1 TEST REPORT

1.1 System test configuration

1.1.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it). The NCX was connected to a Hewlett Packard Brio 6769A Personal computer. Each In/Out audio ports were connected on a "load box" simulating a typical user environment. The Ethernet connector is set with a Lan Cat5 cable which is looped on itself. An headphone is also connected to the audio out output.
During pre-scan evaluation, all different NCXs have been tested: NCX200, NCX,400, NCX040, NCX220.
The NCX220 has been identified as the worst case.
Consequently, all test results contained in this report are from the NCX220.

1.1.2 EUT Exercise software

The EUT exercise program used during radiated and conducted testing was designed to exercise the NCX in a manner similar to a typical use (PC manage the NCX and data are transmitted on each audio inputs and outputs). Software is running on PC under Windows98 and is called NCXCEM.

1.1.3 Special accessories

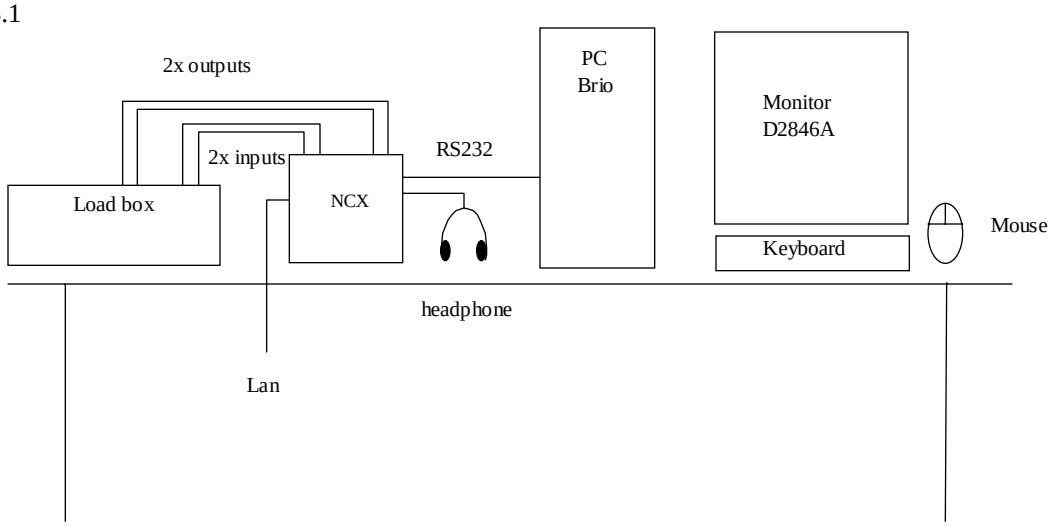
As shown in Figure 3.1, all interfaces cables used for compliance testing are shielded (except Lan cable which is unshielded) as normally supplied. All these cables are normally recommended to be used with the NCX.

1.1.4 Equipment modifications

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

1.1.5 Configuration of tested system

Fig 3.1



Inputs are connected to 47Ω load.
Outputs are connected to 15 KΩ load.

1.2 Conducted emission data

1.2.1 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.

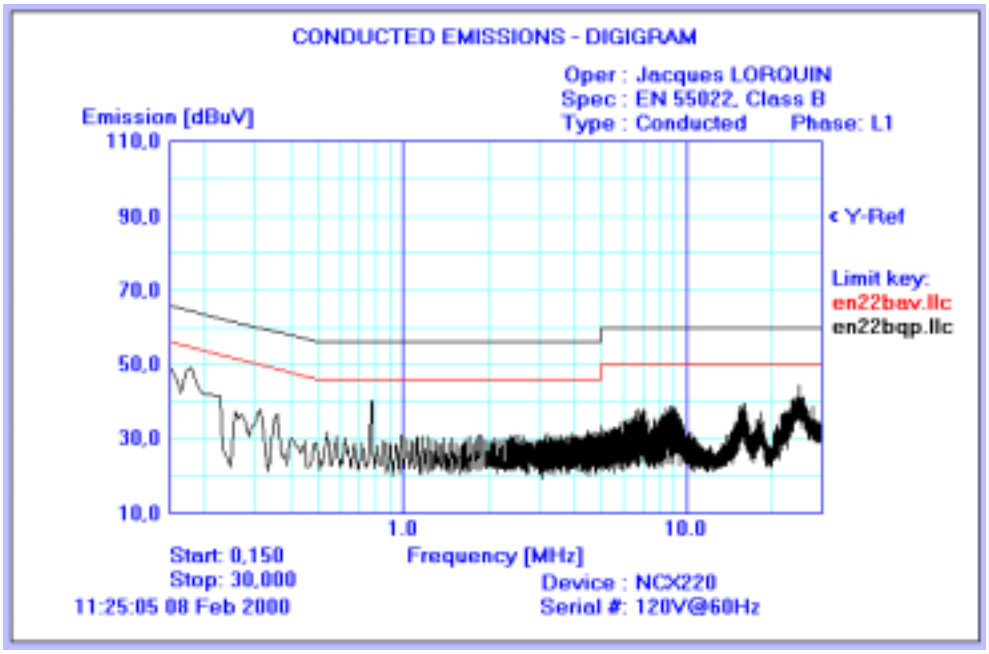
Measurement was initially made with an HP-8591EM Spectrum Analyzer in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement with the Rohde & Schwarz ESH3 receiver for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.

