MEASUREMENT/TECHNICAL REPORT

DIGIGRAM - PCX820np/PCX800np

FCC ID: IGT820NP

April 22, 1998

This report concerns : Original grant___X___ Class II change _____

*Class B verification_____ *Class A verification_____ *Class I change _____

Equipment type: Audio PC Board

Request issue of grant :

_ X __Immediately upon completion of review.

_____ Defer grant per 47 CFR 0.457(d)(1)(ii) until _____date____. Company Name agrees to notify the Commission by ____date____ of the intended date of announcement of the product so that the grant can be issued on that date.

Confidentiality of grant:

_____Applicant requests the existence of this grant to be kept confidential until ___date__. The announcement of this product before this date via freedom of information would be detrimental to Company Name, and therefore must be considered a business secret. Public announcement of this product will not be made prior to this date. *(Max. 60 days after grant issued).*

Limits used: *(check one)*

CISPR 22 _____X_____ Part 15_____

Measurement procedure used is ANSI C63.4-1992 unless another is specified.

Other test procedure: _____

Application for Certification prepared by:

François POITEVIN
DIGIGRAM
Parc de Pré Milliet
38330 MONTBONNOT - FRANCE
Ph. : (33) 4 76 52 47 47
Fax : (33) 4 76 52 18 44

Applicant for this device:

Philippe GIRARD-BUTTOZ
DIGIGRAM
Parc de Pré Milliet
38330 MONTBONNOT - FRANCE
Ph. : (33) 4 76 52 47 47
Fax : (33) 4 76 52 18 44

**Not to be filed with Equipment Authorization Branch of FCC unless requested.*

Report format prepared by the Information Technology Industry Council (ITI) ESC-5 and reviewed by FCC staff in 1994.

Table of Contents

1 GENERAL INFORMATION

1.1 Product Description

PCX820np is a PCI bus PC-Card intended for professional sound recording and editing application on a personal computer.
The PCX820np provides one stereo or two mono input channels and four stereo or eight mono outputs channels, balanced analog audio outputs, wordclock synchronization input, and one optional board :
.....- MIDI/SMPTE time code on additional PC slot
It provides recording, processing and playback functionality.
The main processing functions are :
.....- Real-time MPEG audio compression and decompression
.....- Playback in PCM mode on four independant stereo channels
.....- Real time mixing of several PCM or MPEG audio files on one or several outputs.

PCX800np is the same board than PCX820np without audio input. All the measurments have been performed on the PCX820np board, which is the most complete product.
See Attachment A for further description and technical features of the submitted product.

1.2 Related Submittal(s)/Grant(s)

All host equipment used in the test configuration are FCC granted, when relevant.

1.3 Tested System Details

The FCC IDs for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

Model Number (Serial Number)	FCC ID	Description	Cable Description
PCX820nP card (1) (975303702)	IGT820NP	Audio PC board	Shielded signal cable.
VECTRA VL Series 3 5/75 FR53352782	K4UVECTRAVL5	Personal Computer	Unshielded power cord.
HP D2846 (JP74001005)	N/A - Déclaration of Conformity	21" Video monitor	Shielded video cable
HP C3751B LCA52435792	DZL210582	Mouse	Shielded cable
HP C3757A (F62008)	CIGE03614	Keyboard	Shielded cable
HP C2145A (US5301105F)	B94C2145X	Printer, Parrallel I/F Deskjet 850C	HP24542D - Shielded cable
HP7475A (2807L77281)	BSD4TE7475A	Serial plotter	HP24542G - Shielded cable

(1) EUT submitted for grant.
N/A = Not Applicable

1.4 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4-1992, CISPR 22-1993/A1:1995 and EN55022:1994/A1:1995.
Radiated testing was performed at an antenna to EUT distance of 10 meters. During testing, all equipments and cables were moved relative to each other in order to identify the worst case set up.

1.5 Test Facility

The test facility used to collect the radiated and conducted data is the Hewlett Packard Quality Engineering Test Center B10 EMI facility located 5 Avenue Raymond Chanas - EYBENS, 38053 GRENOBLE, FRANCE. This test facility has been fully described in a report and accepted by the FCC as compliant with the radiated and AC line conducted test site criteria in ANSI C63.4-1992 in a letter dated August 19, 1996 (31040/SIT, 1300F2). This test facility has also been accredited by COFRAC (french accreditation authority for european union test lab accreditation organization), accreditation number 1-0199 as compliant with test site criteria and competence in EN 55022 / CISPR22 norms for 89/336/EEC European EMC Directive application. All pertinent data for this test facility remains unchanged.

