photograph: Front View



5.4 Radiated Emissions Photograph: Rear View

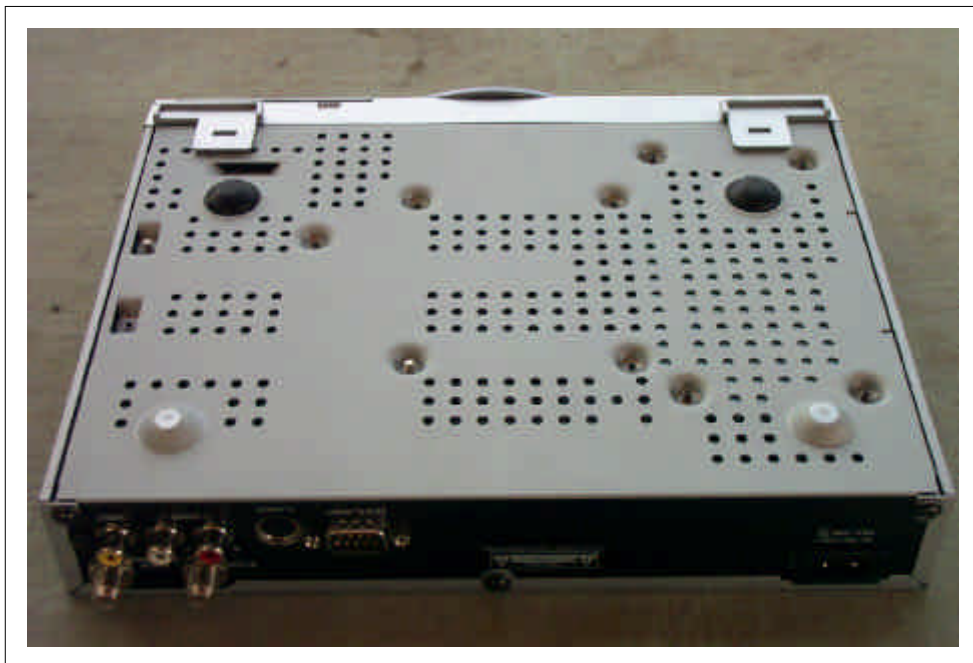


6 - Photographs

