

1 SYSTEM TEST CONFIGURATION

1.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it).

It has been tested with a Hewlett Packard BRIO 6769A#ABF Personal computer. Each input/output of the Dual Channel Sound Card is connected on a "load box" simulating a typical user environment, and the headphone output is connected to a headphone.

During pre-scan evaluation, both sound card, PCX11+/24 and VX222 have been tested, and the PCX11+/24 has been identified as the worst case .

Consequently, all test results contained in this report are from the PCX11+/24 set in the HP BRIO 6769A personal computer.

At the time the test was performed, the name of the product wasn't definitive; that's why in data results, the name of the tested product is PCX11+ PCI V2. Each time PCX11+ PCI V2 name is used in data results, it should be replaced by PCX11+/24.

1.2 EUT Exercise software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The test software has been designed in order to exercise each part of the product involved in a typical use. Data are transmitted on each digital input and output.

Exercise software running under DOS system, the screen definition used was 640 x 480 pixels.

1.3 Special accessories

As shown in Figure 3.1, all interfaces cables used for compliance testing are shielded as normally supplied. All these cables are normally recommended to be used with the product.

1.4 Equipment modifications

No equipment modification has been necessary during testing to achieve compliance to Class B levels. The unit tested was a production representative unit.

1.5 Configuration of tested system.

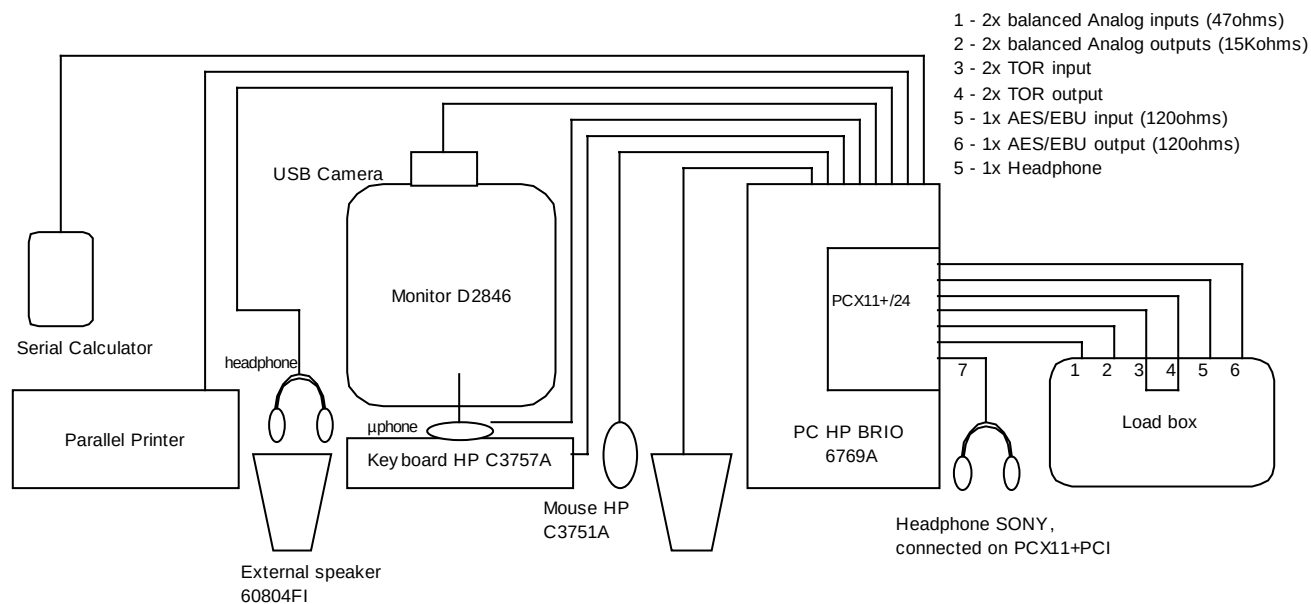


Fig 3.1

2 CONDUCTED EMISSION DATA

2.1 Test procedure

The product has been tested according to ANSI C63.4-1992, CISPR22-1993/A1:1995 and EN55022:1994/A1:1995.

