

KTL Test Report: 9R01569.1

Applicant: Norpak Corporation
10 Hearst Way
Kanata, Ontario
K2L 2P4

**Equipment Under Test:
(E.U.T.)** TTX81X PC Card - TV Data Broadcast Receiver

FCC ID: CIHTTX81X

In Accordance With: **FCC Part 15, Subpart B
Class B Certification**

Tested By: KTL Ottawa Inc.
3325 River Road, R.R. 5
Ottawa, Ontario K1V 1H2

Authorized By:

K. Colborne, RF Laboratory Supervisor

Date:

Total Number of Pages: 26

EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
FCC ID: CIHTTX81X

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EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
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EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
FCC ID: CIHTTX81X

Section 1. Summary of Test Results

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 FCC Part 15, Subpart B for Class B Digital Devices.

These tests were conducted using measurement procedures of ANSI C63.4-1992.

The equipment was tested for conducted emissions from 0.45 MHz to 30 MHz using a 50 microhenry line impedance stabilization network (L.I.S.N.) as described in ANSI C63.4-1992. Peripheral equipment was also operated through a 50 microhenry L.I.S.N.

The equipment was tested for radiated emissions from 30 MHz to 1000 MHz with extension to the 10th harmonic of any fundamental clock frequency in accordance with the requirements of FCC Part 15, Subpart B. Frequencies were initially identified in a large shielded room. Amplitude measurements were made on an outdoor Open Area Test Site. Details of the outdoor site are on file with the FCC.

Abstract:

Name Of Test	Para. No.	Results	Margin
Conducted Emissions	15.107	Complies	???
Radiated Emissions	15.109	Complies	???

THIS REPORT APPLIES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE. None



NVLAP Lab Code: 100351-0

Test Performed By: _____
Wayne Clarke, Technologist

Date: _____

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EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
FCC ID: CIHTTX81X

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

Brand Name: TTX81X PC Card - TV Data Broadcast Receiver

Manufacturer: Norpak Corporation

Model No.: TTX81X

Serial No.: None



Production Unit



Pre-Production Unit

Description of E.U.T.

The E.U.T. is a PC card that interfaces directly with the PC BUS, decoding the raw data stream on board and providing NABTS or WST data to the PC for application processing.

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: TTX81X PC Card - TV Data Broadcast Receiver
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Theory of Operation

The TTX81X receiver is installed in a PC and connected to an incoming TV signal from any source including cable, off-air antenna or TVRO satellite dish. The TV input signal is software selectable for either a base band (composite) or RF video input. Again under software control, the card is configured for the desired TV channel, data mode and authorized packet address or addresses. The receiver continuously monitors the TV signal for any data. When data of the required type is received it is captured and delivered to the PC for subsequent handling.

EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
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Justification

The E.U.T. was configured for testing as per typical installation. Position and bundling of cables were investigated to establish maximum amplitude of emissions.

The following combinations were investigated to establish worst case configuration:

- (1) The E.U.T. was receiving data packets.
- (2) Cable positioning.

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) The E.U.T. was receiving data packets from an encoder and checking for “BER” on received signal.

EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
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Section 3. Equipment Configuration

Equipment Configuration List:

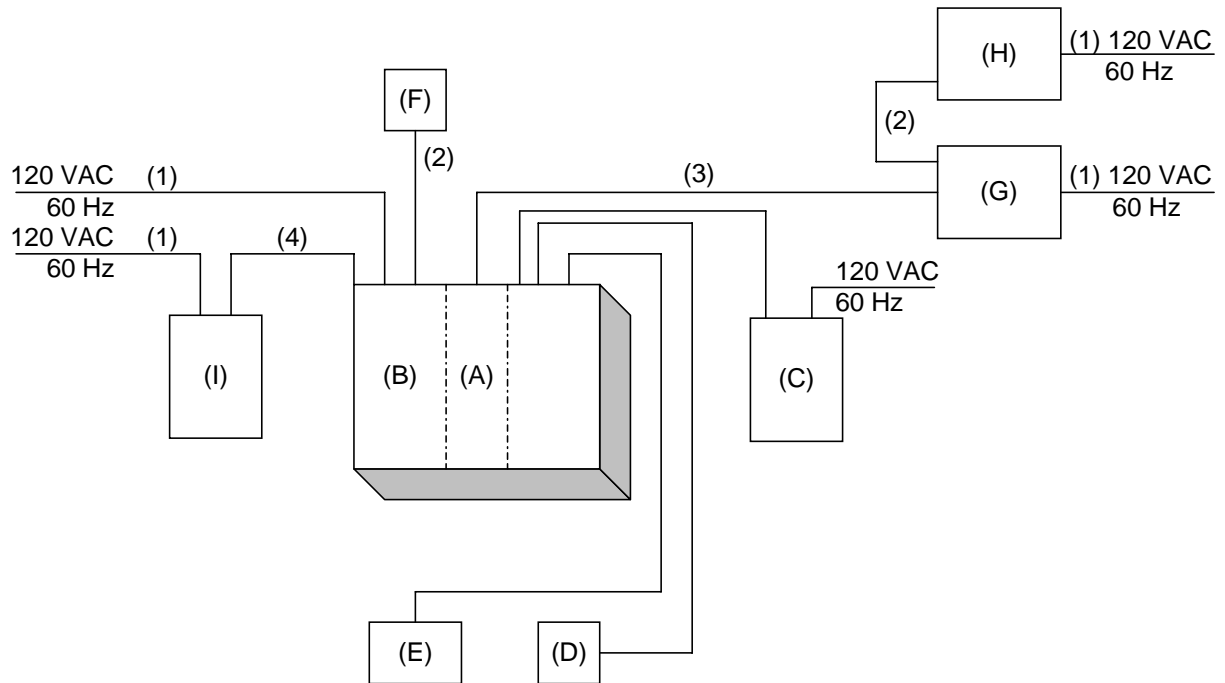
Item	Description	Model No.	Serial No.	Rev.
(A)	TV Data Broadcast Receiver	TTX81X	None	
(B)	IBM PC	L5F	156571L5F23RBM79	
(C)	IBM Monitor	6542-103	6669868	
(D)	IBM 2 Button Mouse	13H6690	23-H7-1946	
(E)	IBM Keyboard	06H5283	30492	
(F)	75 ohm Load	None	None	
(G)	Samsung VCR	VT2870/SECA	61FB5001679032	
(H)	GES3 Encoder	GS3-UNI-536	None	
(I)	Fujitsu Printer	C9SDP033M3352A1	00301899	

