1 TEST REPORT

1.1 System test configuration

1.1.1 Justification

Two different configurations are submitted with this application: the **miXart8** and **miXart8 AES-EBU** sound cards.
The **miXart8** is the main PCI sound card (motherboard) for analog applications. The **miXart8 AES-EBU** consists of the same main card with an added optional card (daughter board) for AES-EBU applications (digital inputs and outputs).
All measurements are performed with **the miXart8 AES-EBU** equipment since it contents the main board miXart8 (which can be purchased alone for analog application) and the optional daughter card (with digital AES-EBU inputs and outputs). Both configurations were tested in a pre-characterization measurement and the miXart8 AES-EBU was found to have highest emission level than the miXart8.

The system was configured for testing in a typical fashion (as a customer would normally use it). The PCI card miXart8 AES-EBU is set in a HP Personal Computer and is exercised by a special software. Each ports of the Personal Computer were loaded with a typical peripheral device.

1.1.2 EUT Exercise software

The EUT exercise program (Txx Appli.exe, running under Windows NT4.0) used during radiated and conducted testing was designed to exercise the miXaert8 AES-EBU card sound in a manner similar to a typical use (sending sound on analog and digital outputs)

1.1.3 Special accessories

The miXart8 AES-EBU package consists of the following components:
- miXart8 main card
- AES-EBU optional card
- Breakout cable for analog inputs/outputs (with passive components and PCB inside, see internal photos)
- Breakout cable for digital inputs/outputs and synchronization (only connecting purpose)

Breakout cables are shielded and recommended to be used with the equipment.
Figure #1, shows the installation of the setup. All interfaces cables used for compliance testing are shielded as normally supplied. All these cables are normally recommended to be used with the Personal Computer.
A load box is used in order to simulate typical load on cables :
- Analog inputs: 50 Ohm
- Analog outputs: 15 kOhm
- Numeric I/O: 110 Ohm
- Video and LTC: 75 Ohm

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

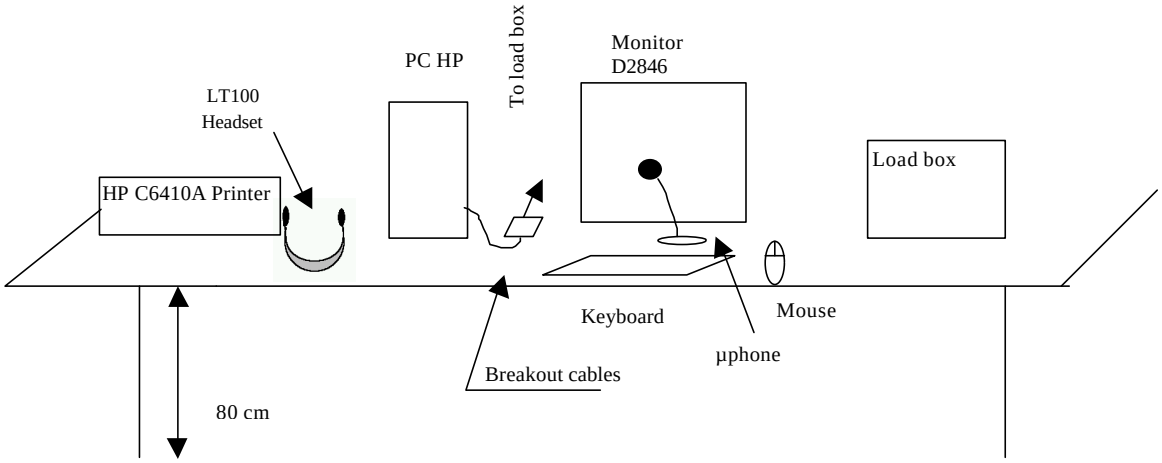


Fig #1

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/A2:1996 and EN55022:1994/A1:1995/A2:1997.

The product has been tested with 110V / 60Hz power line voltage and compared to the CISPR22 Class B limits. Measurement bandwidth was 9kHz from 150 kHz to 30 MHz.

