6 CONDUCTED EMISSION DATA

6.1 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.
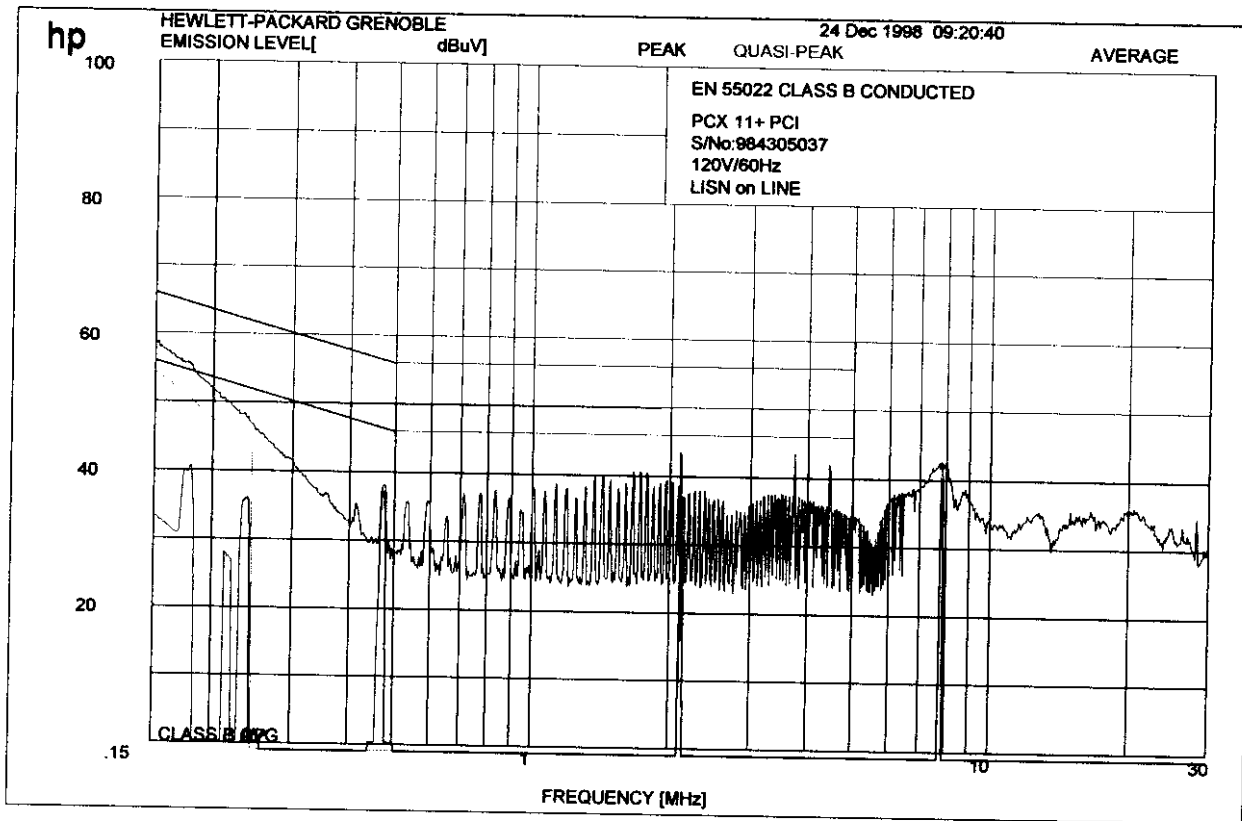
Test equipment :
HP 8568B Analyzer
HP 85650A Quasi Peak adapter
Rhode & Schwarz ESH2-Z5, LISN N° 1
Rhode & Schwarz ESH2-Z5, LISN N° 2

6.3   Line conducted emission data


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hp                HEWLETT-PACKARD GRENOBLE                              24 Dec 1998  09:20:40
    100           EMISSION LEVEL[          dBuV]        PEAK    QUASI-PEAK           AVERAGE
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(Chart showing EN 55022 CLASS B CONDUCTED / PCX 11+ PCI / S/No:984305037 / 120V/60Hz / LISN on LINE)

FREQUENCY [MHz]

<table>
<tr><td colspan="4">-   Quasi peak:</td></tr>
<tr><td colspan="4">==</td></tr>
<tr><td colspan="4">HEWLETT-PACKARD GRENOBLE   24 Dec 1998 09:20:40</td></tr>
<tr><td colspan="4">==</td></tr>
<tr><td colspan="4">1. CONDUCTED
  1.2   EN55022/CISPR 22 CLASS B S2 JAN97</td></tr>
<tr><td colspan="4">==</td></tr>
<tr><td colspan="4">Quasi-Peaks above -30 dB of Limit Line #1
peak criteria = 6 dB</td></tr>
<tr><td>PEAK#</td><td>FREQ (MHz)</td><td>(dBuV)</td><td>DELTA</td></tr>
<tr><td>1</td><td>7.779</td><td>42.4</td><td>-17.6</td></tr>
<tr><td>2</td><td>2.105</td><td>38.1</td><td>-17.9</td></tr>
</table>