Inter-connection Cables:

Item	Description	Length (m)
(1)	Standard AC Cable	1.8
(2)	75 ohm Coax Cable	1.0
(3)	75 ohm Coax Cable	10.0
(4)	Centronics To dB 25 Printer Cable	5.0

EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
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Configuration of the Equipment Under Test (E.U.T)



EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
FCC ID: CIHTTX81X

Section 4. Conducted Emissions

NAME OF TEST: Conducted Emissions	PARA. NO.: 15.107
TESTED BY: Wayne Clarke	DATE: May 20, 1999

Test Conditions: Test Voltage: 120 VAC
Temperature: 22 °C
Humidity: 40 %

Minimum Standard:

Frequency(MHz)	Maximum Powerline Conducted RF Voltage	
	μV	$\text{dB}\mu\text{V}$
0.45 - 30.0	250	48

Test Results: Complies. See attached graphs and table.

Measurement 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.

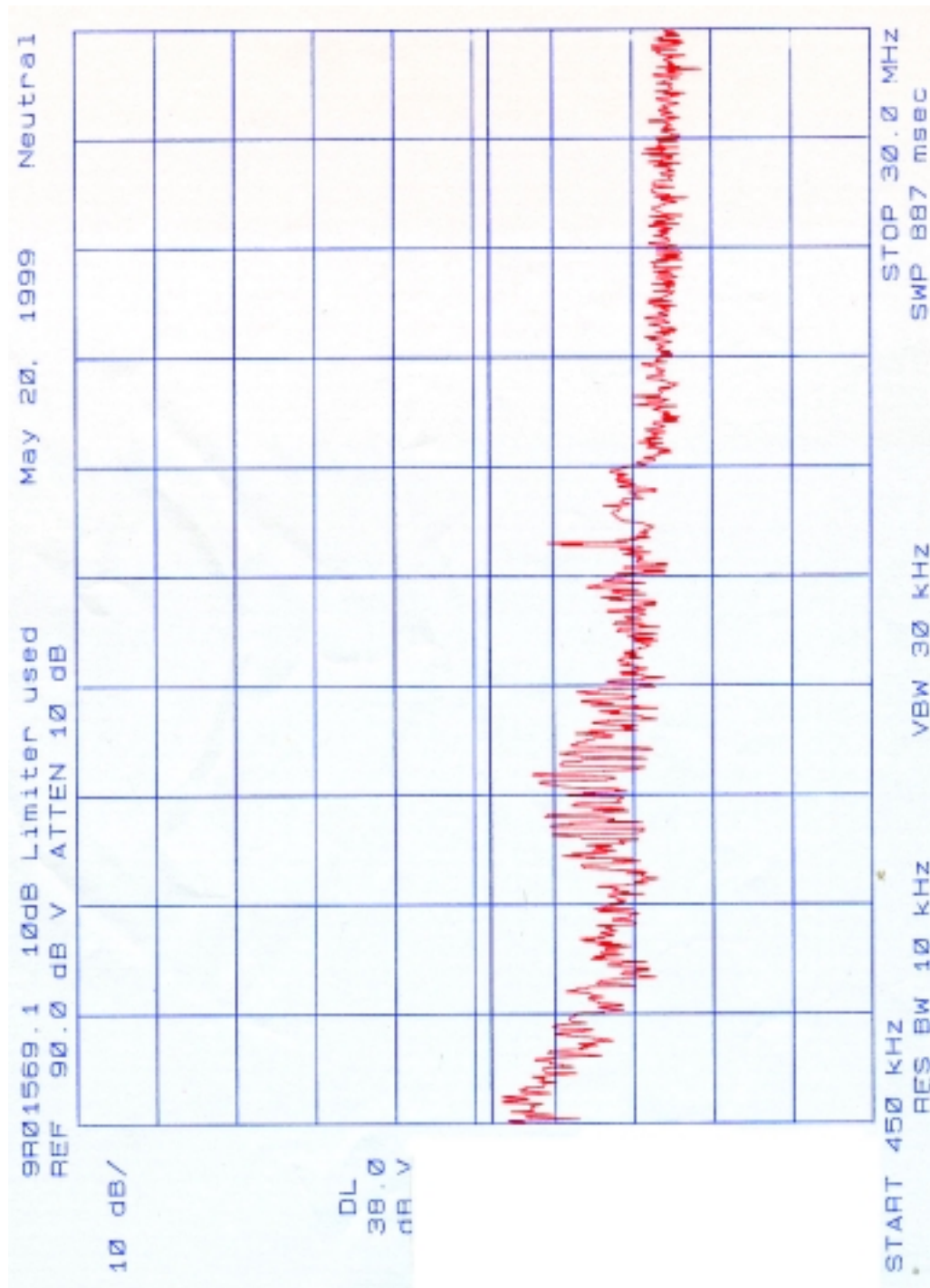
EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
FCC ID: CIHTTX81X

Measurement Data:

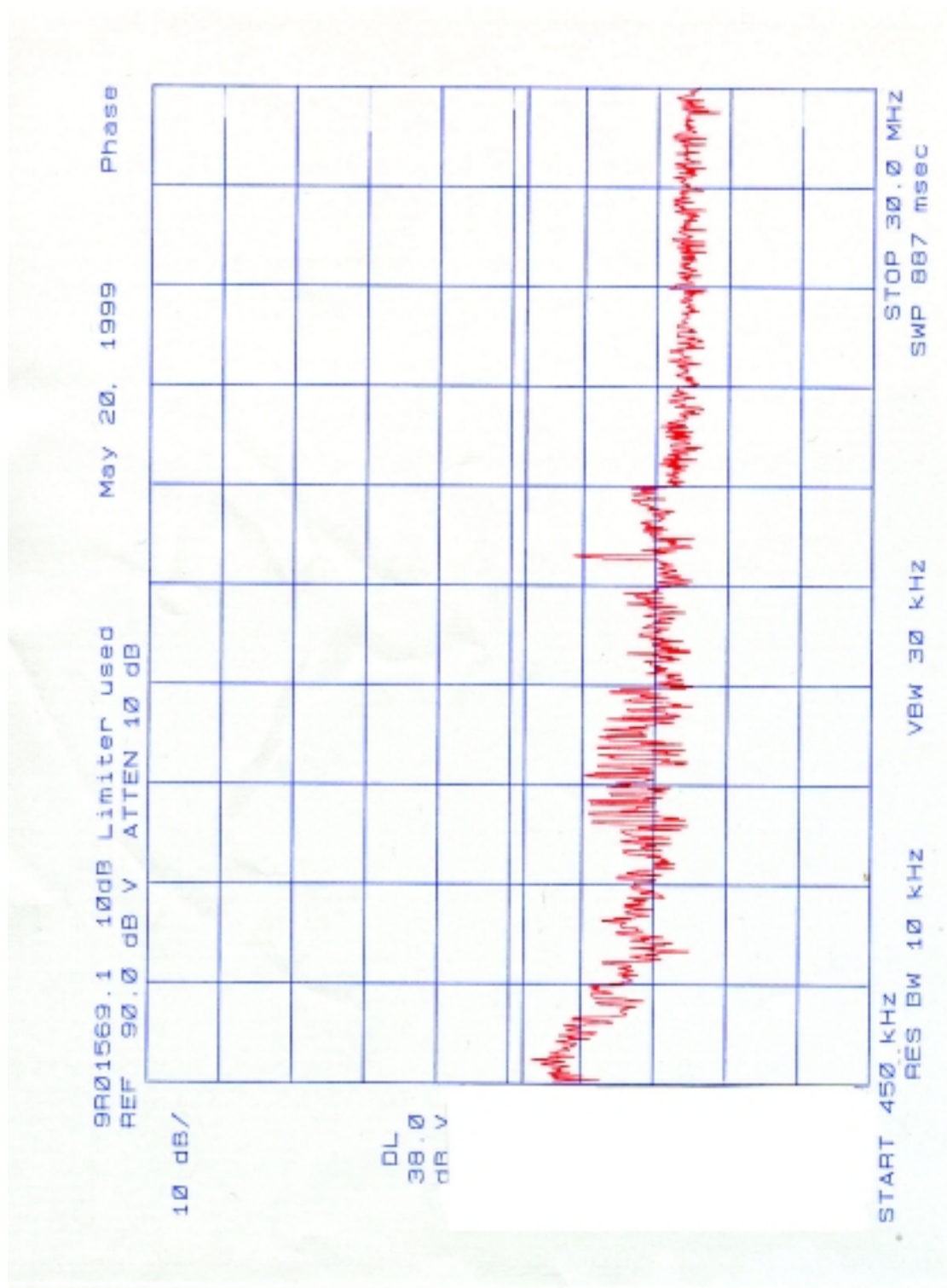
Conductor	Frequency (MHz)	CISPR (dB μ V)	Average (dB μ V)	BB/NB	BB Correction (dB)	Result (dB μ V)
Neutral	1.0	43.1	40.7	NB	0.0	7.3
Phase	1.0	43.2	40.3	NB	0.0	7.7
Neutral	0.47	43.4	42.4	NB	0.0	5.6
Phase	0.47	43.2	40.3	NB	0.0	7.7
Neutral	9.84	38.5	28.5	BB	-13.0	35.2
Phase	9.84	36.2	26.8	BB	-13.0	34.2
Neutral	16.09	39.5	38.1	NB	0.0	9.9
Phase	16.09	41.6	39.8	NB	0.0	8.2

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Conducted Emissions (120 VAC, 60 Hz)



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Conducted Photographs (Worst Case Configuration)

Front View



Side View



EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
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Section 5. Radiated Emissions

NAME OF TEST: Radiated Emissions	PARA. NO.: 15.109
TESTED BY: Wayne Clarke	DATE: May 20, 1999

Test Conditions: Test Voltage: 120 VAC
Temperature: 22 °C
Humidity: 40 %

Minimum Standard:

Frequency(MHz)	Maximum Field Strength at 3m	
	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$
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 42.3 $\text{dB}\mu\text{V/m}$ @ 3m at 324.015 MHz. This is 3.7 dB below the specification limit.

Measurement Data: See attached table.

The equipment was prescanned in a shielded room using a spectrum analyzer and broadband antenna. A list of frequencies was compiled for investigation in the open field. The equipment was then moved to an open area test site where amplitude measurements were made at a distance of 3 meters. The bandwidth was set to 120 kHz and the detector function was CISPR Quasi-Peak.

All fundamental clock frequencies were measured to the 10th Harmonic.

EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
FCC ID: CIHTTX81X

Test Data - Radiated Emissions

Test Distance (meters) : 3		Range: B Tower		Receiver: ESVS 30		RBW(kHz): 120		Detector: Q-Peak			
Freq. (MHz)	Ant. *	Pol. (V/H)	Ant. HGT. (m)	Table (deg.)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
111.937	B/C2	V			18.0	13.1			31.1	43.5	12.4
111.937	B/C2	H			18.3	13.1			31.4	43.5	12.1
58.28	B/C2	V			19.5	10.5			30.0	40.0	10.0
58.28	B/C2	H			19.4	10.5			29.9	40.0	10.1
58.03	B/C2	V			15.2	10.5			25.7	40.0	14.3
58.03	B/C2	H			20.4	10.5			30.9	40.0	9.1
107.941	B/C2	V			20.8	12.6			33.4	43.5	10.1
107.941	B/C2	H			16.3	12.6			28.9	43.5	14.6
56.32	B/C2	V			24.6	10.7			35.3	40.0	4.7*
56.317	B/C2	H			19.9	10.7			30.6	40.0	9.4
324.015	L/P	V			19.2	19.2			38.4	46.0	7.6
324.015	L/P	H			22.5	19.2			41.7	46.0	4.3*
300.714	L/P	V			10.6	19.4			30.0	46.0	16.0
300.714	L/P	H			14.8	19.4			34.2	46.0	11.8
400.978	L/P	V			13.0	21.0			34.0	46.0	12.0
400.978	L/P	H			15.9	21.0			36.9	46.0	9.1
323.274	L/P	V			17.5	19.2			36.7	46.0	9.3
323.274	L/P	H			17.4	19.2			36.6	46.0	9.4
324.015	E/D3	V			16.0	23.4			39.4	46.0	6.6
324.015	E/D3	H			18.9	23.4			42.3	46.0	3.7
56.32	E/D2	V			28.7	4.4			33.1	40.0	6.9
56.32	E/D2	H			26.7	4.4			31.1	40.0	8.9

Notes:

B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole

* Re-measured using dipole antenna.

** Includes cable loss when amplifier is not used.

*** Includes cable loss.

() Denotes failing emission level.

EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
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Radiated Photographs (Worst Case Configuration)