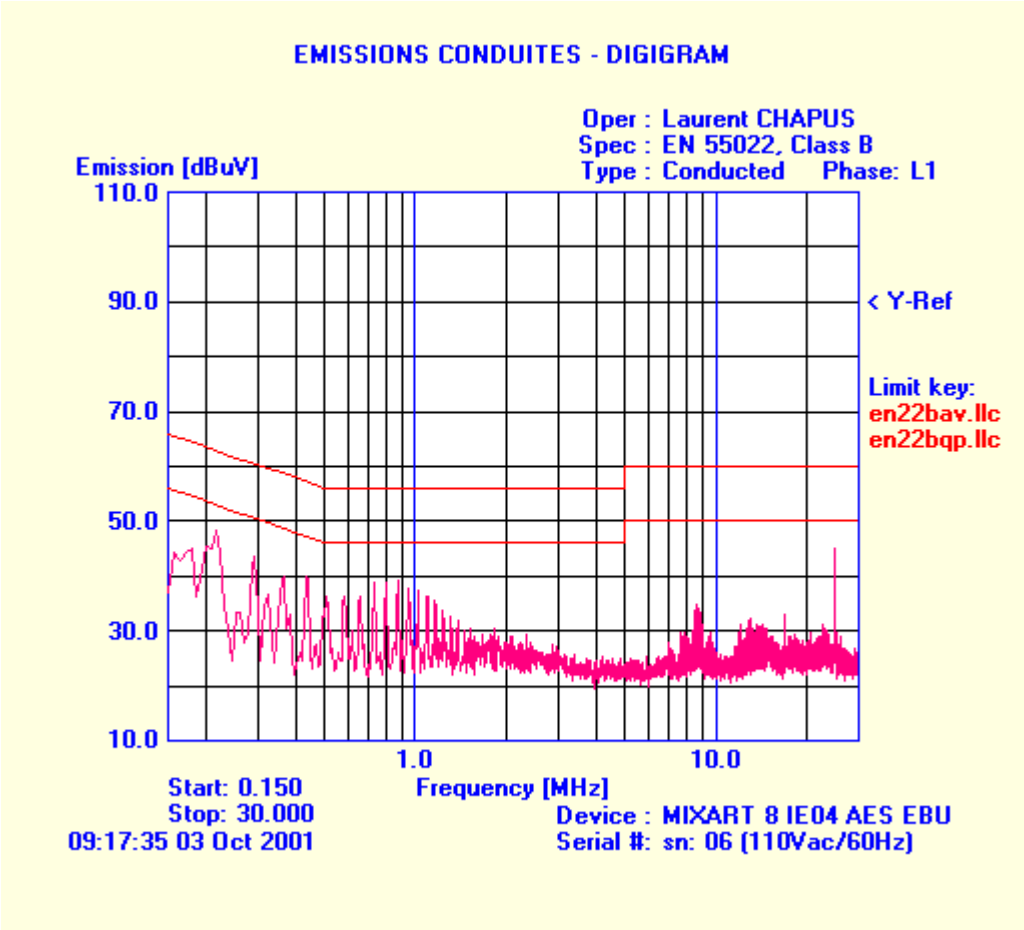
Measurement was initially made with an HP-8591EM Spectrum Analyzer in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement with the Rohde & Schwarz ESH3 receiver for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits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

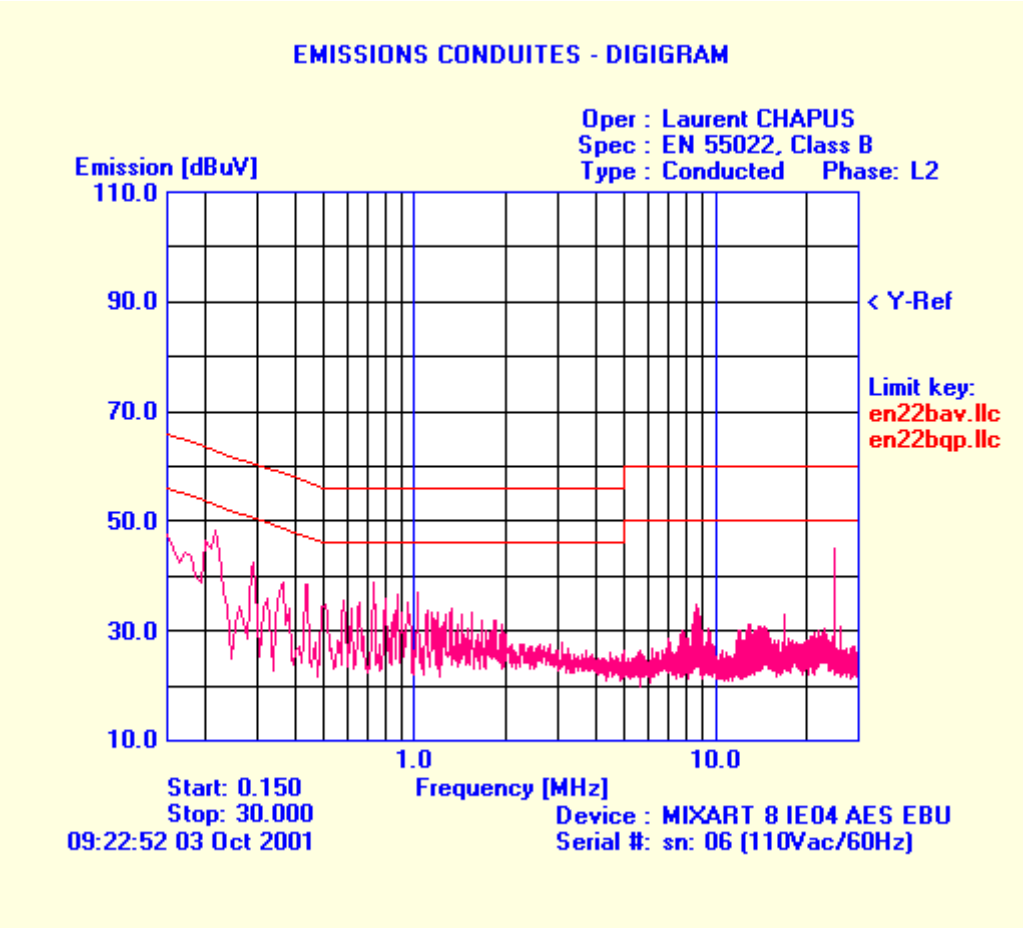
Test equipment :
HP 8591EM Spectrum Analyzer
Rhode & Schwarz ESH3 Receiver
EMCO 3810/2SH LISN N°1
TELEMETER NNB-2/16L LISN N°2