2 PRODUCT LABELING

Figure 2.1 FCC ID Label

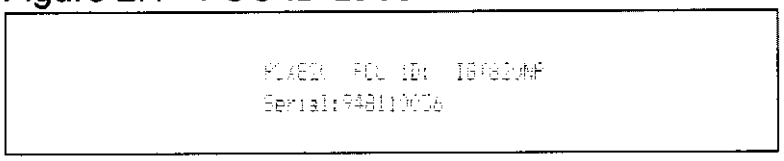


Figure 2.2 Location of Label on EUT

Label is sticked on the board, foil side. (See photo of board in this file).

3 SYSTEM TEST CONFIGURATION

3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it). It has been tested with a Vectra VL Series 3 5/75 Personal Computer. Each audio input / output is connected on a "load box" simulating a user environment. The board PCX820nP has been tested with MIDI/SMPTE option, as it's the worst case found during preliminary tests, among PCX820np and PCX800np. Speed selection at 8 Mhz has been performed, but the highest emission was found for the high speed selection. Exercise software running under Windows 95 system, the screen definition used was 640 x 480 pixels.

3.2 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 PC involved in a typical use. Data are transmitted on each output.

3.3 Special Accessories

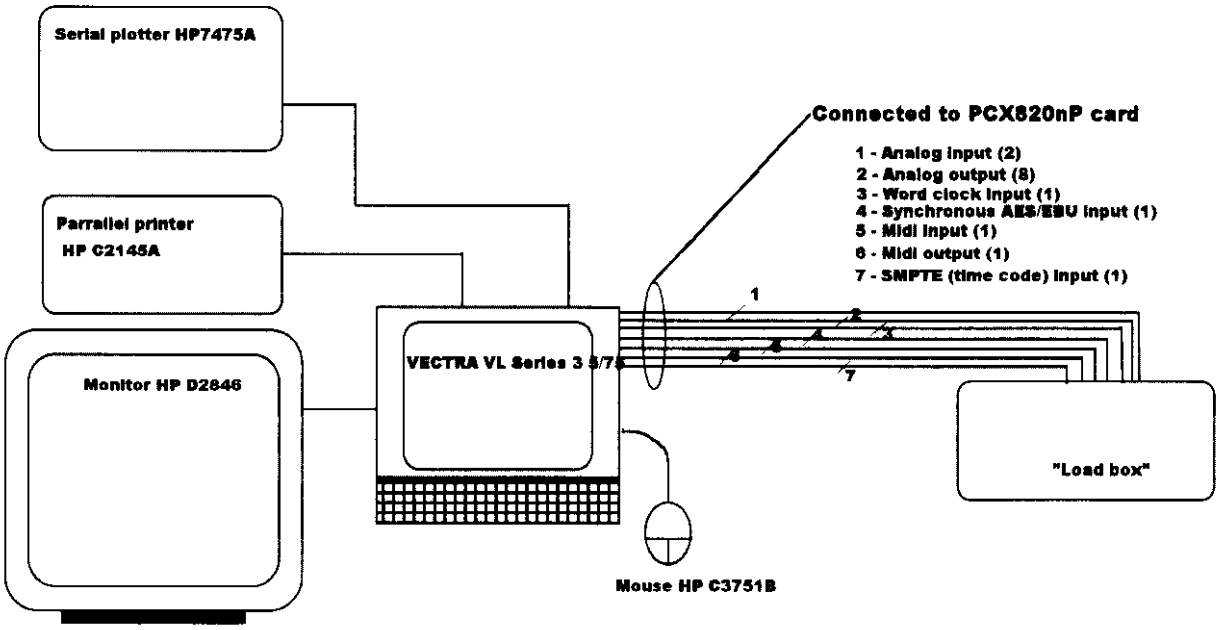
As shown in Figure 3.1, all interface cables used for compliance testing are shielded as normally supplied. All these cable are normally recommended to be used with the product.

