



Actions Mesures

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EMC TEST REPORT

Nr 2662-FCC

This test report applies only on equipment described hereafter.

Proposal number : 200302-2146

Date of test..... : February 10th , 2003

Location : SMEE *Actions Mesures* Laboratory - 38 VOIRON

Performed by : Jacques LORQUIN

Customer..... : **Gemplus**
Z.I. Athélia III - Voie Antiope
13705 LA CIOTAT Cedex 8
France

Product..... : **GemPC Key**

Type of test : **Radiated and Conducted Emission Test**

Applied standards or specification: EN55022 (1999) +/A1: (2000)
CISPR22 (1997) +/A1: (2000)

Level : CISPR Class B

Test objective : Qualification

Results : Conducted emissions: Comply
Radiated emissions: Comply

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Written by : Jacques LORQUIN

Approved by..... : Jacques LORQUIN



1. System test configuration

1.1. Justification

The system was configured for testing in a typical fashion (as a customer would normally use it). A typical GemPC Key was connected onto the USB port of a personal computer. It has been tested with a HP Personal computer. Each ports of the Personal Computer were loaded with a typical peripheral device.

1.2. HARDWARE IDENTIFICATION:

Equipment under test (EUT):

- **GemPC Key** **PCB: 016-708010-00** **sn: R02C0600477**
- Frequency: crystal 4 MHz
 - Size : 15x65x7mm (1xLxh)
 - Input/output: USB connector.

1.3. Auxiliaries

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

Trade Mark - Model Number (Serial number)	FCC ID	Description	Cable description
GemPC Key PN:016-708010-00* (sn: R02C0600477)	MESKEY	Smart card reader	none
GemSAFE TM Entreprise	None	Smart card	none
HEWLETT PACKARD Vectra VLi8 pn:D7963A (sn: FR9402053)	Doc. Of Conf.	Personal computer	All data cables are shielded Power cable unshielded
HEWLETT PACKARD pn: D2846 (sn: JP74001000)	Doc. Of Conf.	21" color monitor	Shielded video cable with ferrite at each end
HEWLETT PACKARD pn: C4736-60101 (sn: LZA693024031)	JNZ201213	Mouse	Shielded cable
HEWLETT PACKARD pn: C4734-60111 (sn: M971168931)	GYUR385K	Keyboard	Shielded cable
HEWLETT PACKARD 895CXI pn: C6410A (sn: MY9761915S)	Doc. Of Conf.	Parallel printer	HP C2950A shielded parallel cable
HEWLETT PACKARD deskjet500 pn: C2106A (sn: 3110S58792)	B94C2106X	Serial printer	HP 24542G shielded serial cable
TELEX (sn: 700.373.000A)	None	Microphone	Shielded cable
LABTEC LT100 pn: D8387A (sn: none)	None	Headset	Shielded cable
HEWLETT PACKARD 48GX (sn: 83802369)		Graphic Calculator	Unshielded cable with ferrite



1.4. EUT Exercise software

The EUT exercise program (Soft Apitest.exe V.2.0, running under Windows 98) used during radiated and conducted testing was designed to exercise the GemPC Key in a manner similar to a typical use :

- Make a comparison of the answer to the reset (ATR) between the GemPC Key and the PC.

1.5. I/O cables

- USB cable, length : 3m
- Video cable with ferrite at each end, length : 1.8m.
- Parallel cable shielded HP #C2950A, length : 2m.
- Serial cable shielded HP #24542G, length : 3m.
- Serial / graphic adapter cable with ferrite, HP # 8120-6736, length : 1m
- Power cord (PC and monitor), length : 1.8m

1.6. 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.



2. Radiated emission data

2.1. SET-UP

Mains: 230V@50Hz

The EUT and auxiliaries are set on the no-conductive table of 80 cm height.



Equipment configuration and running mode:

- The GemPC Key is plug in the USB port of the PC;
- software running in loop;

The installation of EUT is identical for pre-characterization measures in a 3 meters full anechoic chamber and for measures on a 10 meters Open site.