6.1 EUT: Front View



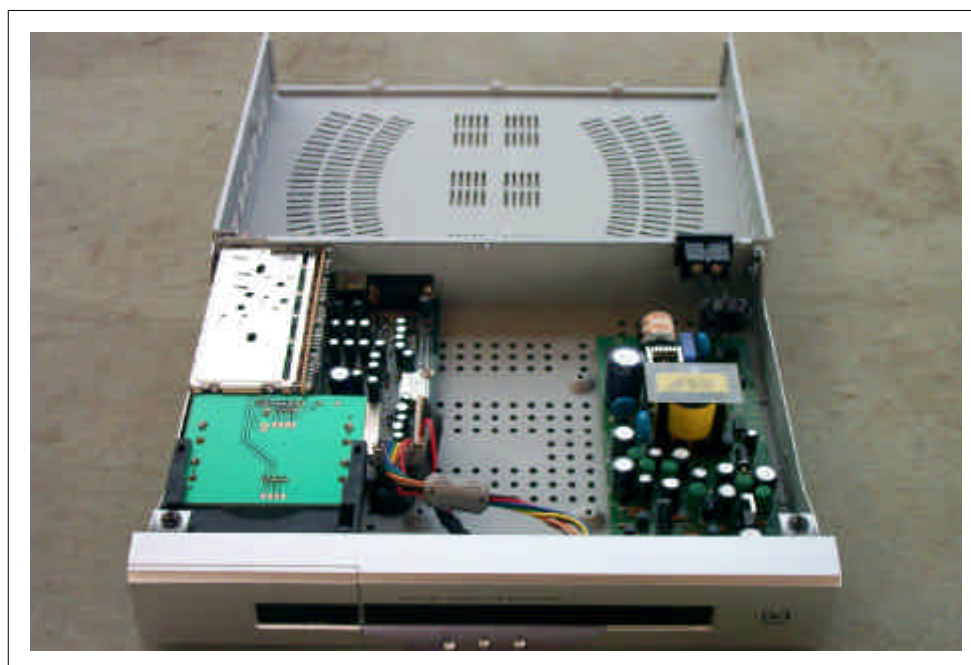
6.2 EUT: Rear View



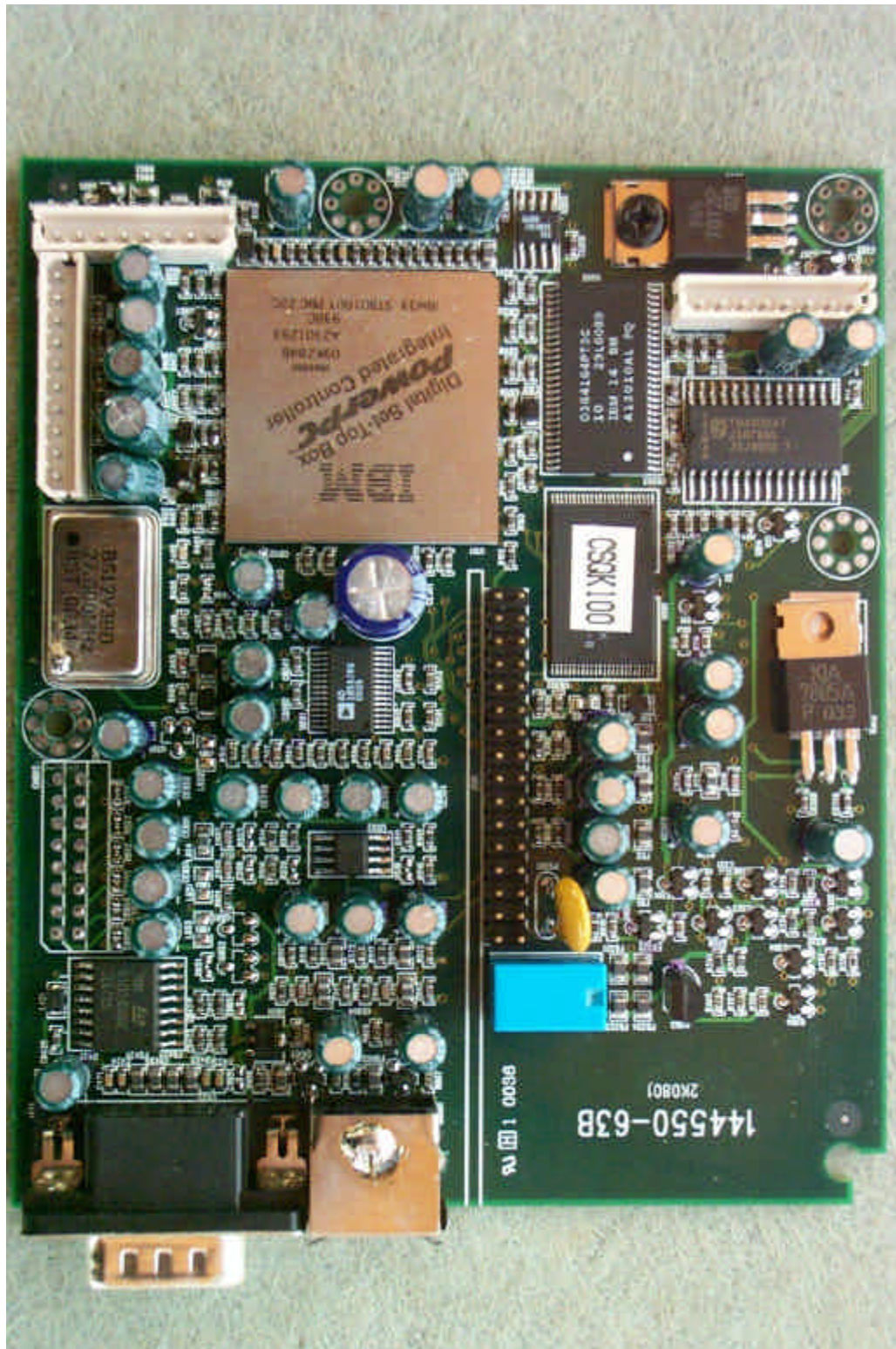