3.4 Equipment Modifications

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

3.5 Configuration of Tested System

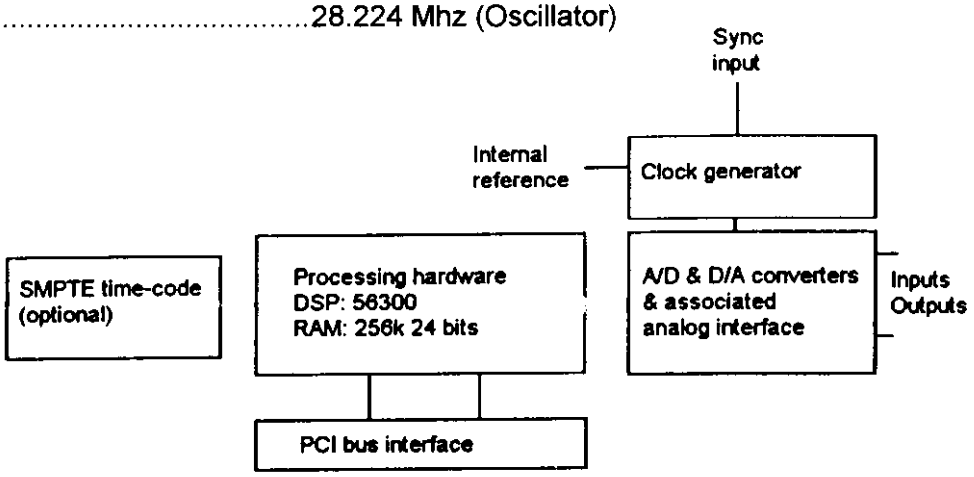
Figure 3.1 Configuration of Tested System



4 BLOCK DIAGRAM(S) OF EQUIPMENT

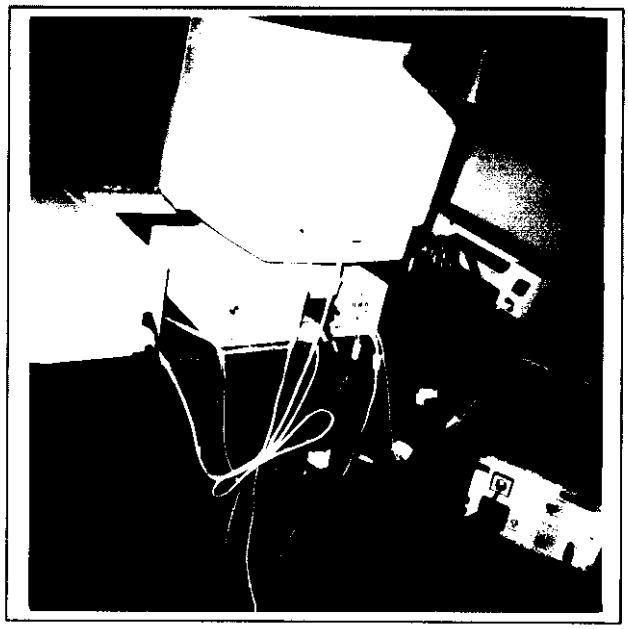
4.1 Clock schematics of PCX820nP board

Crystal and oscillators :.....10 Mhz (Crystal)
....28.224 Mhz (Oscillator)

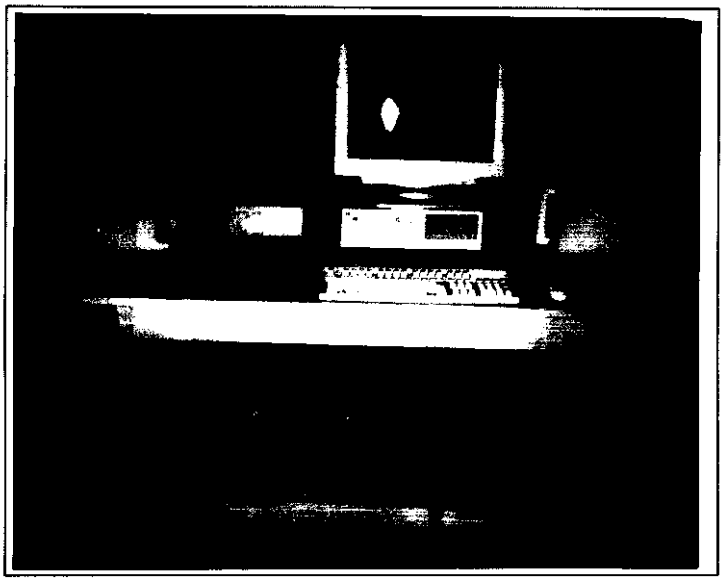


5 CONDUCTED AND RADIATED MEASUREMENT PHOTOS

Conducted emission



Radiated Emission



6 CONDUCTED EMISSION DATA

6.1 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 120V / 60Hz power line voltage and compared to the CISPR 22 Class B limits. Measurement bandwidth was 9 KHz from 150 KHz to 30 MHz.