The product has been tested with 120V / 60Hz power line voltage and compared to the CISPR22 Class B limits. Measurement bandwidth was 9KHz from 150 KHz to 30 MHz.

Measurement was initially made with an HP-8568B Spectrum Analyzer in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement with the HP-85650A Quasi-Peak Adapter on the analyzer for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

Both the Peak and Quasi-Peak data are shown on the following plots. Where a Quasi-Peak measurement has been performed, a Quasi-Peak trace has been added under the Peak trace in order to show the QP level. Area where Quasi-Peak measurement were performed and other points of interest are detailed in a table with frequencies and levels measured.

Interconnecting cables and equipment's were moved to position that maximized emission. A summary of the worst case emissions found in all test configurations and modes is shown on the following page.

Test equipment :

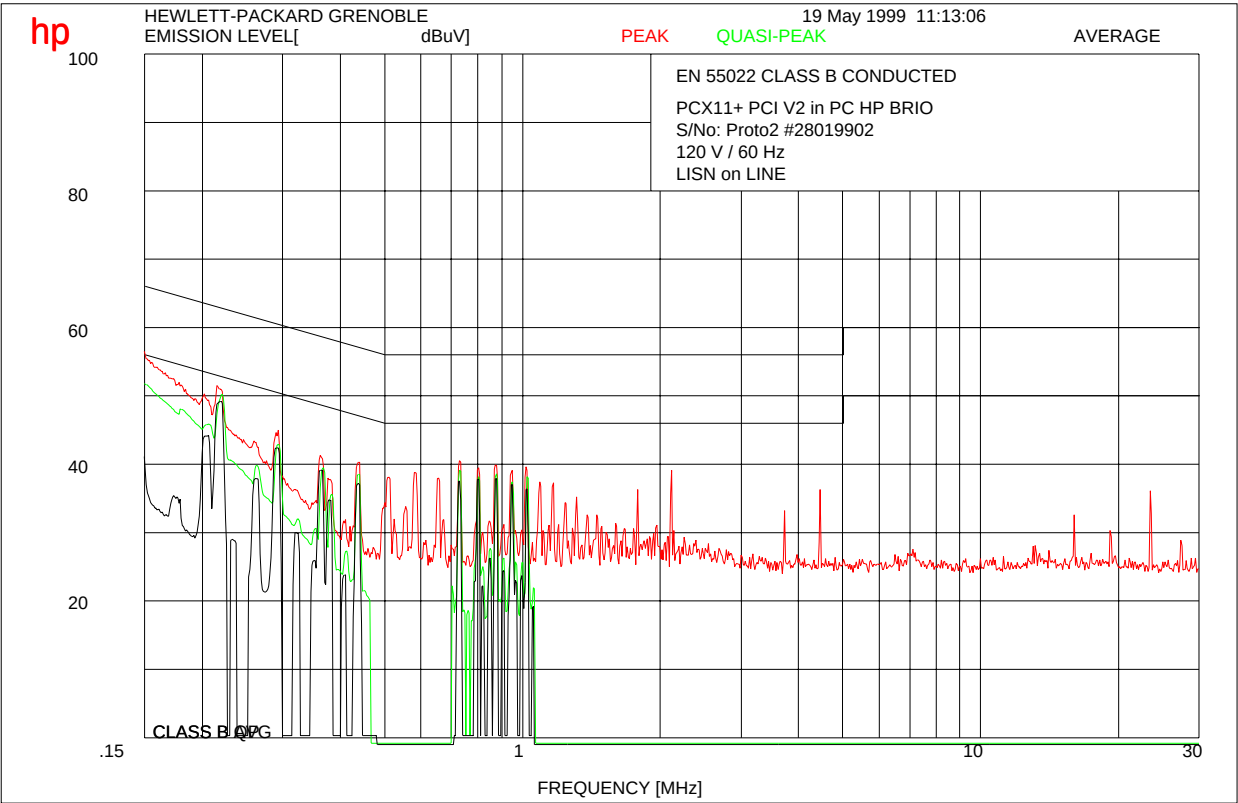
HP 8568B Analyzer

HP 85650A Quasi Peak adapter

Rhode & Schwarz ESH2-Z5, LISN N° 1

Rhode & Schwarz ESH2-Z5, LISN N° 2

2.2 Line conducted emission data



- Quasi peak:

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HEWLETT-PACKARD GRENOBLE 19 May 1999 11:13:06

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1. CONDUCTED

1.2 EN55022/CISPR 22 CLASS B S2 JAN97

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Quasi-Peaks above -30 dB of Limit Line #1

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV)	DELTA
1	.2207	50.2	-12.5
2	.7301	39.1	-16.9
3	.8788	38.6	-17.4
4	.2938	42.9	-17.5
5	.8031	38.2	-17.8
6	1.025	38.2	-17.8
7	.4393	38.5	-18.5
8	.9514	37.4	-18.6
9	.3689	39.5	-19.0
10	.3848	35.6	-22.5
11	.8513	27.7	-28.3
12	.9119	26.3	-29.7

- Average:

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HEWLETT-PACKARD GRENOBLE 19 May 1999 11:13:06

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1. CONDUCTED

1.2 EN55022/CISPR 22 CLASS B S2 JAN97

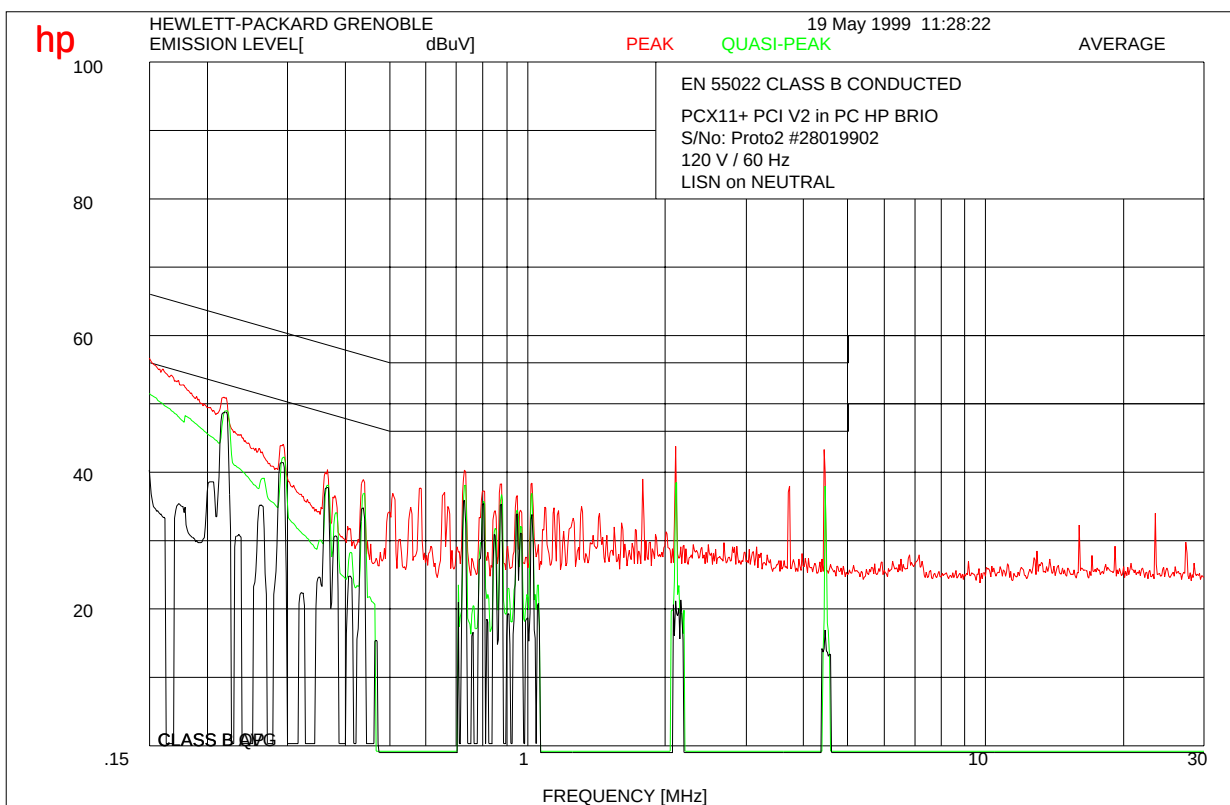
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Avg Peaks above -30 dB of Limit Line #2

peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV)	DELTA
1	.2196	49.2	-3.6
2	.2907	42.4	-8.1
3	.8741	37.9	-8.1
4	.7989	37.8	-8.2
5	.7263	37.5	-8.5
6	.9463	37	-9.0
7	.2072	44.2	-9.1
8	.3631	39.1	-9.5
9	1.025	36.4	-9.6
10	.4393	37.2	-9.8
11	.2615	37.9	-13.4
12	.3788	34.8	-13.5
13	.8513	26.3	-19.7
14	.3197	30	-19.7
15	.9071	24.4	-21.6
16	.2327	29	-23.3
17	.4101	23.8	-23.8
18	.8203	22.2	-23.8
19	1.058	19.2	-26.8

2.3 Neutral conducted emission data



- Quasi peak:

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1. CONDUCTED

1.2 EN55022/CISPR 22 CLASS B S2 JAN97

Quasi-Peaks above -30 dB of Limit Line #1
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV)	DELTA
1	2.116	38.5	-17.5
2	.7301	38.1	-17.9
3	4.462	38	-18.0
4	.2938	42.2	-18.2
5	1.025	36.9	-19.1
6	.8788	36.7	-19.3
7	.4393	36.9	-20.1
8	.8031	35.8	-20.2
9	.3669	38.1	-20.4
10	.9514	34.5	-21.5
11	.3828	34.1	-24.1
12	.8513	31.8	-24.2

- Average:

HEWLETT-PACKARD GRENOBLE 19 May 1999 11:28:22

1. CONDUCTED

1.2 EN55022/CISPR 22 CLASS B S2 JAN97

Avg Peaks above -30 dB of Limit Line #2
peak criteria = 6 dB

PEAK#	FREQ (MHz)	(dBuV)	DELTA
1	.2196	48.8	-4.0
2	.2907	41.4	-9.1
3	.7301	35.9	-10.1
4	.8031	35.4	-10.6
5	.3669	37.8	-10.7
6	.8788	35.3	-10.7
7	.9514	33.9	-12.1
8	.4393	34.8	-12.2
9	1.025	33.8	-12.2
10	.9666	31.1	-14.9
11	.8468	30.9	-15.1
12	.2615	35.2	-16.1
13	.3808	30.7	-17.5
14	.2352	30.9	-21.3
15	.4079	24.8	-22.8
16	2.161	21.3	-24.7
17	.7073	21	-25.0
18	1.058	20.8	-25.2
19	.9071	19.3	-26.7
20	.3214	22.4	-27.2
21	.816	18.5	-27.5
22	4.462	16.9	-29.1
23	.7617	16.6	-29.4

3 RADIATED EMISSION DATA

3.1 Test Procedure

The product has been tested according to ANSI C63.4-1992, CISPR 22-1993/A1:1995 and EN55022:1994/A1:1995.

