Actions Mesures

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EMC TEST REPORT

Nr 2598-FCC

This test report applies only on equipment described hereafter.

Proposal number : 200209-2031

Date of test.....: September 23rd & 30th , 2002

Location .....: SMEE *Actions Mesures* Laboratory - 38 VOIRON

Performed by .....: Jacques LORQUIN

Customer .....: **GemPlus (Mr. COLLET)**
Z.I. Athélia III
Voie Antiope
13705 LA CIOTAT Cedex 8 –France

Product.....: **GemPCTwin (USB / RS232)**

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

Applied standards or specification: EN55022 (1999) +/A1: (2000)
CISPR22 (1997) +/A1: (2000)
ANSI C63-4 (1992+2000)

Level.....: CISPR Class B

Test objective.....: Qualification

Results .....: Conducted emissions: Comply
Radiated emissions: Comply

 This report contents 15 pages

Written by .....: Laurent CHAPUS

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 smart card was introduced in the GemPC Twin reader, which was itself connected to a personal computer. It has been tested with a Dell Personal computer laptop. Each ports of the Personal Computer were loaded with a typical peripheral device.

1.2. HARDWARE IDENTIFICATION:

Equipment under test (EUT):

- ① **GemPCTwin (USB) pn: HWP0108760 sn: none FCCID:MES473GPC**
  - Frequency: crystal 4 MHz
  - Size : 70x60x11mm
  - Input/output: USB cable with USB connector.

- ① **GemPCTwin (RS232) pn: HWP0108760 sn: none FCCID:MES473GPC**
  - Frequency: crystal 4 MHz
  - Size : 70x60x11mm
  - Input/output: serial cable with DB9 and PS/2 (keyboard) 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
GemSAFE ™ Entreprise (sn: 000020004303921)	None	Smart card	none
Dell Latitude CPi PN: Cpi AD400XTB (sn: VSRW6) with AC adaptor block 9364U	Doc. Of Conf	Laptop	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: C3751B (sn: LZA62831261)	DZL211029	Mouse	Shielded cable
HEWLETT PACKARD 895CXI pn: C6410A (sn: MY9761915S)	Doc. Of Conf.	Parallel printer	HP C2950A shielded parallel cable
TELEX (sn: 700.373.000A)	None	Microphone	Shielded cable
LABTEC LT100 pn: D8387A (sn: none)	None	Headset	Shielded cable

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.

1.5. EUT Exercise software

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

- testing the smart card presence in the reader,
- testing the Answer To Reset (ATR),
- powering down the smart card.

1.6. Special accessories

The cable which connect the GemPC Twin reader to RS232+Keyboard port of the Personal Computer, is shielded and attached to the GemPC Twin. For USB setup, the USB cable connected to the GemPC Twin reader is shielded.

The smart card used in the GemPC Twin is a GemSAFE™ Entrepris ISO 7816-1,2,3 and 4 compliant.

1.7. I/O cables

- USB cable, length : 1.5m (used for USB setup)
- RS232 cable shielded with keyboard connector, length : 1.5m + 0.3m (see figure 1)
- Video cable with ferrite at each end, length : 1.8m.
- Parallel cable HP #C2950A, length : 2m.
- USB cable LINDY, length : 1m (used for RS232 setup)

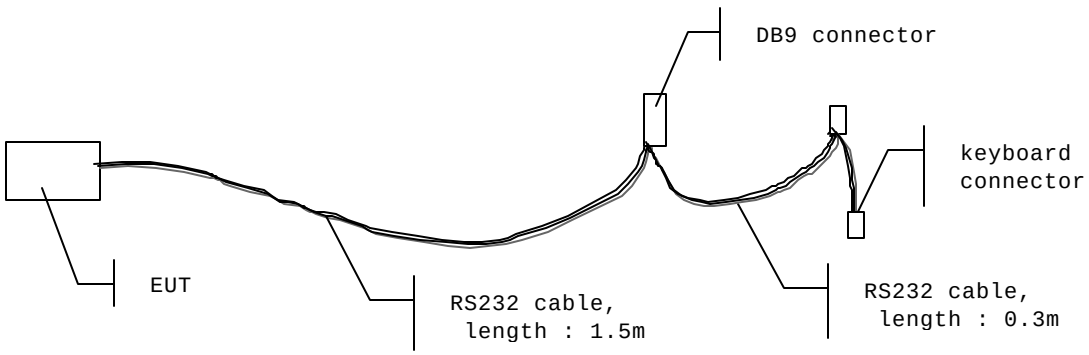


Figure 1

1.8. 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 for USB cable

Mains: 230V@50Hz
The EUT and auxiliaries are set on the no-conductive table of 80 cm height.


Equipment configuration and running mode:

- The GemPCTwin is connected on USB connector of the PC;
- The smart card is insert in GemPCTwin;
- 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. SET-UP for RS232 cable

Mains: 230V@50Hz
The EUT and auxiliaries are set on the no-conductive table of 80 cm height.