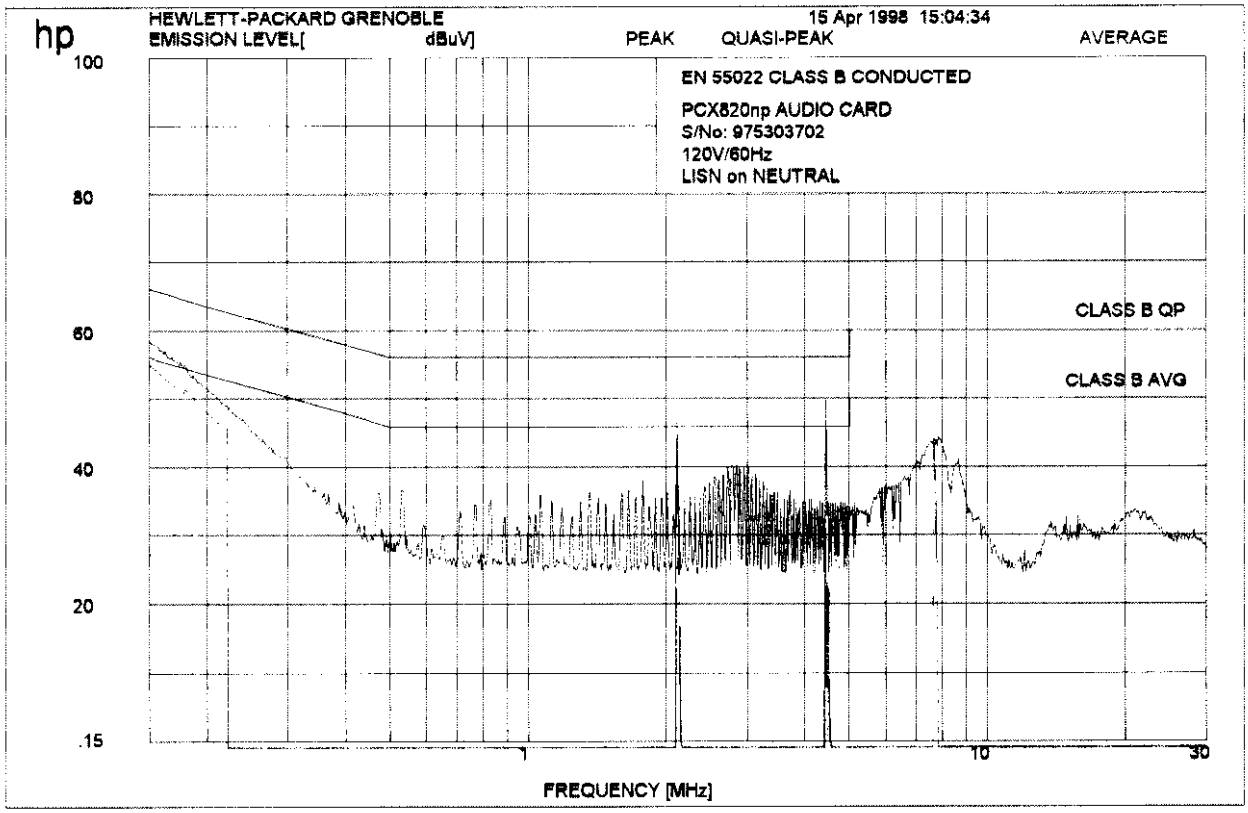
Measurement was initially made with an HP-8568B Spectrum Analyzer in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement with the HP-85650A Quasi-Peak Adapter on the analyzer for any strong signal. If the average limit is met when using a quasi-peak detector, the EUT shall be deemed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

6.2 Neutral conducted emission data



- Quasi peak:

HEWLETT-PACKARD GRENOBLE 15 Apr 1998 15:04:34

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	4.462	45.1	-10.9
2	2.116	42.1	-13.9
3	7.697	43.5	-16.5
4	7.779	35	-25.0

- Average:

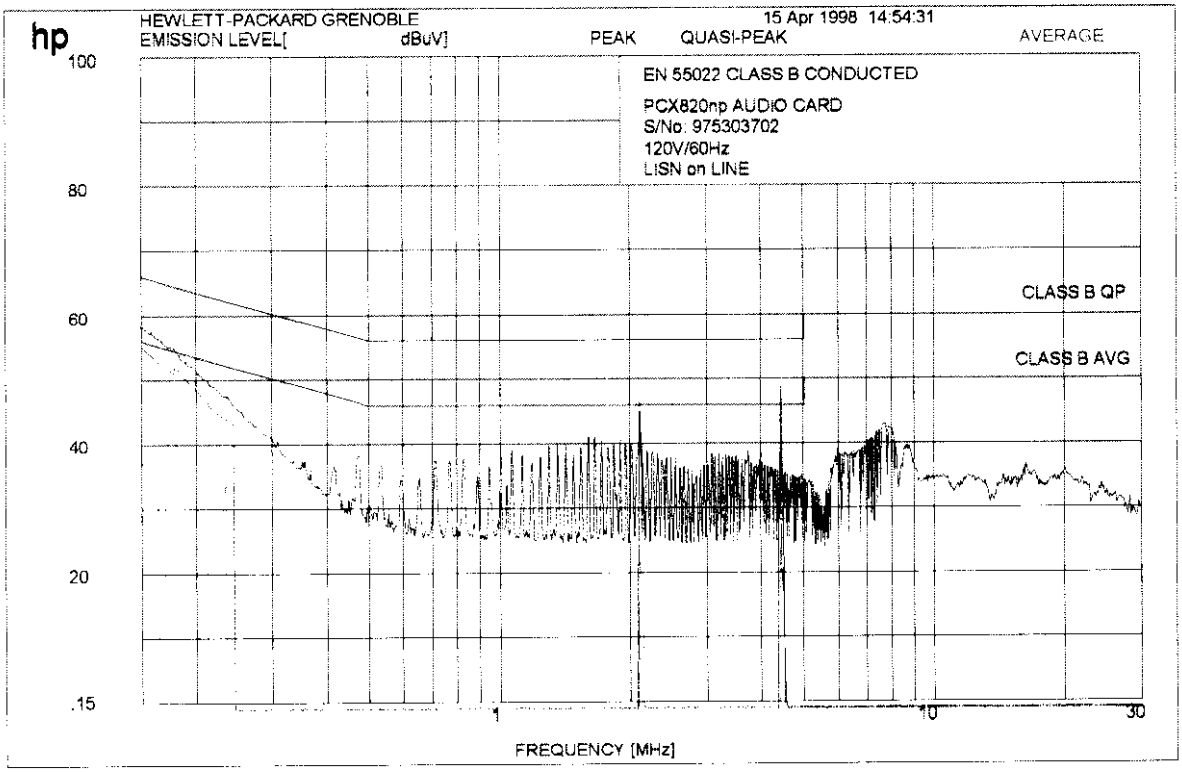
HEWLETT-PACKARD GRENOBLE 15 Apr 1998 15:04:34

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	7.697	41.9	-8.1
2	.1796	40.1	-14.4
3	7.779	35.4	-14.6
4	4.462	30.8	-15.2
5	4.51	30.6	-15.4
6	2.138	30.4	-15.6

6.3 Line conducted emission data



- Quasi peak:

HEWLETT-PACKARD GRENOBLE 15 Apr 1998 14:54:31

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	4.462	45.8	-10.2
2	2.116	42.2	-13.8

- Average:

HEWLETT-PACKARD GRENOBLE 15 Apr 1998 14:54:31

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	2.138	36.2	-9.8
2	.1796	41	-13.5
3	4.439	32.2	-13.8
4	.2352	34.1	-18.1

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.