1.2.2 Neutral conducted emission data on miXart8 AES-EBU (power line of PC)



Num.	Freq.	Peak	Q-Peak	QP limit	***QP delta***	Average	AVG Limit	***AVG Delta***
	[MHz]	[dBµV]	[dBµV]	[dBµV]	***[dB]***	[dBµV]	[dBµV]	***[dB]***
1	0.220	49.14	48.47	62.8	**-14.3**	48.26	52.8	**-4.5**
2	0.290	44.81	42.83	60.5	**-17.6**	41.96	50.5	**-8.5**
3	0.360	40.80	39.50	58.7	**-19.2**	39.13	48.7	**-9.5**
4	0.870	39.99	38.49	56.0	**-17.5**	37.74	46.0	**-8.2**
5	1.020	38.03	36.55	56.0	**-19.4**	35.68	46.0	**-10.3**
6	24.85	45.51	39.37	60.0	**-20.6**	27.42	50.0	**-22.6**
7	25.00	45.61	41.56	60.0	**-18.4**	32.14	50.0	**-17.8**

1.2.3 Line conducted emission data on miXart8 AES-EBU (power line of PC)



Num.	Freq. [MHz]	Peak [dBµV]	Q-Peak [dBµV]	QP limit [dBµV]	***QP delta [dB]***	Average [dBµV]	AVG Limit [dBµV]	***AVG Delta [dB]***
1	0.180	47.38	42.76	64.5	**-21.7**	31.15	54.5	**-23.3**
2	0.220	50.06	48.36	62.8	**-14.4**	48.08	52.8	**-4.7**
3	0.290	44.19	42.31	60.5	**-18.2**	41.24	50.5	**-9.26**
4	0.370	39.82	38.44	58.5	**-20.0**	38.00	48.5	**-10.5**
5	0.730	45.48	39.78	56.0	**-16.2**	28.23	46.0	**-17.7**
6	24.85	45.65	41.74	60.0	**-18.2**	32.20	50.0	**-17.8**
7	25.01	39.69	37.64	60.0	**-22.3**	35.14	50.0	**-14.8**