6.3 EUT: Label View



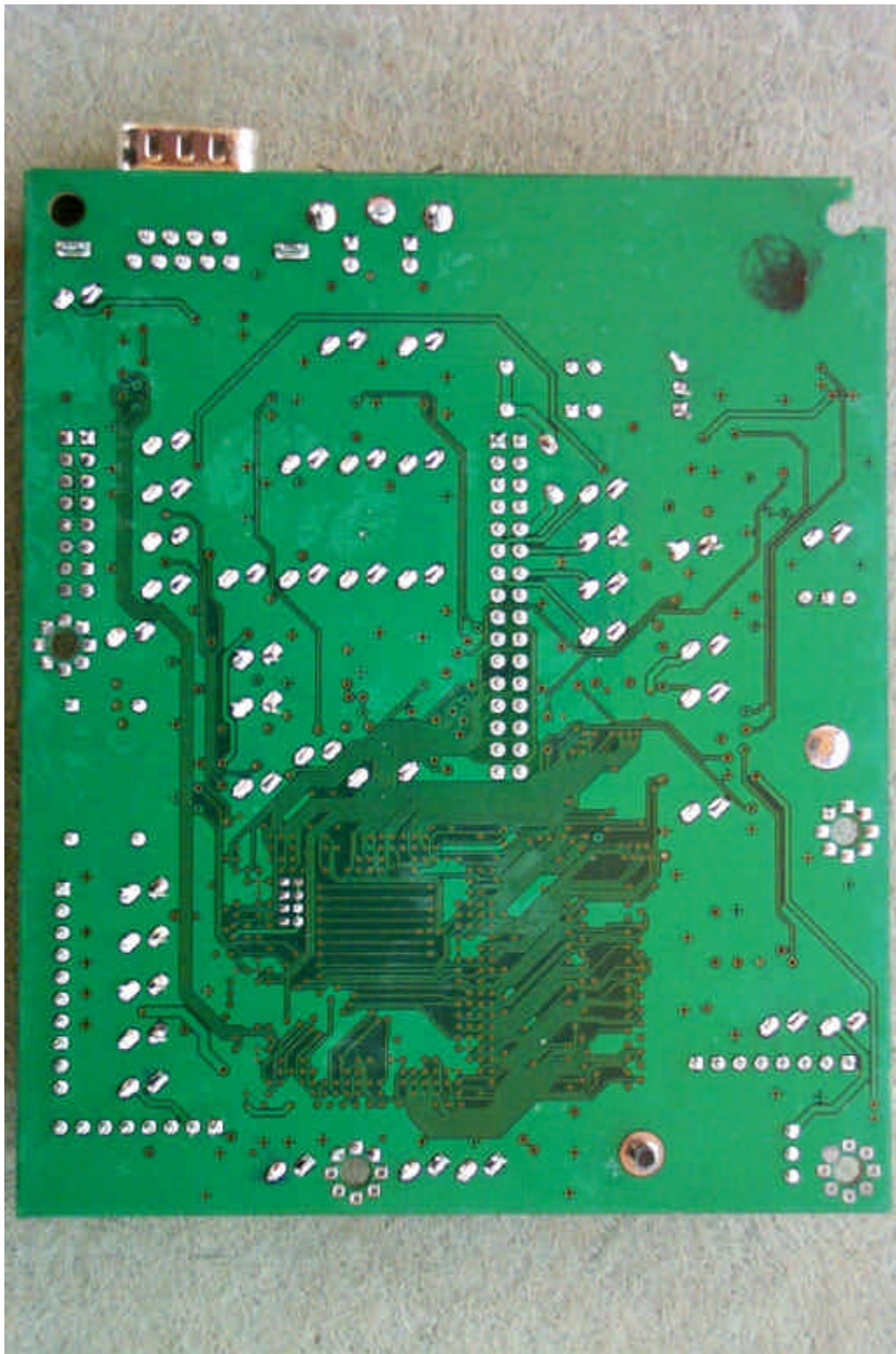
6.4 EUT: Internal View



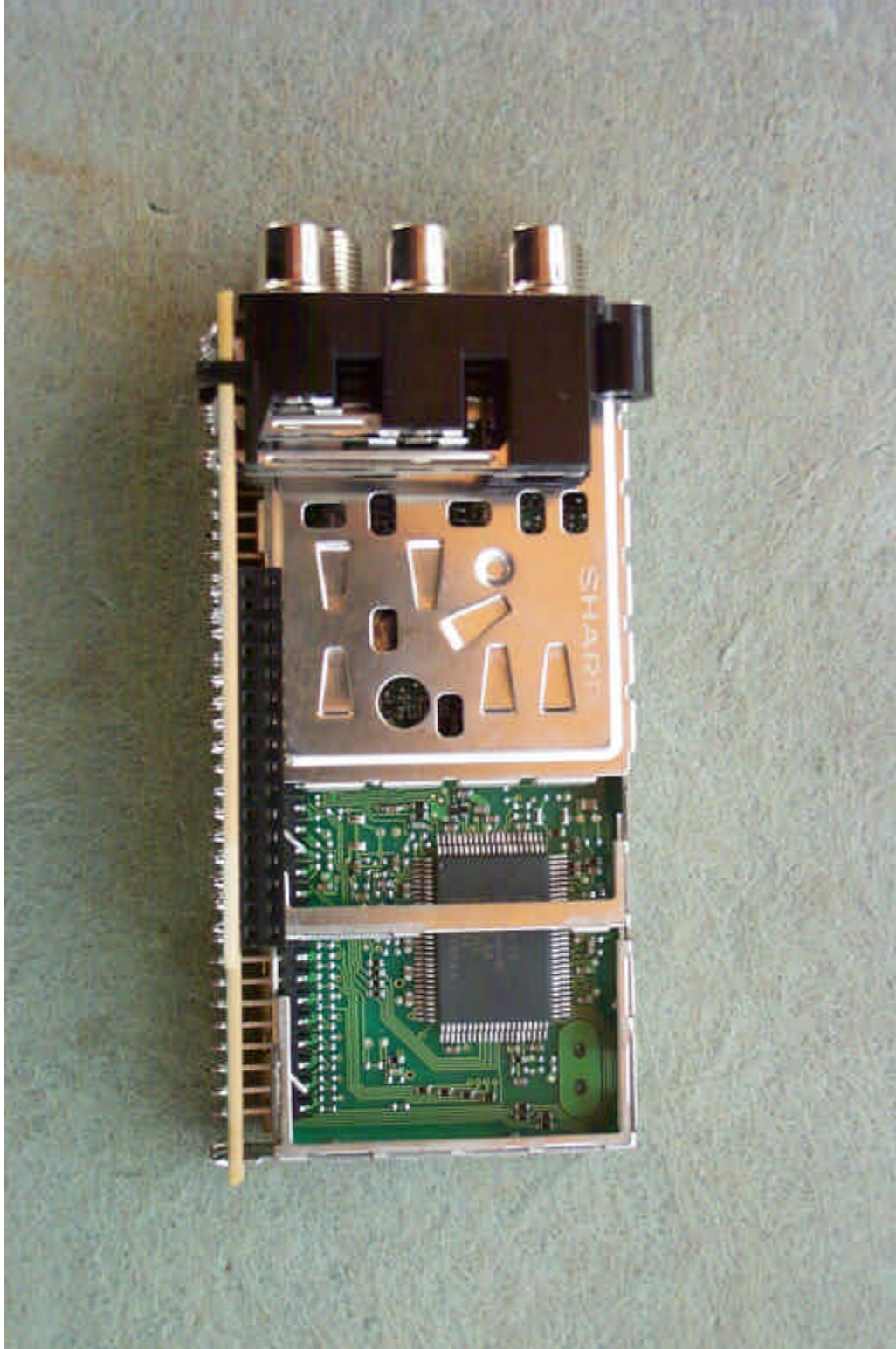