Equipment configuration and running mode:

- The GemPCTwin is connected on serial port and keyboard connector of the PC;
- The smart card is insert in GemPCTwin;
- 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.

2.3. 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 22nd ,2003
Quasi-Peak adapter	HP	85650A	2811A01136	March 22nd ,2003
RF Pre-selector	HP	85685A	2833A00773	March 22nd ,2003
Biconical Antenna	EMCO	3104C	9401-4636	April 4th ,2003
Log Periodic Antenna	EMCO	3146	2178	April 4th ,2003
Absorbing clamp	LÜTHI	MDS21	2826	September 25th ,2003
OATS				April 9th ,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).

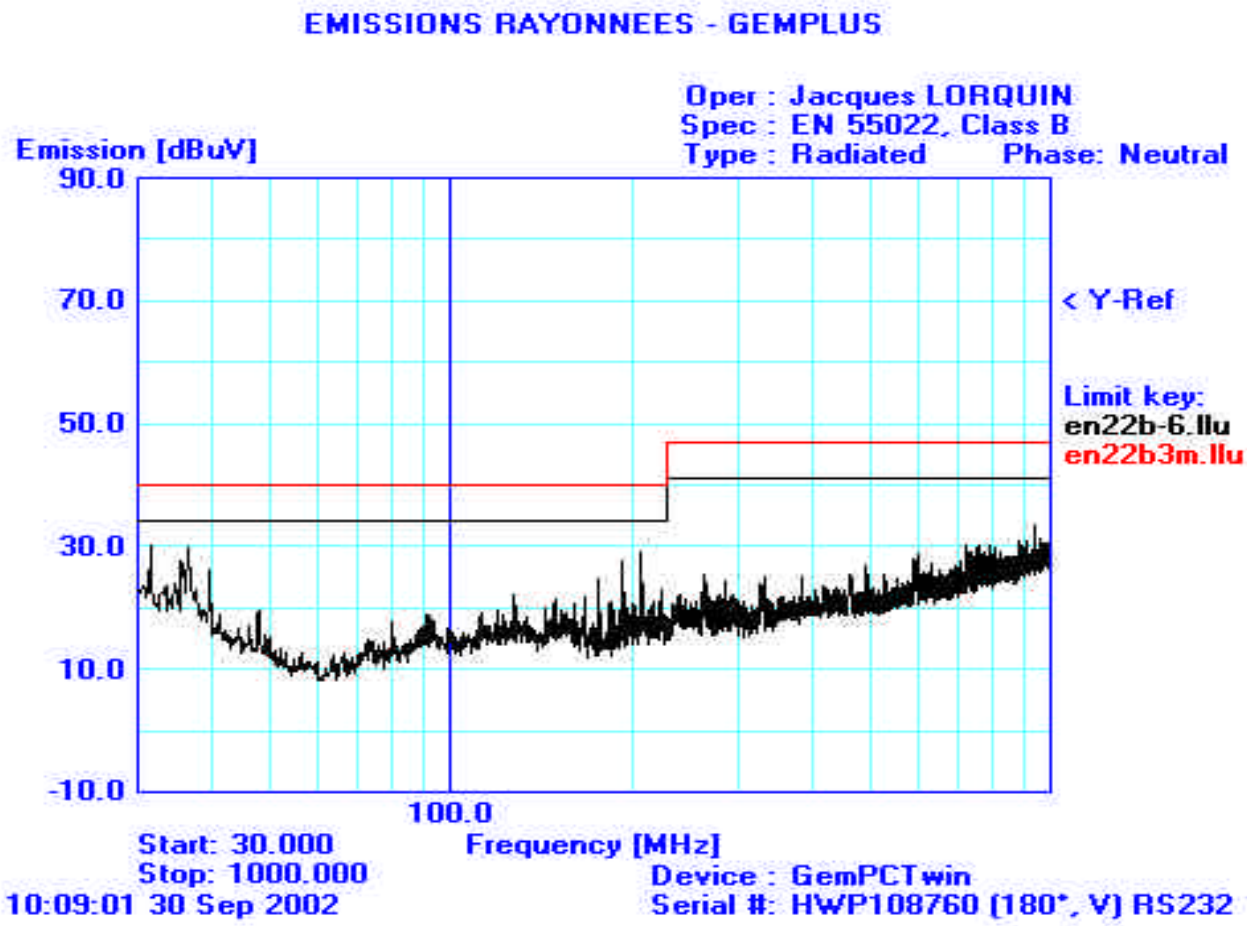
Pre-scan, test Equipment from 30MHz to 1GHz:

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

2.4. TEST SEQUENCE AND RESULTS FOR RS232 SETUP

2.4.1.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:



2.4.2.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 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.