1.3 Radiated emission data

1.3.1 Test Procedure

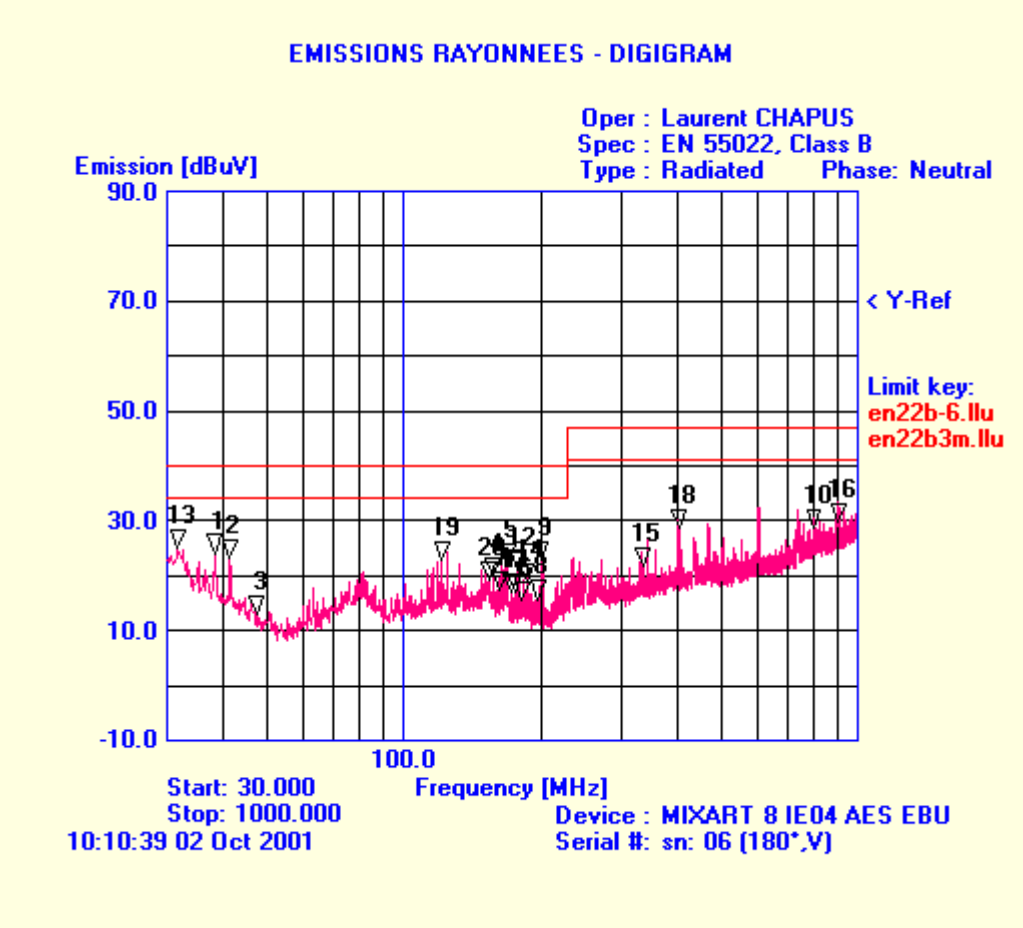
The product has been tested according to ANSI C63.4-1992, CISPR22-1993/A1:1995/A2:1996 and EN55022:1994/A1:1995/A2:1997.
The product has been tested with 230V / 50Hz power line voltage, at a distance of 10 meters from the antenna (in the frequency range 30MHz - 1GHz) and 3 meters (in the frequency range 1GHz-2Ghz) and compared to the CISPR 22 Class B limits and FCC part15, Subpart B, class B limits. Measurement bandwidth was 120 kHz from 30 MHz to 1 GHz and 1MHz above 1GHz.
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.
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:
From 30MHz to 1GHz:
HP-8574A E.M.I Receiver (30Mhz - 1G
(HP-8568B Analyzer + HP-85650 Quasi-Peak adapter + HP-85685A RF Preselector).
EMCO 3104C Biconical Antenna & EMCO 3146 Log Periodic Antenna

From 1GHz to 2GHz:
HP 8593E (9kHz-26.5GHz) Analyzer;
With pre-amplifier 8GHz
EMCO 3115 double ridged guide horn antenna

EMCO-1050, 6 meters height antenna mast & EMCO-1060, 3 meters diameter Turntable.

1.3.2 Radiated emission data



Graph example - 30-1000MHz

Final result 30-1000 MHz

Frequency (MHz)	QPeak Lmt (dBµV/m)	QPeak (dBµV/m)	QPeak-Lmt (dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
47.612	30.0	17.1	**-12.9**	191	H	394	11.8	
121.371	30.0	19.7	**-10.3**	2	V	107	16.6	
153.626	30.0	23.3	**-6.7**	232	H	388	16.3	
156.694	30.0	20.7	**-9.3**	1	H	389	16.8	
162.835	30.0	26.6	**-3.4**	37	V	106	17.6	
168.953	30.0	29.8	**-0.2**	292	V	108	17.9	*S/Amb. Noise: 1dB*
175.113	30.0	25.0	**-5.0**	38	V	107	18.3	
178.198	30.0	22.7	**-7.3**	83	V	107	18.5	
181.270	30.0	22.1	**-7.9**	39	V	107	18.8	
185.880	30.0	23.1	**-7.0**	44	V	148	19.1	
196.607	30.0	25.8	**-4.2**	7	V	109	19.8	
201.236	30.0	22.6	**-7.4**	22	V	196	14.0	
335.440	37.0	28.1	**-8.9**	284	H	214	18.2	

Final result 1GHz-2GHz

Freq. (GHz)	Peak measure dBµV/m	Average measure dBµV/m	Peak limit dBµV/m	Average limit dBµV/m	Margin dB
1.0038	46.0	34.0	74.0	54.0	-20.0
1.30	42.0	33.0	74.0	54.0	-21.0
1.40	41.0	33.0	74.0	54.0	-21.0
1.50	44.5	34.5	74.0	54.0	-19.5
1.60	46.5	35.5	74.0	54.0	-18.5
1.70	51.0	35.5	74.0	54.0	-18.5
1.7993	49.0	34.0	74.0	54.0	-20.0
1.8990	48.5	35.5	74.0	54.0	-18.5
1.9995	48.0	35.5	74.0	54.0	-18.5

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.