6.5 PCB: Mainboard, Component View



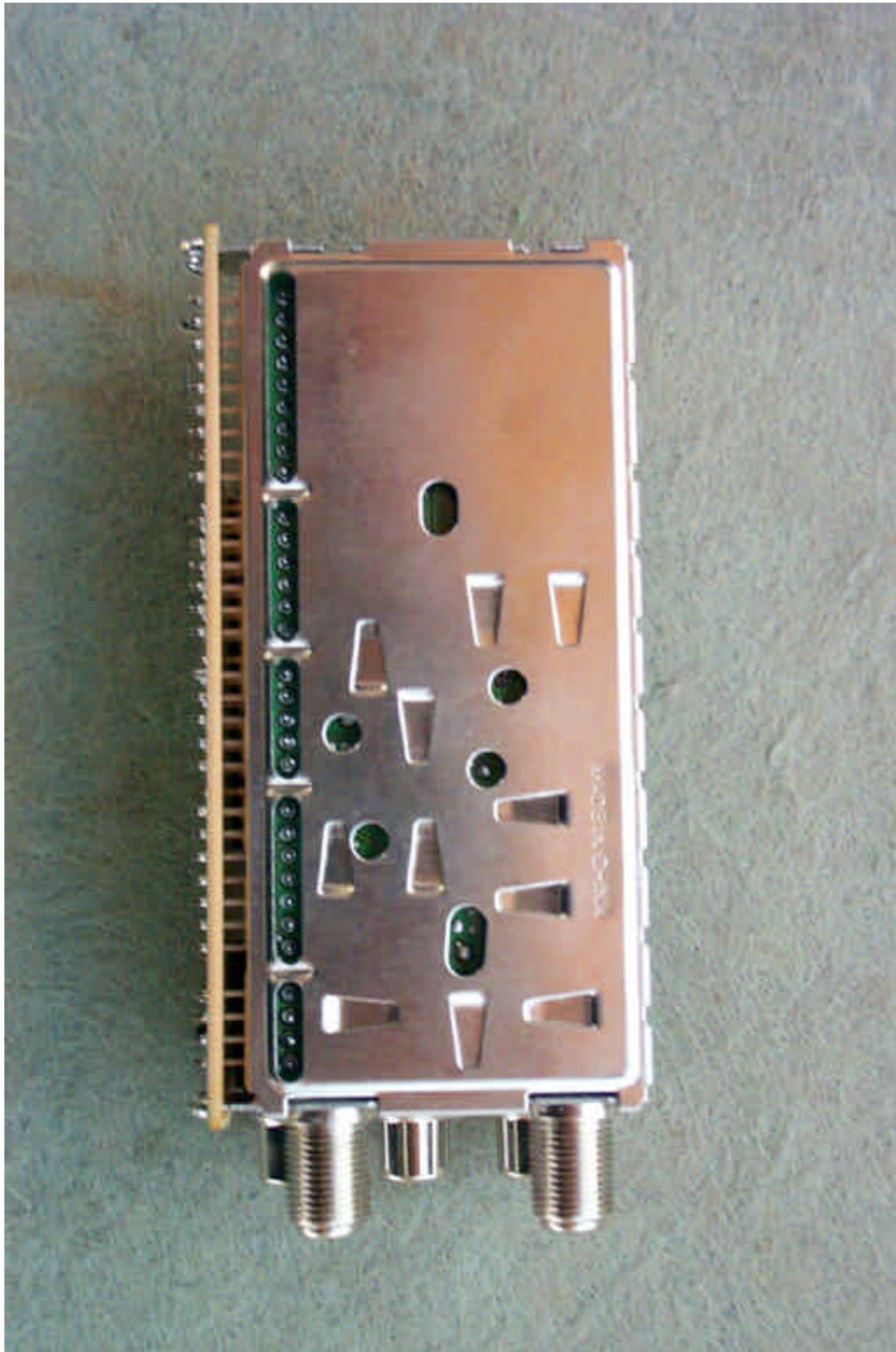
6.6 PCB: Mainboard, Circuit View