The Peak data are shown on the following plots. Quasi-Peak and Average measurements 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.

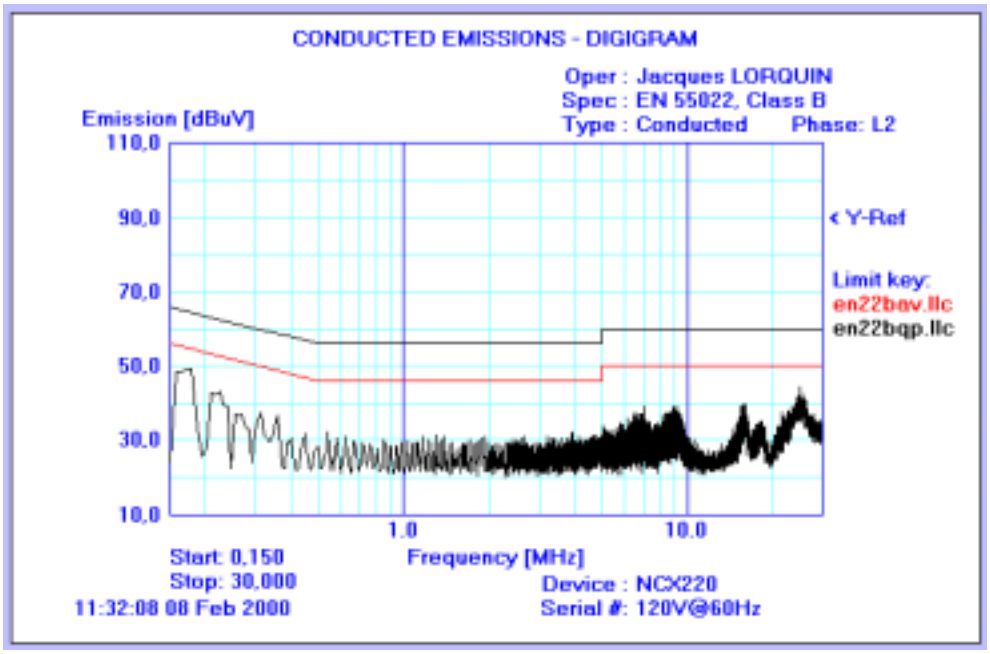
Test equipment :
HP 8591EM Spectrum Analyzer
Rhode & Schwarz ESH3 Receiver
EMCO 3810/2SH LISN N°1
TELEMETER NNB-2/16L LISN N°2

1.2.2 Neutral conducted emission data on NCX220



Num.	Freq. [MHz]	Peak [dBµV]	Q-Peak [dBµV]	QP limit [dBµV]	***QP delta [dBµV]***	Average [dBµV]	AVG Limit [dBµV]	***AVG Delta [dBµV]***
1	0,150	53,65	45,49	64,00	-18,51	29,12	54,00	-24,88
2	0,180	52,09	48,91	64,00	-15,09	35,06	54,00	-18,94
3	0,220	46,16	42,26	62,00	-19,74	29,57	52,00	-22,43
4	0,360	39,08	33,29	58,00	-24,71	25,33	48,00	-22,67
5	0,770	37,42	28,88	56,00	-27,12	21,52	46,00	-24,48
6	24,89	45,00	39,57	60,00	-20,43	30,74	50,00	-19,26