Front View

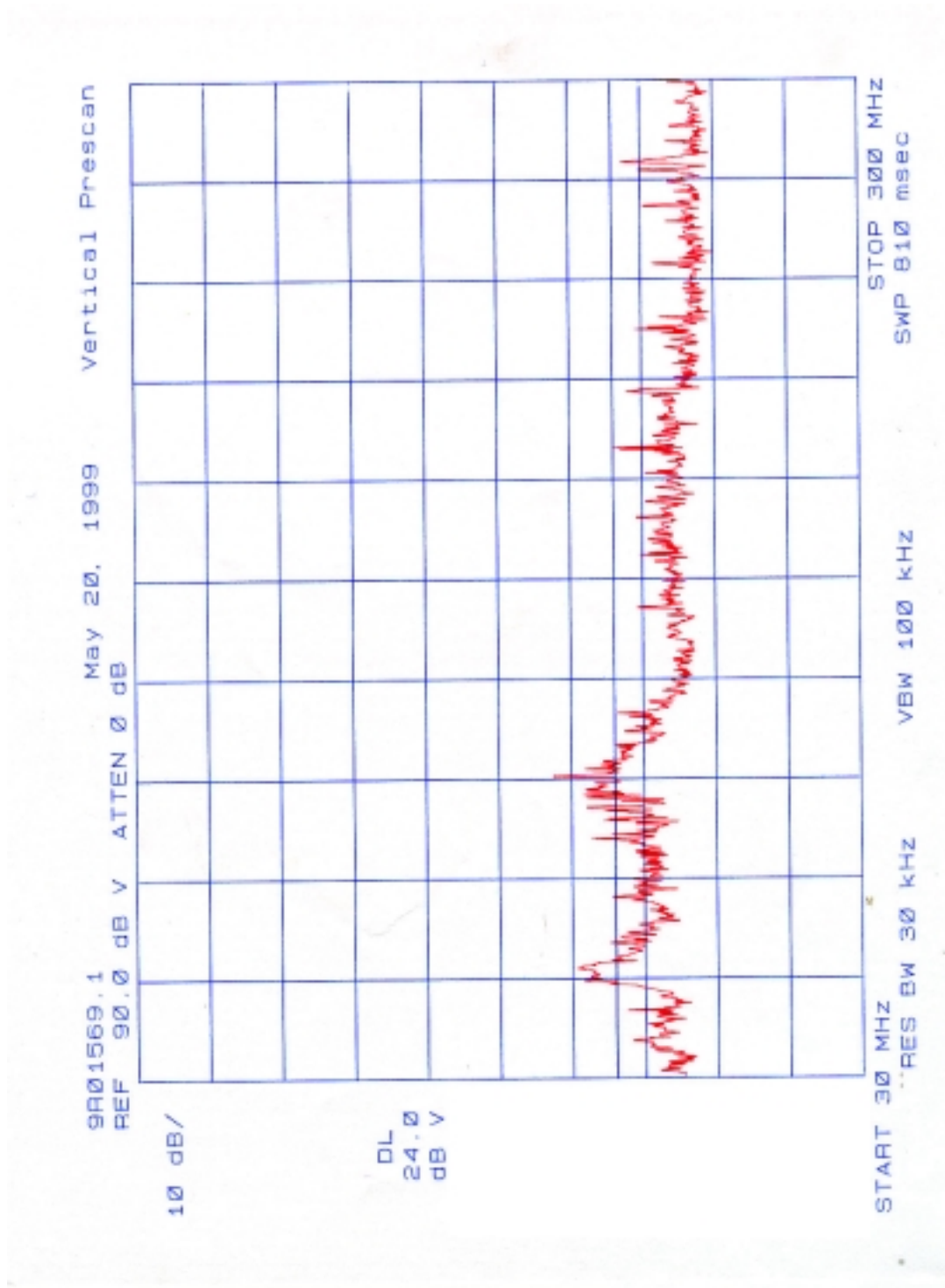


Rear View

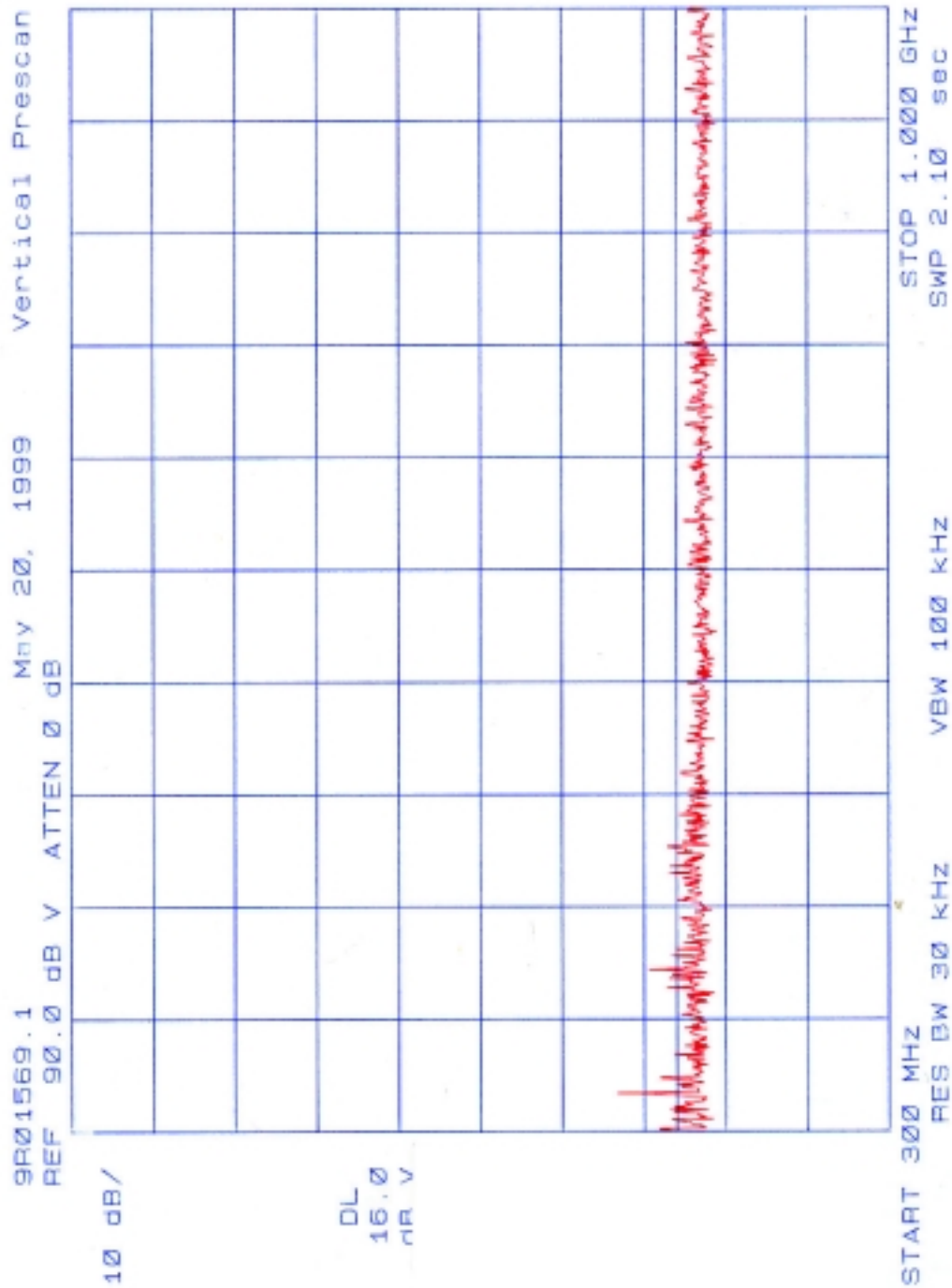


EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
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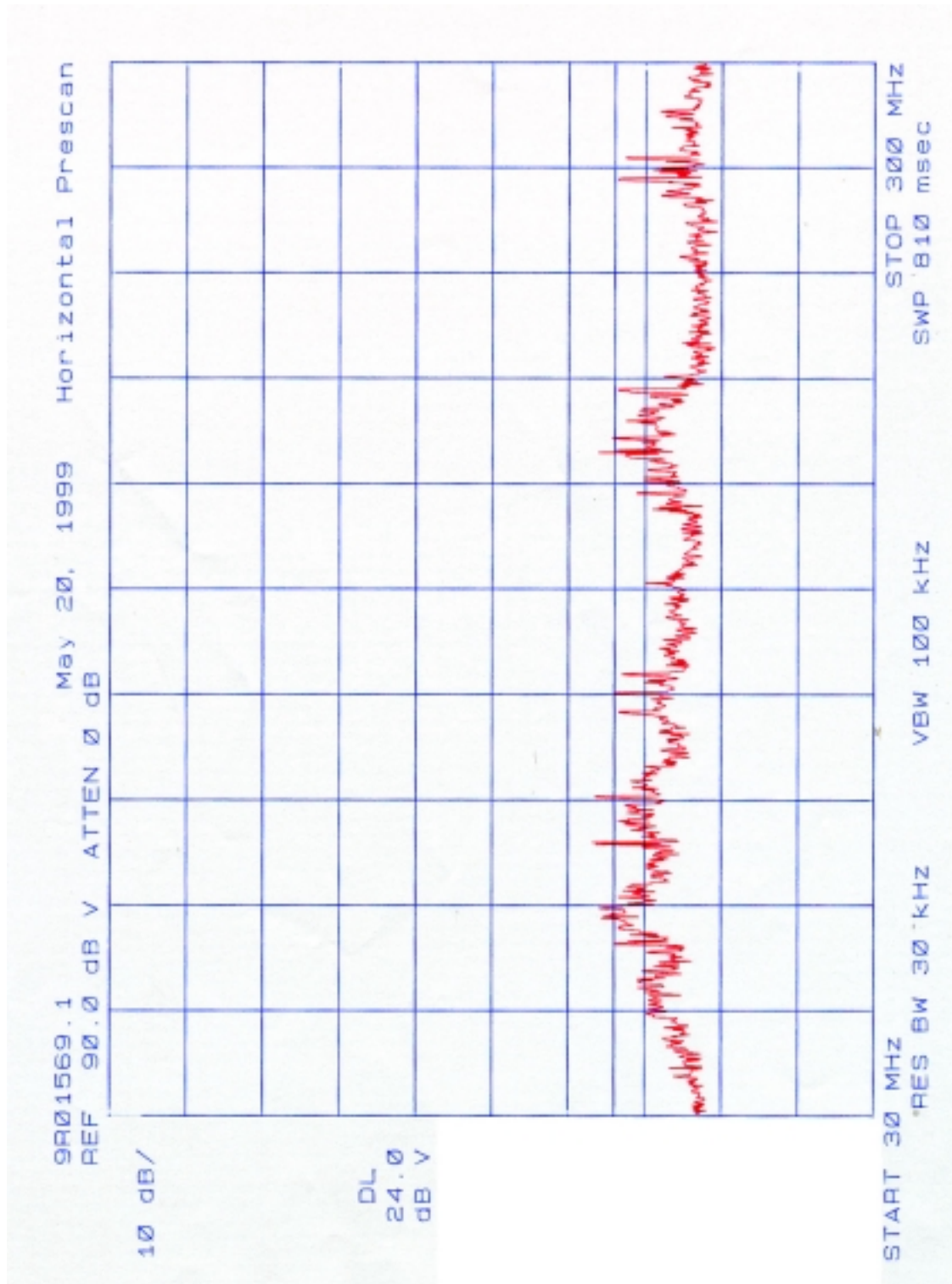
Pre-Scan Data