6.7 PCB: Tuner Module, Component View



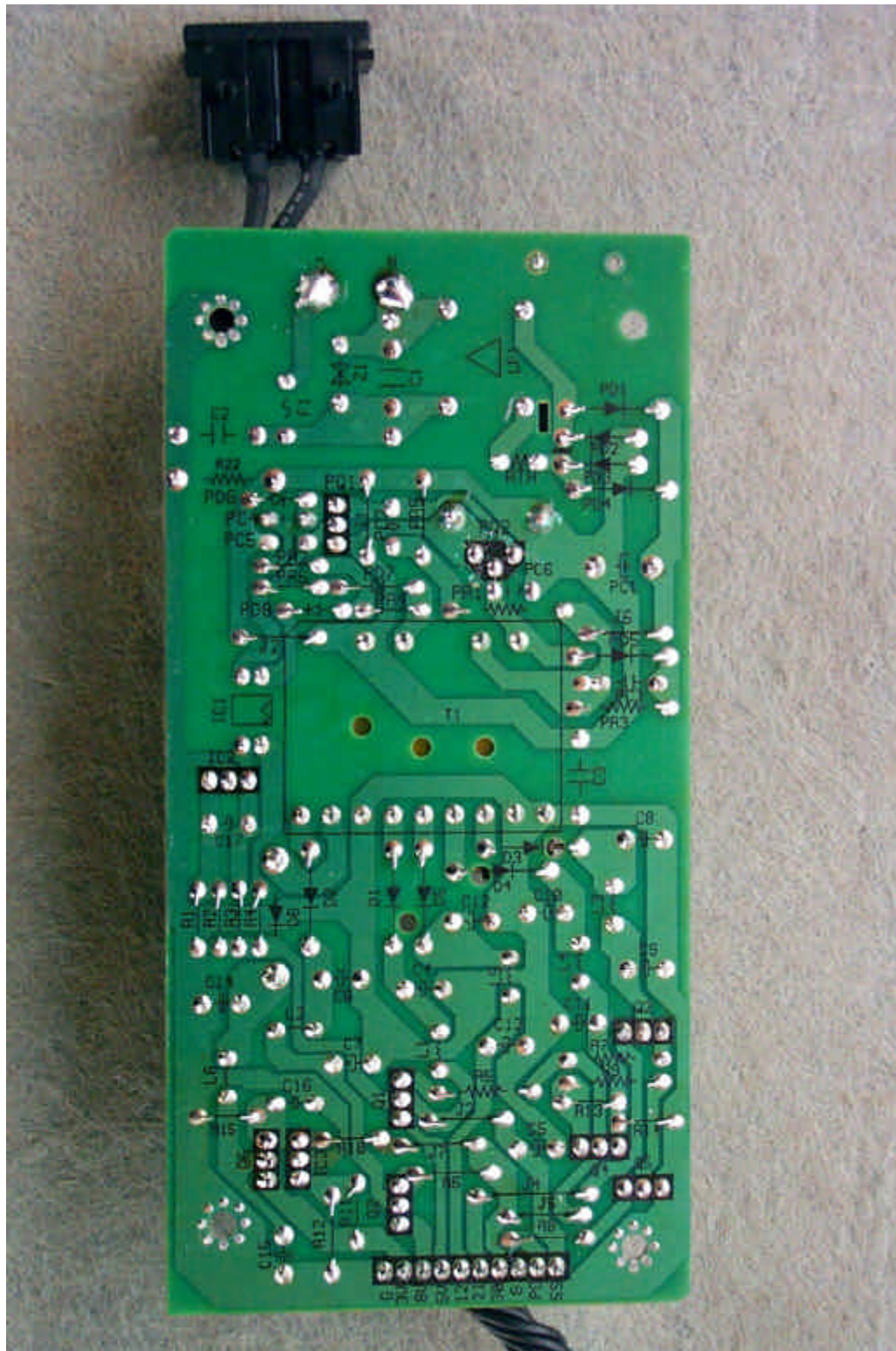
6.8 PCB: Tuner Module, Circuit View