2.2. TEST EQUIPMENT

Test Equipment from 30MHz to 1GHz on 10 meters open site:

Equipment	Company	Model	Serial	Calibration Due
Spectrum Analyzer	HP	8568B	2732A04140	March 22 nd , 2003
Quasi-Peak adapter	HP	85650A	2811A01136	March 22 nd , 2003
RF Pre-selector	HP	85685A	2833A00773	March 22 nd , 2003
Biconical Antenna	EMCO	3104C	9401-4636	April 4 th , 2003
Log Periodic Antenna	EMCO	3146	2178	April 4 th , 2003
Absorbing clamp	LÜTHI	MDS21	2826	September 25 th , 2003
Absorbing clamp	R&S	85024A	194.0100.50	September 25 th , 2003
Tube ferrite	LÜTHI	MDS101	4485	September 25 th , 2003
OATS				April 9 th , 2003

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



A 10 meters Open site located in SMEE *Actions Mesures* - Voiron (FRANCE).

Pre-scan, test Equipment from 30MHz to 1GHz:

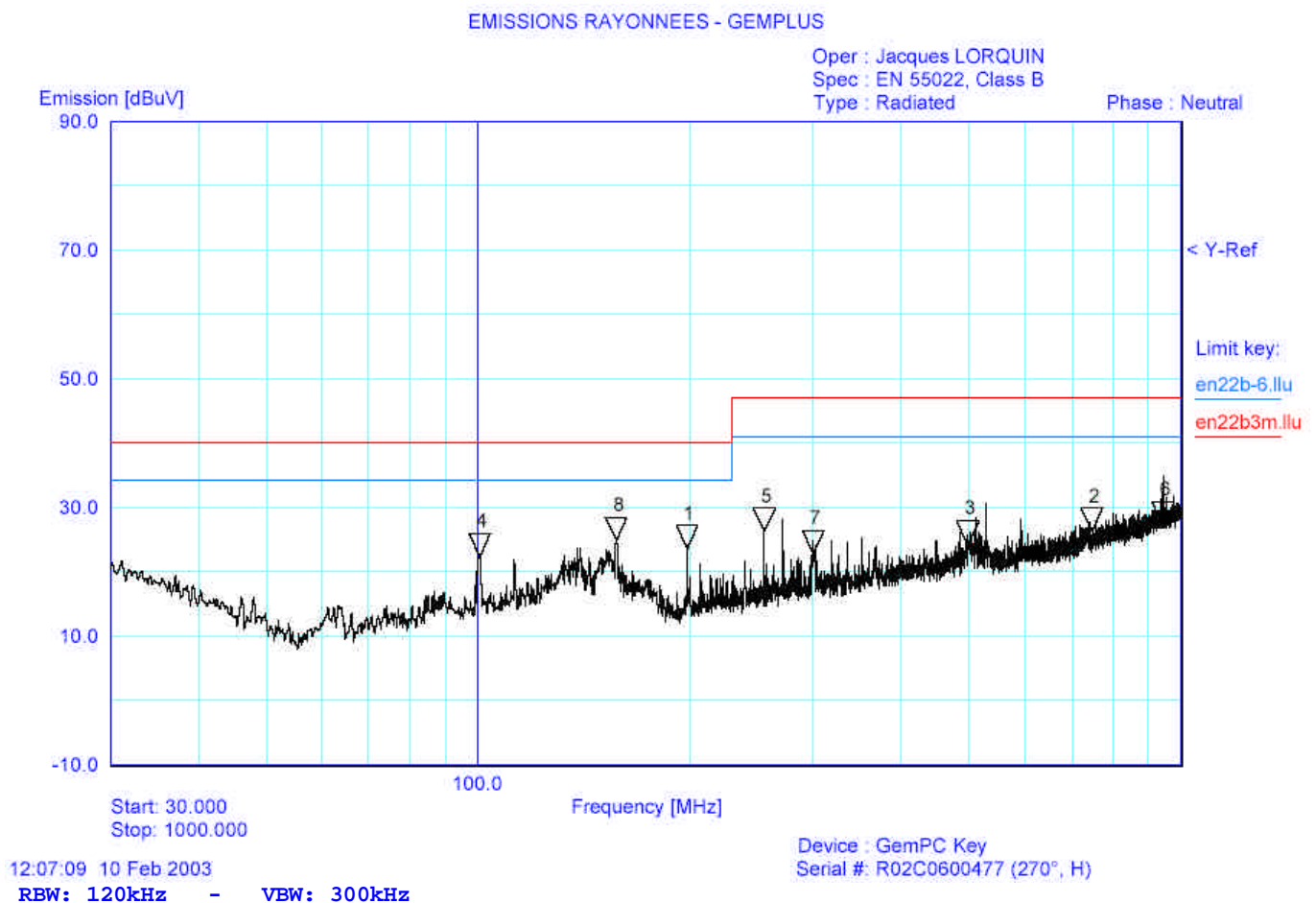
Equipment	Company	Model	Serial	Calibration Due
EMC Analyzer	HP	8591EM	3536A00384	March 29 th , 2003
Amplifier	HP	8447F H64	3113A06394	March 28 th , 2003
Antenna (30MHz-1GHz)	CHASE	CBL6111A	1628	March 29 th , 2003
Absorbing clamp	LÜTHI	MDS21	2826	September 25 th , 2003
Absorbing clamp	R&S	85024A	194.0100.50	September 25 th , 2003
Tube ferrite	LÜTHI	MDS101	4485	September 25 th , 2003