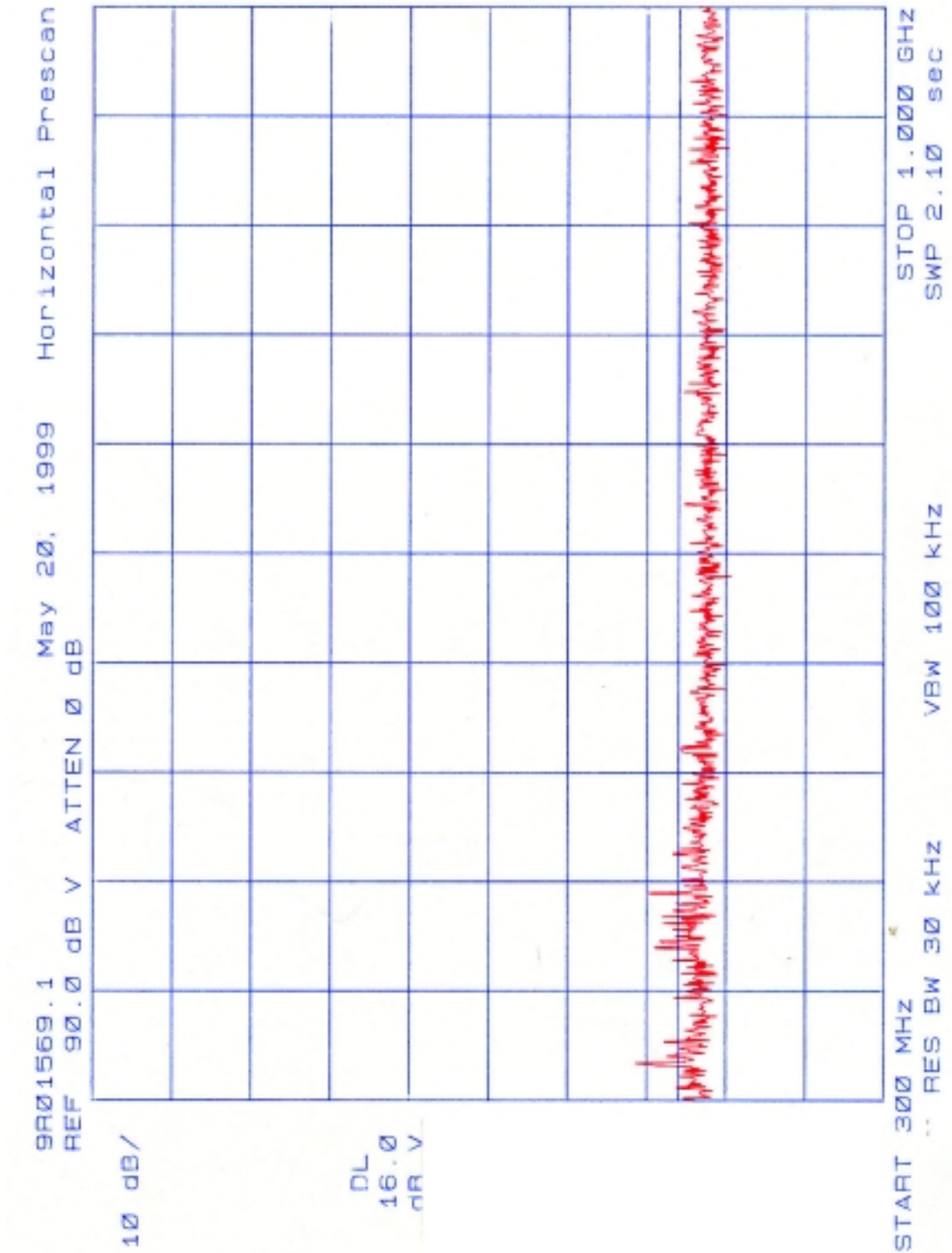
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EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
FCC ID: CIHTTX81X

Prescan Data

Project Number : 9R01569
 Project Filename : 9R1569.LST
 Date : May 20, 1999
 Start Frequency : 30 MHz
 Stop Frequency : 1000 MHz
 Display Line Value: 24 (30-300 MHz), 16 (300-1000MHz) dBuV

Vertical Prescan

Top 6 Emissions below 300 MHz from the vertical prescan list:

111.94 MHz, 31 dBuV.
 58.29 MHz, 28.9 dBuV.
 113.95 MHz, 26.4 dBuV.
 94.91 MHz, 26.2 dBuV.
 99.89 MHz, 26 dBuV.
 59.2 MHz, 25.7 dBuV.

Full Emission List below 300 MHz:

58.29 MHz, 28.9 dBuV. Peak.
 58.6 MHz, 24.9 dBuV. Peak.
 58.81 MHz, 24.8 dBuV. Peak.
 59.2 MHz, 25.7 dBuV. Peak.
 59.71 MHz, 25.5 dBuV. Peak.
 60 MHz, 24.4 dBuV. Peak.
 94.91 MHz, 26.2 dBuV. Peak.
 99.89 MHz, 26 dBuV. Peak.
 103.31 MHz, 25.6 dBuV. Peak.
 106.91 MHz, 24.8 dBuV. Peak.
 107.96 MHz, 25.6 dBuV. Peak.
 111.94 MHz, 31 dBuV. Peak.
 113.95 MHz, 26.4 dBuV. Peak.