1.2.3 Line conducted emission data on NCX220



Num.	Freq. [MHz]	Peak [dBµV]	Q-Peak [dBµV]	QP limit [dBµV]	***QP delta [dBµV]***	Average [dBµV]	AVG Limit [dBµV]	***AVG Delta [dBµV]***
1	0,180	51,50	48,62	64,00	-15,38	34,56	54,00	-19,44
2	0,220	45,66	42,70	62,00	-19,3	29,82	52,00	-22,18
3	0,310	38,83	33,88	58,00	-24,12	29,18	48,00	-18,82
4	0,360	40,23	35,38	58,00	-22,62	27,80	48,00	-20,2
5	15,93	39,87	35,07	60,00	-24,93	25,85	50,00	-24,15
6	24,91	45,24	40,98	60,00	-19,02	33,89	50,00	-16,11

1.3 RADIATED EMISSION DATA

1.3.1 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. Antenna height search was performed from 1m to 4m for both horizontal and vertical polarization. Continuous linear turntable azimuth search was performed with 360 degrees range. In first, the frequencies are identified in the full anechoic chamber at 3 meters and then are measured on the Open Area Test Site.
The plots on the following page shown only the frequency identification.
The table just after shown the measured levels.

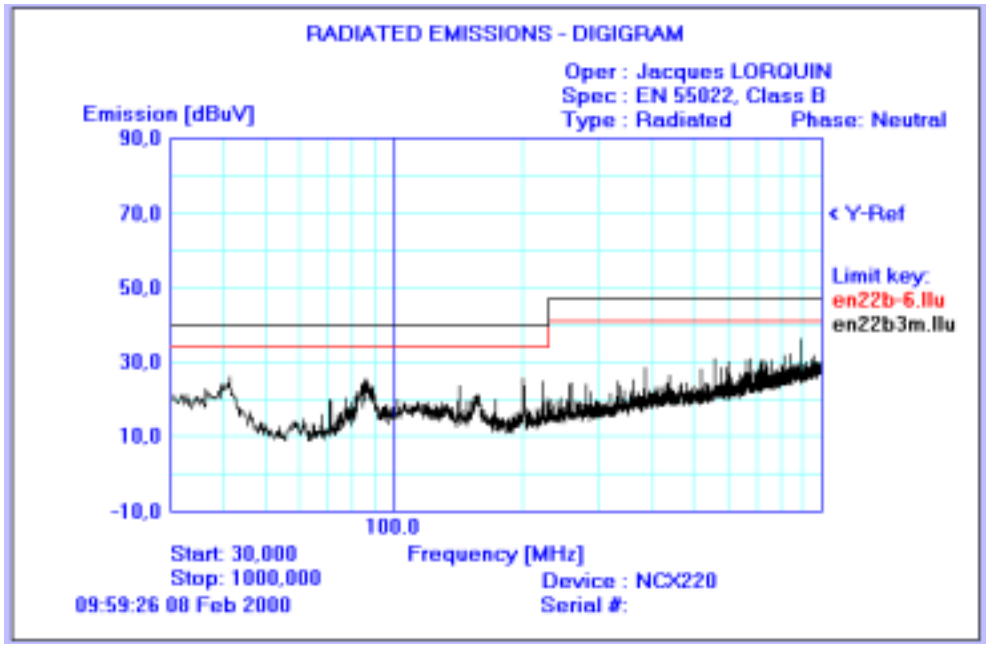
Interconnecting cables and equipment's were moved to position that maximized emission. A summary of the worst case emissions found in all test configurations and modes is shown on the following page.

Test Equipment: HP-8574A E.M.I Receiver
(HP-8568B Analyzer + HP-85650 Quasi-Peak adapter + HP-85685A RF Preselector).
EMCO 3104C Biconical Antenna & EMCO 3146 Log Periodic Antenna
EMCO-1050, 6 meters height antenna mast & EMCO-1060, 3 meters diameter Turntable.

1.3.2 Radiated emission data

Final result 30-1000 MHz

Graph example in full anechoic chamber- 30-1000MHz



Frequency (MHz)	QPeak Lmt (dBµV/m)	QPeak (dBµV/m)	QPeak-Lmt (dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)
31.73	30	25.1	-4.9	73	V	105	13.0
41.52	30	28.6	-1.4	260	V	104	11.2
70.67	30	27.3	-2.7	279	V	104	9.8
222.27	30	24.2	-5.8	112	H	276	14.3
257.72	37	31.1	-5.9	292	H	311	15.4
520.01	37	32.9	-4.1	343	H	261	22.6
560.02	37	34.4	-2.6	335	H	223	23.1
600.00	37	35.1	-1.9	299	H	171	23.7
640.01	37	30.4	-6.6	192	H	240	24.8
840.05	37	32.3	-4.7	11	H	302	27.8
890.99	37	34.8	-2.2	196	H	255	28.7
926.09	37	32.3	-4.7	196	V	255	29.3

1.3.3 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 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.