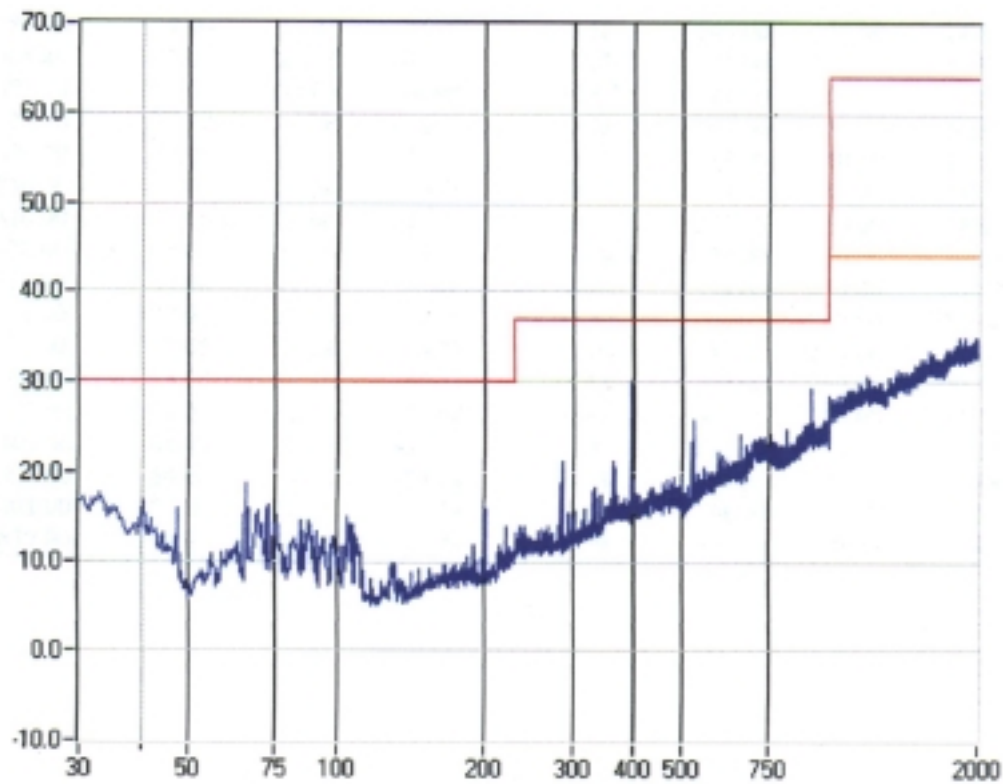
The product has been tested with 230V / 50Hz power line voltage, at a distance of 10 meters from the antenna and compared to the CISPR 22 Class B limits. Measurement bandwidth was 120 KHz from 30 MHz to 1 GHz and 1 MHz upon 1 GHz.

Antenna height search was performed from 0.9m to 4m for both horizontal and vertical polarization. Continuous linear turntable azimuth search was performed with 360 degrees range.

Interconnecting cables and equipment's were moved to position that maximized emission. A summary of the worst case emissions found in all test configurations and modes is shown on the following page.

Test Equipment: HP-8574A E.M.I Receiver
(HP-8568B Analyzer + HP-85650A Quasi-Peak adapter + HP-85685A RF Preselector).
HP 8563E 30Hz - 26.5GHz Spectrum Analyzer
EMCO 3110 Biconical Antenna S/No 1245 & EMCO 3146 Log Periodic Antenna S/No 1151
EMCO-1050, 6 meters height antenna mast & EMCO-1060, 3 meters diameter Turntable.
EMCO 3147, 200MHz - 5GHz Log Periodic Antenna S/No 1109
EMCO 3147, 200MHz - 5GHz Log Periodic Antenna S/No 1110

3.2 Radiated emission data



Final result:

Frequency (MHz)	QPeak Lmt (dBuV/m)	QPeak (dBuV/m)	Peak (dBuV/m)	QPeak-Lmt (dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)
67.01	30.00	17.34	19.17	-12.66	121	V	216	8.28
73.73	30.00	17.94	19.06	-12.06	0	V	213	8.42
396.01	37.00	31.49	31.97	-5.51	139	H	299	18.36
528.02	37.00	31.55	32.59	-5.45	177	H	199	20.87
660.02	37.00	24.94	27.81	-12.06	131	H	142	23.51
816.14	37.00	22.42	26.06	-14.58	303	H	204	24.86
912.13	37.00	26.95	29.78	-10.05	156	H	225	26.57

3.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follow :

$$FS = RA + AF + CF - AG$$

Where FS = Field Strength
 RA = Receiver Amplitude
 AF = Antenna Factor
 CF = Cable Factor
 AG = Amplifier Gain

Assume a receiver reading of 52.5dBμV is obtained. The antenna factor of 7.4 and a cable factor of 1.1 is added. The amplifier gain of 29dB is subtracted, giving a field strength of 32 dBμV/m.

$$FS = 52.5 + 7.4 + 1.1 - 29 = 32 \text{ dB}\mu\text{V/m}$$

The 32 dBμV/m value can be mathematically converted to its corresponding level in μV/m.

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm} [(32\text{dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}.$$