Top Emissions above 300 MHz from the vertical prescan list:

324.02 MHz, 22.8 dBuV.
 401 MHz, 19.2 dBuV.
 395.38 MHz, 16.6 dBuV.
 323.28 MHz, 16.3 dBuV.
 477.83 MHz, 16.2 dBuV.

Full Emission List above 300 MHz:

323.28 MHz, 16.3 dBuV. Peak.
 324.02 MHz, 22.8 dBuV. Peak.
 395.38 MHz, 16.6 dBuV. Peak.
 401 MHz, 19.2 dBuV. Peak.
 477.83 MHz, 16.2 dBuV. Peak.

Horizontal Prescan

Top Emissions below 300 MHz from the horizontal prescan list:

99.88 MHz, 27.5 dBuV.
 200.47 MHz, 26.6 dBuV.
 79.07 MHz, 24.7 dBuV.

Full Emission List below 300 MHz:

79.07 MHz, 24.7 dBuV. Peak.
 99.88 MHz, 27.5 dBuV. Peak.
 200.47 MHz, 26.6 dBuV. Peak.

Top 6 Emissions above 300 MHz from the horizontal prescan list:

324.04 MHz, 19.1 dBuV.
 417.88 MHz, 18.6 dBuV.
 413.87 MHz, 18.4 dBuV.
 323.3 MHz, 17.9 dBuV.
 409.88 MHz, 17.8 dBuV.
 405.88 MHz, 17.4 dBuV.

Full Emission List above 300 MHz:

323.3 MHz, 17.9 dBuV. Peak.
 324.04 MHz, 19.1 dBuV. Peak.
 328.35 MHz, 16.3 dBuV. Peak.
 397.88 MHz, 16.5 dBuV. Peak.
 405.88 MHz, 17.4 dBuV. Peak.
 409.88 MHz, 17.8 dBuV. Peak.
 413.87 MHz, 18.4 dBuV. Peak.
 417.88 MHz, 18.6 dBuV. Peak.
 421.85 MHz, 16.2 dBuV. Peak.
 432.87 MHz, 17.3 dBuV. Peak.

EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
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Section 6. Sample Calculations

Conducted Emissions:

If the Quasi-Peak to Average ratio is greater than 6 dB, then the emission is classified as broadband and its Quasi-Peak level is reduced by 13 dB for comparison to the limit.

- i.e. Quasi-Peak level = 40 dB μ V
 Average level = 34 dB μ V
 Corrected level = 40 - 13 = 27 dB μ V

Radiated Emissions

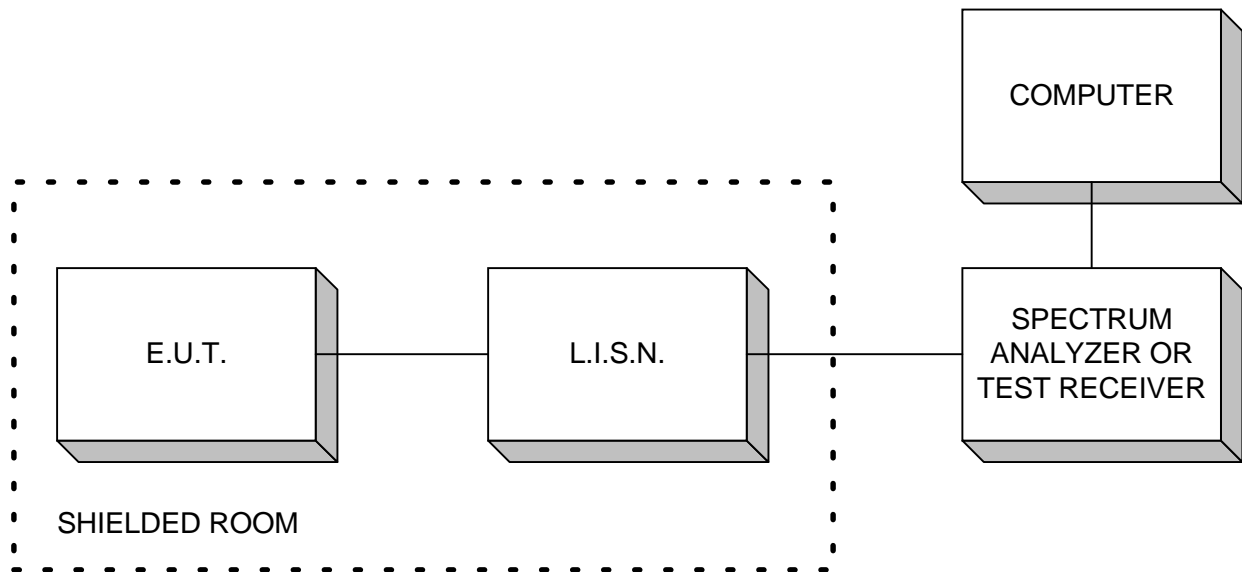
Emissions are measured at a distance of 3 meters and corrected for antenna factor and cable loss.