<table>
<tr><td colspan="4">-   Average:</td></tr>
<tr><td colspan="4">==</td></tr>
<tr><td colspan="4">HEWLETT-PACKARD GRENOBLE   24 Dec 1998 09:20:40</td></tr>
<tr><td colspan="4">==</td></tr>
<tr><td colspan="4">1. CONDUCTED
  1.2   EN55022/CISPR 22 CLASS B S2 JAN97</td></tr>
<tr><td colspan="4">==</td></tr>
<tr><td colspan="4">Avg Peaks above -30 dB of Limit Line #2
peak criteria = 6 dB</td></tr>
<tr><td>PEAK#</td><td>FREQ (MHz)</td><td>(dBuV)</td><td>DELTA</td></tr>
<tr><td>1</td><td>.4756</td><td>37.2</td><td>-9.2</td></tr>
<tr><td>2</td><td>7.779</td><td>40.2</td><td>-9.8</td></tr>
<tr><td>3</td><td>.1805</td><td>40.7</td><td>-13.7</td></tr>
<tr><td>4</td><td>2.138</td><td>31.2</td><td>-14.8</td></tr>
<tr><td>5</td><td>.239</td><td>36.1</td><td>-16.0</td></tr>
<tr><td>6</td><td>.2138</td><td>28</td><td>-25.0</td></tr>
</table>

7 RADIATED EMISSION DATA

7.1 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).
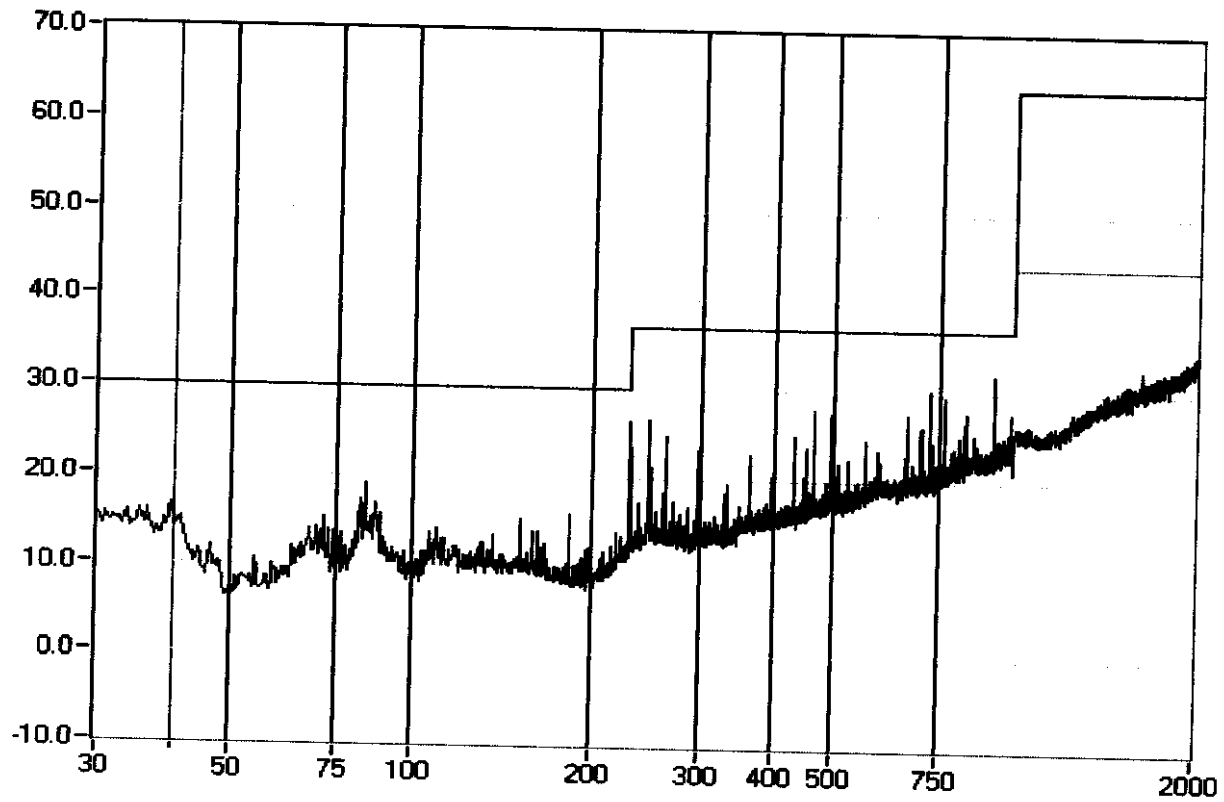HP 8563E 30Hz - 26.5GHz Spectrum Analyzer
EMCO 3110 Biconical Antenna S/No 1245 & EMCO 3146 Log Periodic Antenna S/No 1151
EMCO-1050, 6 meters height antenna mast & EMCO-1060, 3 meters diameter Turntable.
EMCO 3147, 200MHz - 5GHz Log Periodic Antenna S/No 1109
EMCO 3147, 200MHz - 5GHz Log Periodic Antenna S/No 1110

7.2 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)
464.65	37.00	27.47	29.41	-9.53	106	H	155	18.56
725.98	37.00	29.53	31.08	-7.47	17	V	312	21.54
763.29	37.00	32.22	34.63	-4.78	176	V	253	22.16
829.26	37.00	28.58	31.33	-8.42	47	H	281	22.94
923.99	37.00	35.17	36.46	-1.83	168	H	334	23.77
989.98	37.00	31.62	33.39	-5.38	167	V	345	24.93

7.3   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. Tha amplifier gain of 29dB is subtracted, giving a field strength of 32 dBμV/m.