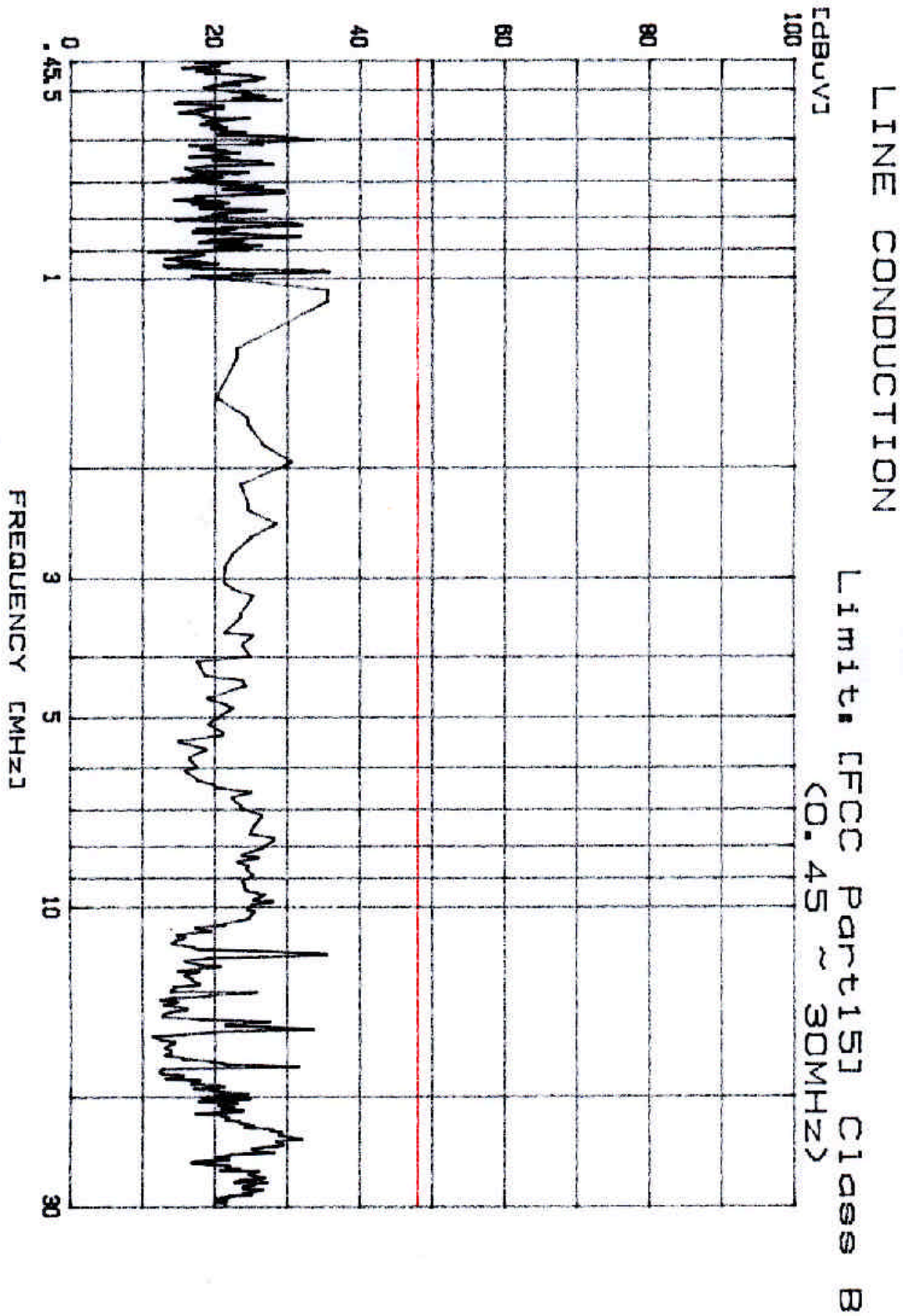
6.9 PCB: Power Board, Component View



6.10 PCB: Power Board, Circuit View