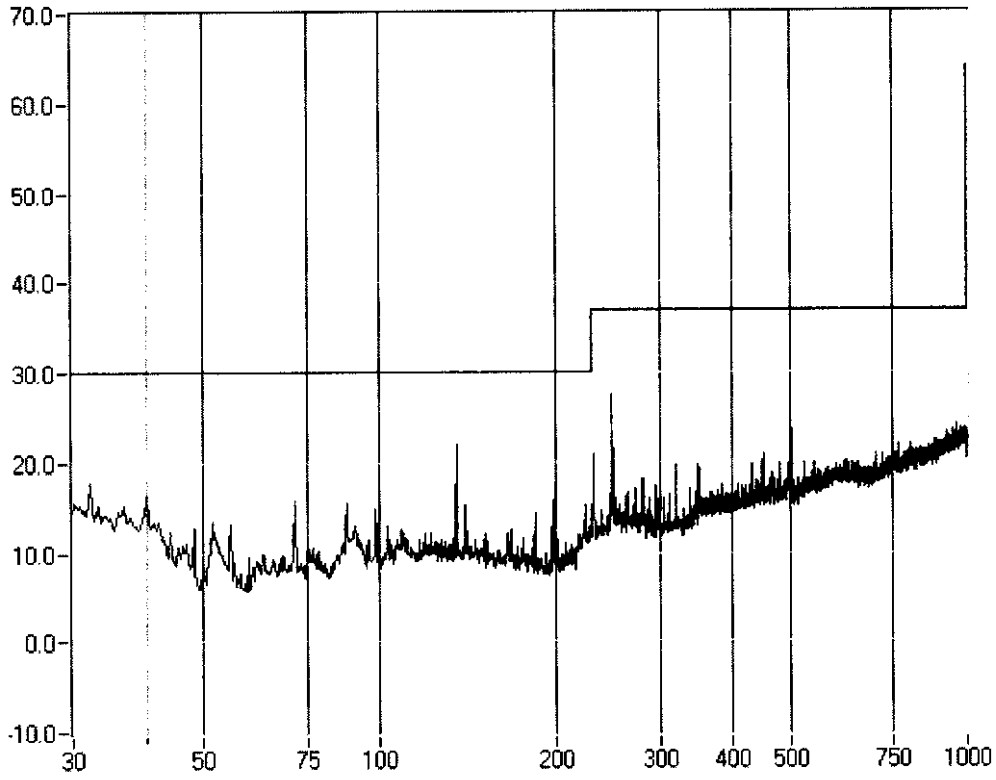
The product has been tested with 230V / 50Hz power line voltage, at a distance of 10 meters from the antenna and compared to the CISPR 22 Class B limits. Measurement bandwidth was 120 KHz from 30 MHz to 1 GHz.

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 8546A E.M.I Receiver
HP 85460A RF Filter section
CHASE Bilog Antenna CBL 6112 / 26-2000 MHz

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)
136.21	30.00	25.77	26.36	-4.23	105	H	398	12.13
250.03	37.00	25.63	26.25	-11.37	207	V	318	15.36

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 follows:

FS = RA + AF + CF - AG

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

Assume a receiver reading of 52.5 dBuV is obtained. The Antenna Factor of 7.4 and a Cable Factor of 1.1 is added. The Amplifier Gain of 29 dB is subtracted, giving a field strength of 32 dBuV/m.

FS = 52.5 + 7.4 + 1.1 - 29 = 32 dBuV/m

The 32 dBuV/m value can be mathematically converted to its corresponding level in uV/m.

Level in uV/m = Common Antilogarithm [(32 dBuV/m)/20]= 39.8 uV/m

8 PHOTOS OF TESTED EUT

The following photos are attached:

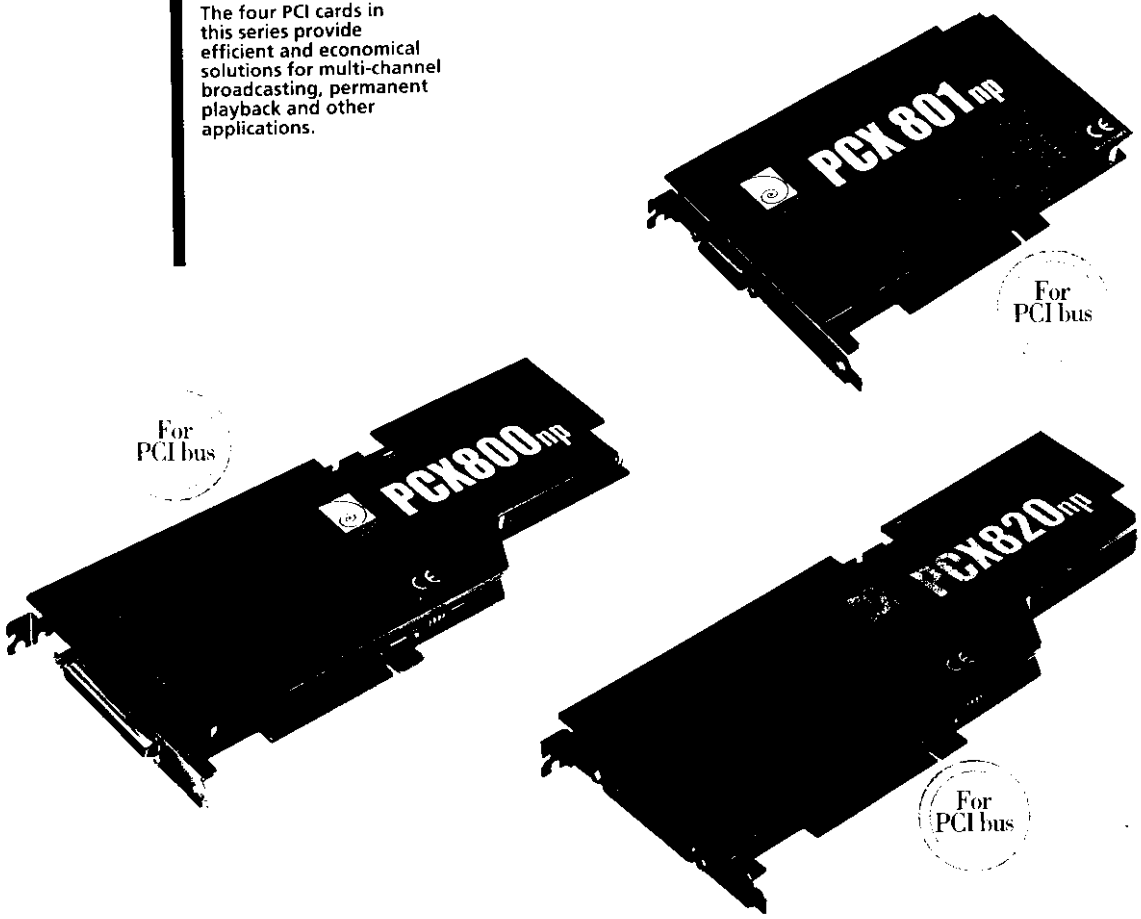
Attachment A. Product Data Sheet
(3 pages)

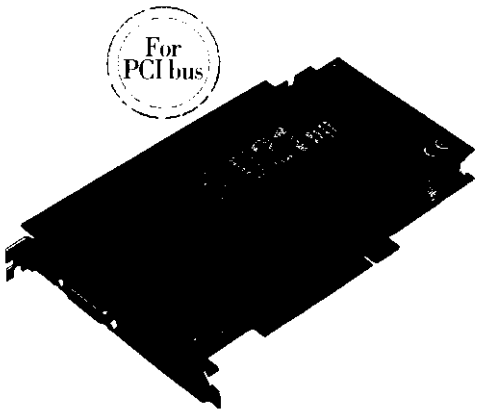
Digigram
Products

PCXnp série 800

New performance multi-channel PCX audio boards for professional applications

The four PCI cards in this series provide efficient and economical solutions for multi-channel broadcasting, permanent playback and other applications.





The PCX800np* and PCX801np* are playback-only models. The PCX800np has four balanced analog stereo outputs and a wordclock synchronization input. The PCX801np has four AES/EBU or SPDIF digital stereo outputs and both AES/EBU clock and wordclock inputs for synchronization.

For applications requiring recording, the PCX820np* answers highly demanding applications with four balanced analog stereo outputs (or eight mono outputs), one stereo analog balanced input and one digital stereo AES/EBU input. For the all-digital facility, the PCX821np* provides a stereo AES/EBU or SPDIF input and four digital outputs.

Multiple audio streams, in both linear PCM and MPEG Audio compressed formats, may be mixed into each hardware output. Multiple cards can be linked for up to 32 hardware inputs and outputs.