FS = 52.5 + 7.4 + 1.1 – 29 = 32 dBμV/m

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

Level in μV/m = Common Antilogarithm [(32dBμV/m)/20] = 39.8 μV/m.
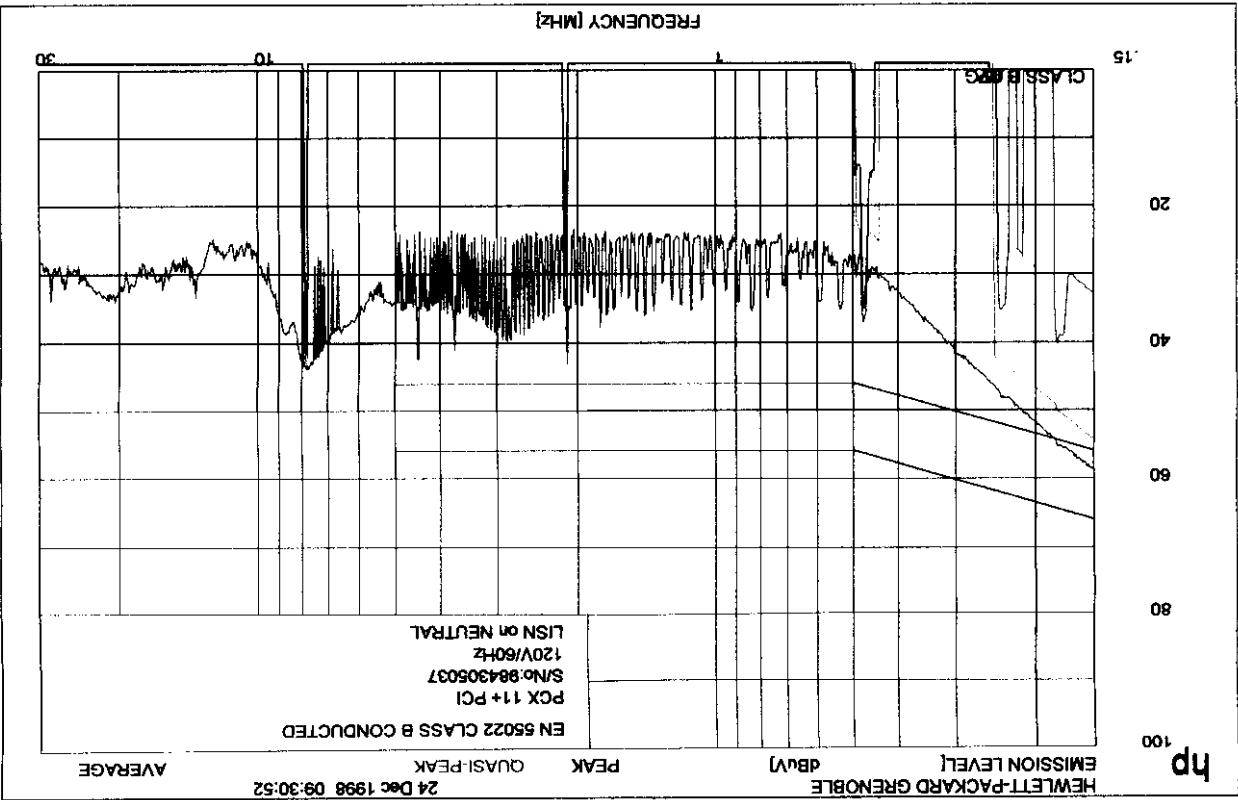
- Quasi peak:

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HEWLETT-PACKARD GRENOBLE     24 Dec 1998  09:30:52
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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	.7779	43.7	-16.3
2	2.105	38.1	-17.9
3	.4781	35.1	-21.2

- Average:

```
==============================================================
HEWLETT-PACKARD GRENOBLE     24 Dec 1998  09:30:52
==============================================================
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	.7779	41.5	-8.5
2	.4756	34.8	-11.6
3	.1796	36.9	-14.6
4	.239	35.1	-17.0
5	2.138	27.8	-18.2
6	.2138	27.5	-25.5

HEWLETT-PACKARD GRENOBLE   24 Dec 1998 09:30:52

EMISSION LEVEL (dBuV)

PEAK   QUASI-PEAK   AVERAGE

EN 55022 CLASS B CONDUCTED
PCX 11+ PCI
S/No:984305037
120V/60Hz
LISN on NEUTRAL

FREQUENCY [MHz]

CLASS B PCB

hp