2.3. TEST SEQUENCE AND RESULTS

2.3.1. Pre-characterization at 3 meters

A pre-scan of all the setup has been performed in a 3 meters full anechoic chamber.

The distance between EUT and antenna is 3 meters. Test is performed in horizontal (H) and vertical (V) polarization, and on 4 faces of the EUT. See below for a graph example:





2.3.2.Characterization on 10 meters open site from 30MHz to 1GHz

The product has been tested according to ANSI C63.4-(1992), CISPR22-1997/A1:2000 and EN55022:1998/A1:2000. Radiated Emission were measured on an open area test site. A description of the facility is on file with the FCC.

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 120kHz from 30MHz to 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 clause 2.1.

Frequency list has been created with anechoic chamber pre-scan results.

No	Frequencies (MHz)	QPeak Lmt (dBμV/m)	QPeak (dBμV/m)	QPeak-Lmt (dB)	Angle (deg)	Pol	Hgt (cm)	Corr Factor (dB)	Comments
1	157.461	30.0	17.8	-12.2	76	H	293	16.9	
2	198.005	30.0	28.1	-1.9	50	H	328	19.9	
3	255.587	37.0	31.5	-5.6	168	V	104	15.8	
4	300.028	37.0	22.7	-14.3	62	H	286	17.8	
5	499.403	37.0	28.1	-8.9	125	H	220	22.1	
6	593.878	37.0	24.8	-12.2	105	H	200	23.4	
7	599.225	37.0	27.4	-9.6	262	V	396	23.5	
8	748.053	37.0	29.9	-7.1	351	V	224	26.3	

2.4. 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.



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



3. Conducted emission data

The product has been tested according to ANSI C63.4-(1992), CISPR22-1997/A1:2000 and EN55022:1998/A1:2000.

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

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.

3.1. SET-UP

Mains: 110V/60Hz



The EST and auxiliaries are set on the no-conductive table of 80 cm height.



3.2. TEST EQUIPMENT

Equipment	Company	Model	Serial	Calibration Due
EMC Analyzer	HP	8591EM	3536A00384	March 29 th , 2003
test receiver	Rohde&Schwarz	ESH3	872079/117	March 21 st , 2003
Transient Limiter	HP	11947A	3107A01596	March 28 th , 2003
LISN(auxiliary)	EMCO	3810/2SH	9511-11821628	December 12 th , 2003
LISN(measure)	Telemeter	TGmbH	NNB	September 13 th , 2003
(50Ω/50microhenry)	Electronis	2/16		
Faraday room	Rayproof		4854	none