Full processing power on all models manages simultaneous record and playback; simultaneous, real-time MPEG Audio encoding and decoding; format and sampling frequency conversions; and a wide range of real-time effects such as time-stretching, pitch-shifting and scrub.

The PCXnp 800 series operates on the PCI bus in master mode. Using a new generation DSP and Digigram's enhanced np driver, these cards offer the best price/performance ratio.

The four PCXnp 800 series boards are available with a complete set of development tools, Xtrack multitrack editor and a wide range of applications developed by Digigram's OEMs.

**np : new performance*

PCXnp 800 series configurations

	Outputs	Inputs
PCX800np	Four stereo balanced analog	None
PCX820np	Four stereo balanced analog	One stereo available as balanced analog or digital
PCX801np	Four stereo digital	None
PCX821np	Four stereo digital	One stereo digital

PCX820np/PCX821np
Common technical features

Principal features
- One-stereo-channel (or two-mono-channels) record and four stereo channel or eight mono channel playback sound card for PCI bus (master mode)
- Recording, processing and playback of professional-quality sound
- Wordclock synchronization input (PCX820np and PCX821np) and AES/EBU input (PCX821np)
- Interboard synchronization for multi-channel applications

Processing power
- Motorola-56301 DSP
- Clock frequency: 66 MHz
- RAM: 256 kwords

Processing functions*
- Real-time MPEG Audio compression/decompression (four stereo channels) professional audio quality. This format reduces disk storage requirements in a programmable ratio of 1:4 to 1:48. At 128 kbps (1:6 compression at 48 kHz), 1 minute of mono sound (or 30 seconds of stereo sound) takes up only 960 Kbytes. PCX820np and PCX821np support Layers I and II of the ISO/MPEG Audio standard (ISO 11172-3). PCX820np also supports the low sampling frequencies of the MPEG2 Audio standard (ISO 13818-3)
- Record/playback in PCM mode (no compression) on four independent stereo channels
- Real-time mixing of several PCM or MPEG Audio files on one or several outputs: up to 10 stereo PCM or up to 14 stereo MPEG Audio tracks (Layer II tracks at 256 kbps) on four stereo channels
- A wide range of software functions.
  - Time-stretching (in real time and offline)
  - Pitch-shifting
  - Scrubbing
  - Panning
  - Format conversion
  - Sampling frequency conversion

Performance in PCM depends on the PC used

Driver
PCX820np and PCX821np are managed by the np driver.

Available on request
- PCXtools — development tools
- WAVE driver

Options
- Daughterboard for time-code SMPTE (LTC) input
- PCX Designer Kit (Windows)
- Application software

Specific features

PCX820np (analog)

Audio specifications
- Eight-analog outputs (18-bit D/A conversion)
- Two-analog inputs (18-bit A/D conversion) and digital AES/EBU input
- Programmable sampling frequency among the following values: 48, 44.1, 32, 24, 22.05, 16, 11.025, 8 kHz, external frequency, wordclock
- Frequency response at 48 kHz: 20 Hz – 20 kHz: ± 0.20 dB
- Signal/noise ratio: > 88 dB
- Distortion + noise at 1 kHz: < -84 dB
- Phase difference between channels: 20 Hz – 20 kHz: 0.2° / 2°
- Balanced or unbalanced line inputs: impedance 600 Ω or > 15 kOhms
- Balanced or unbalanced line outputs at low impedance
- Programmable input/output levels: maximum +22 dBu

Physical format and connections
- PCI bus board, 1 slot, half-length format (265 mm x 99 mm)
- Connections
  - one 62-pin SUB-D connector for analog outputs and the synchronization input
  - one connector for interboard synchronization

PCX821np (digital)

Audio specifications
- Four-channel stereo digital outputs in the AES/EBU or SPDIF format
- One-channel stereo digital input in the AES/EBU or SPDIF format
- AES/EBU management in both professional and consumer modes
- Programmable sampling frequency according to the AES/EBU standard: 48, 44.1, 32 kHz
- Access to the main status bits of the EBU frame

Physical format and connections
- PCI bus board, 1 slot, short format (174 mm x 99 mm)
- Connections.
  - one high-density 26-pin SUB-D connector for digital outputs and synchronization inputs
  - one connector for interboard synchronization