- i.e. Received Signal = 25 dB μ V @ 100 MHz
 Antenna Factor & Cable Loss = 9.8 dB
 Field Intensity = 25 + 9.8 = 34.8 dB μ V/m @ 3 m

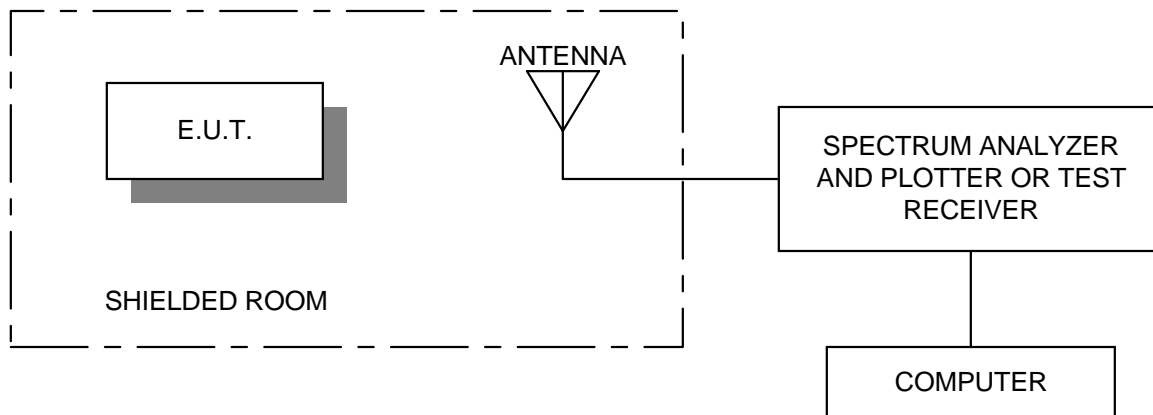
EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
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Section 7. Block Diagrams

Conducted Emissions

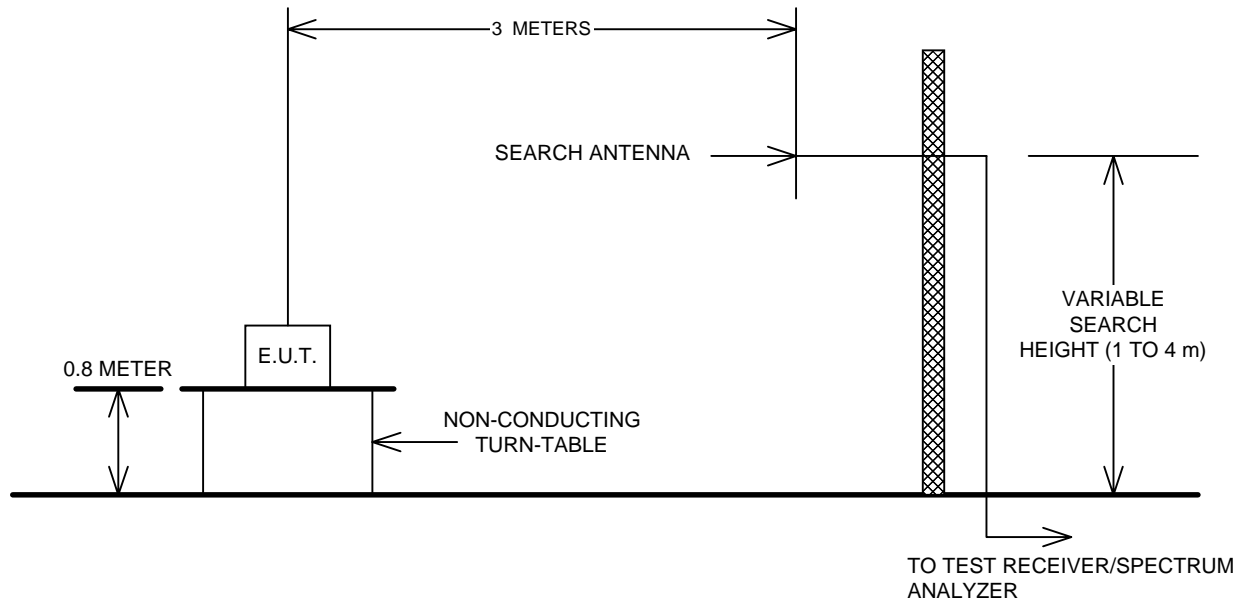


Radiated Prescan



EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
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Outdoor Test Site For Radiated Emissions



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

EQUIPMENT: TTX81X PC Card - TV Data Broadcast Receiver
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Section 8. Test Equipment List

Equipment List - Conducted Emissions - Shielded Room #1

CAL Cycle	Equipment	Manufacturer	Model #	Serial/Asset #	Last Cal.	Next Cal.
1 Year	LISN	Rohde & Schwarz	ESH2-Z5	890485/017	July 23/98	July 23/99
1 Year	LISN(peripheral)	Tegam	95300-50	T-109014/15	July 24/98	July 24/99
1 Year	Receiver	Rohde & Schwarz	ESH3	872079/053	July 23/98	July 23/99
1 Year	Spectrum analyzer	Hewlett-Packard	8566B	2311A02238	Oct. 22/98	Oct. 22/99
1 Year	Spectrum analyzer display	Hewlett-Packard	8566B	2314A04759	Oct. 22/98	Oct. 22/99
1 Year	Quasi-peak adapter	Hewlett-Packard	85650A	2043A00302	Oct. 22/98	Oct. 22/99
	Plotter	Hewlett-Packard	7550A	28484 15123	N/A	N/A
1 Year	Transient Limiter	Hewlett-Packard	1194 7A	3107A01766	July 21/98	July 21/99

Equipment List - Radiated Emissions

CAL Cycle	Equipment	Manufacturer	Model #	Serial/Asset #	Last Cal.	Next Cal.
	Biconilog Antenna	EMCO	3143	9404-1039	NCR	NCR
1 Year	Dipole Antenna Set	EMCO	3121C	1029	Nov. 18/98	Nov. 18/99
1 Year	Receiver	Rohde & Schwarz	ESVS-30	843710/002	Oct. 27/98	Oct. 27/99
1 Year	Spectrum Analyzer	Hewlett-Packard	8566B	2311A02238	Oct. 22/98	Oct. 22/99
1 Year	Spectrum Analyzer Display	Hewlett-Packard	8566B	2314A04759	Oct. 22/98	Oct. 22/99
1 Year	Quasi-Peak Adapter	Hewlett Packard	85650A	2043A00302	Oct. 22/98	Oct. 22/99
	Plotter	Hewlett-Packard	7550A	28484 15123	N/A	N/A
1 Year	Biconical (2) Antenna	EMCO	3109	9503-2894	June 2/98	June 2/99
1 Year	Log Periodic Antenna	EMCO	LPA-25	1141	July 27/98	July 27/99

Note: N/A = Not Applicable
NCR = No Cal Required