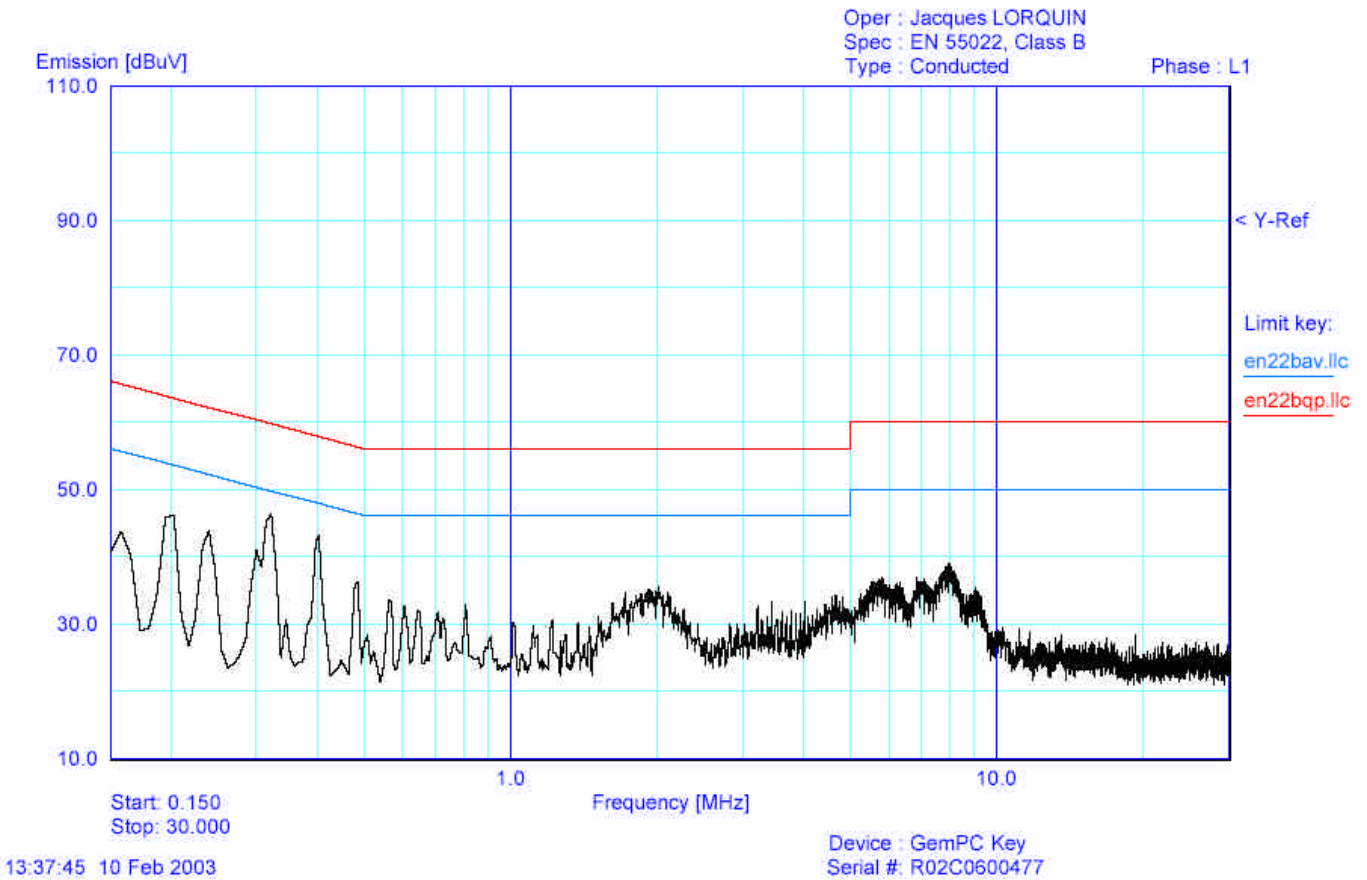
3.3. TEST SEQUENCE AND RESULTS

Measures are performed on line 1 and line 2 of the power supply of the PC,

3.3.1. Line conducted emission data (110V@60Hz)

RBW: 9kHz - VBW: 30kHz

EMISSIONS CONDUITES - GEMPLUS

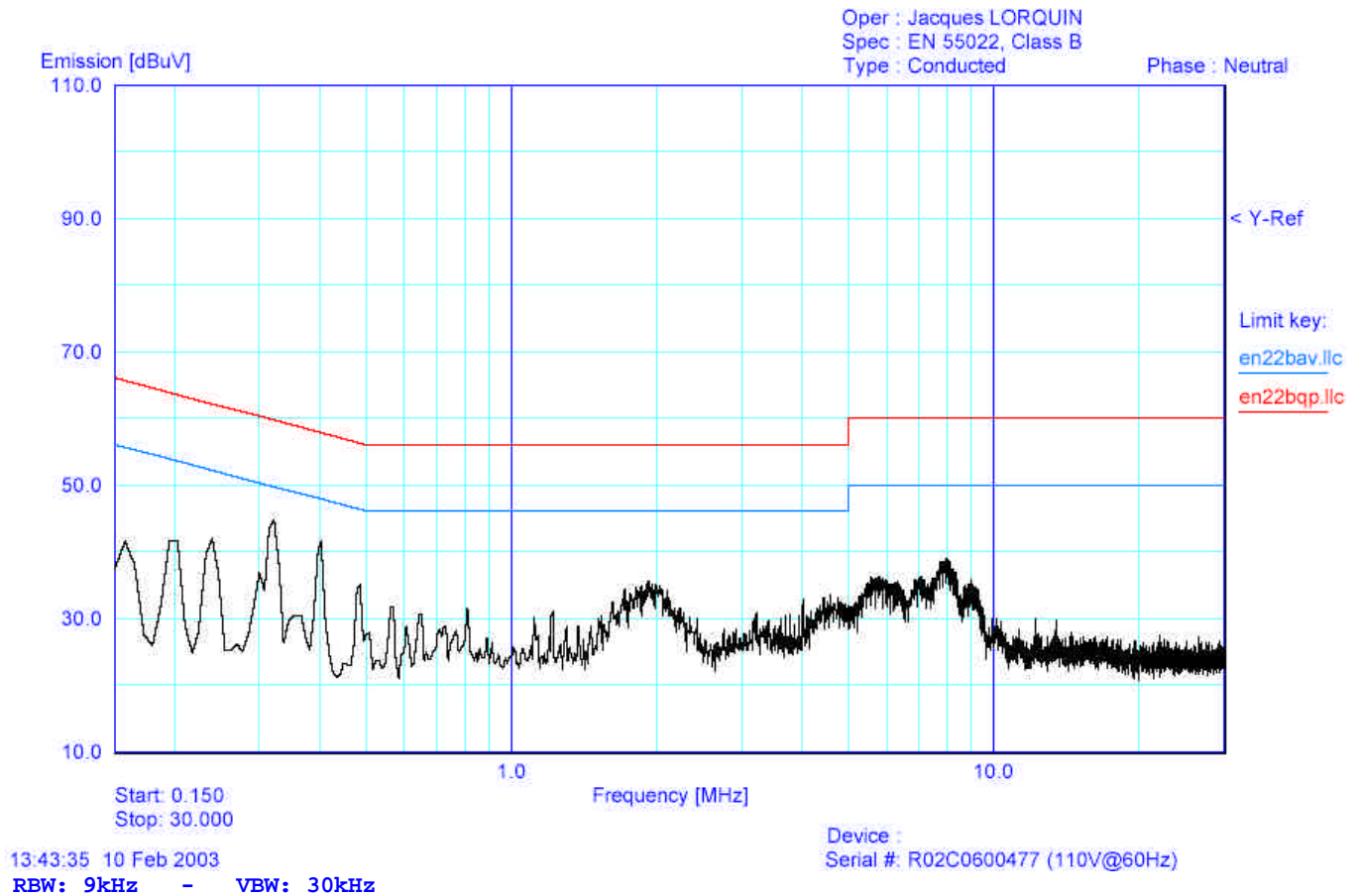


Num.	Freq.	Peak	Q-Peak	QP limit	QP delta	Average	AVG Limit	AVG Delta
	[MHz]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
1	0.16	43.71	42.09	64.0	-21.91	41.44	54.0	-12.56
2	0.20	46.46	45.50	62.0	-16.50	45.03	52.0	-6.97
3	0.24	44.77	43.85	62.0	-18.15	43.27	52.0	-8.73
4	0.30	41.59	40.28	60.0	-19.72	39.39	50.0	-10.61
5	0.32	47.24	46.39	58.0	-11.61	45.44	48.0	-2.56
6	0.40	44.34	43.02	56.0	-12.98	39.07	46.0	-6.93