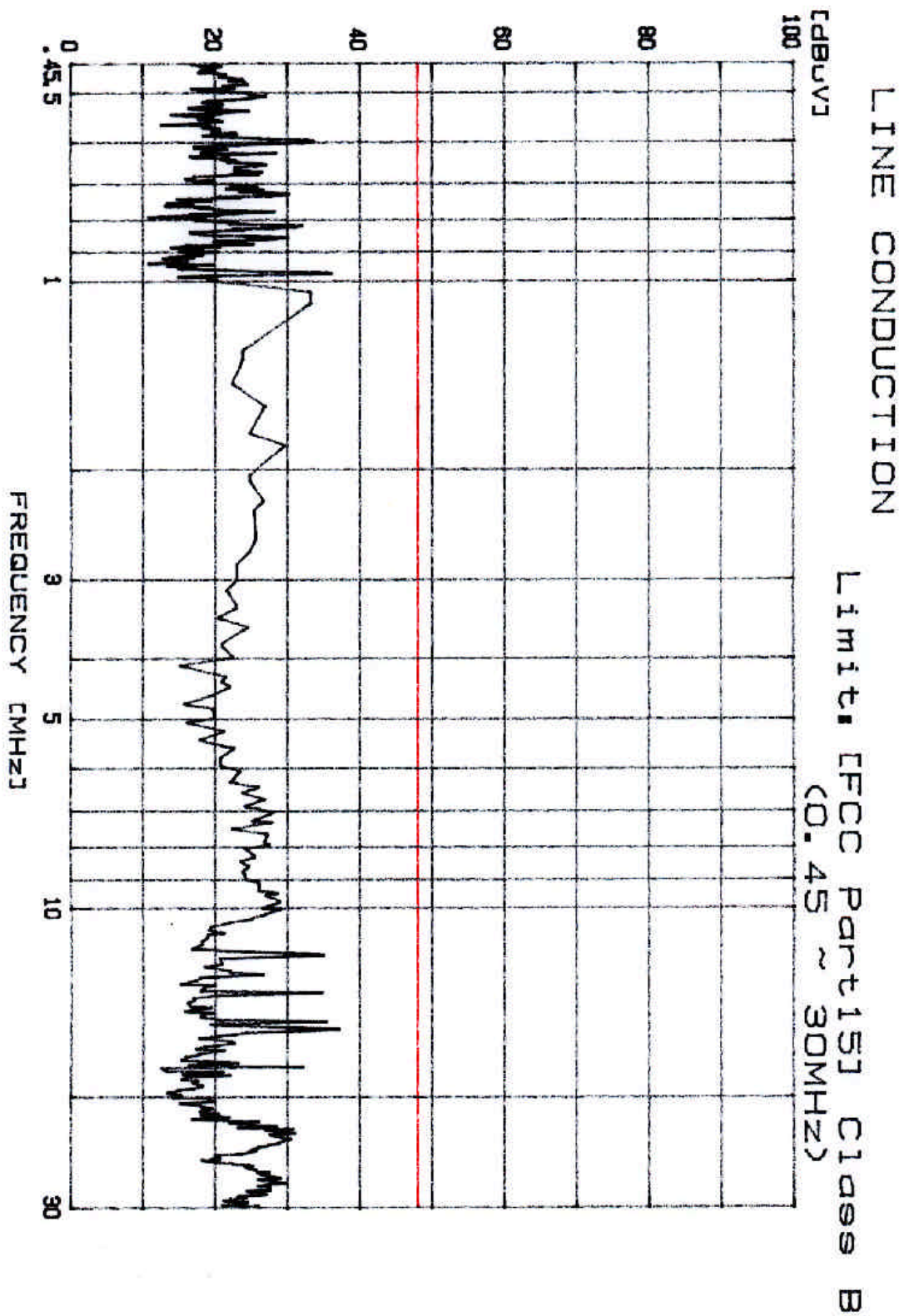


Appendix A - Plot of Conducted Emissions Test Data



HANDAN BroadInfoCom Co., Ltd.
MODEL: V-2500

October 6, 2000
Digital Satellite Set-top Box
PHASE: LINE



Appendix B - EUT Schematics/Block Diagram

Appendix C - User's Manual