7	0.48	37.57	36.11	56.0	-19.89	33.54	46.0	-12.46
8	7.98	39.08	36.93	50.0	-13.07	33.60	50.0	-16.4



3.3.2. Neutral conducted emission data (110V@60Hz)

EMISSIONS CONDUITES - GEMPLUS



Num.	Freq.	Peak	Q-Peak	QP limit	QP delta	Average	AVG Limit	AVG Delta
	[MHz]	[dBμV]	[dBμV]	[dBμV]	[dBμV]	[dBμV]	[dBμV]	[dBμV]
1	0.16	42.82	40.49	64.0	-23.51	39.97	54.0	-14.03
2	0.20	43.16	41.62	62.0	-20.38	41.23	52.0	-10.77
3	0.24	42.78	41.74	62.0	-20.26	41.29	52.0	-10.71
4	0.30	37.90	35.69	60.0	-24.31	33.99	50.0	-16.01
5	0.32	45.61	44.68	58.0	-13.32	43.76	48.0	-4.24
6	0.40	41.74	40.44	56.0	-15.56	37.68	46.0	-8.32
7	1.93	36.35	34.17	56.0	-21.83	32.98	46.0	-13.02
8	8.00	39.30	37.47	60.0	-22.53	35.66	50.0	-14.34

End of Tests