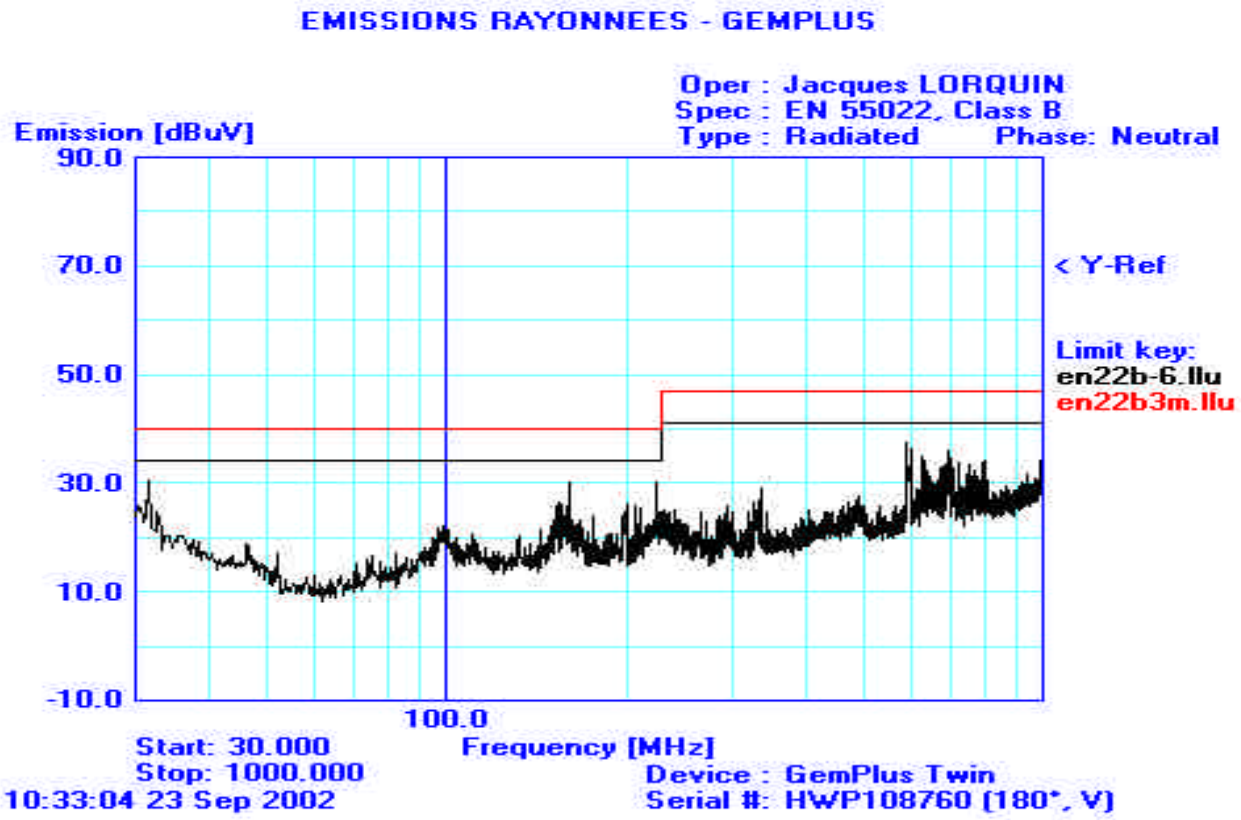
Interconnecting cables and equipment's were moved to position that maximized emission. A summary of the worst case emissions found in all test configurations and modes is shown on clause 2.1 & 2.2.

Frequency (MHz)	QPeak Lmt (dBµV/m)	QPeak (dBµV/m)	QPeak-Lmt (dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
31.983	30.0	29.5	**-0.5**	242	V	102	13.0	
36.033	30.0	26.6	**-3.4**	299	V	160	11.7	
36.897	30.0	24.0	**-6.0**	267	V	100	11.7	
40.004	30.0	21.1	**-8.9**	295	V	237	11.6	
112.031	30.0	27.2	**-2.8**	84	H	396	16.2	
120.001	30.0	22.6	**-7.4**	245	H	396	17.1	
128.026	30.0	21.8	**-8.2**	113	H	378	15.0	
143.614	30.0	13.9	**-16.1**	155	H	396	14.8	
160.031	30.0	23.5	**-6.5**	305	V	219	17.5	
192.002	30.0	25.2	**-4.8**	97	H	185	19.4	
194.031	30.0	21.1	**-8.9**	250	H	392	19.6	
208.159	30.0	17.7	**-12.3**	265	V	102	15.6	

2.5. TEST SEQUENCE AND RESULTS FOR USB SETUP

2.5.1.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:



2.5.2.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 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.

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 & 2.2.

Frequency (MHz)	QPeak Lmt (dBµV/m)	QPeak (dBµV/m)	QPeak-Lmt (dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)	Comments
31.932	30.0	17.16	**-12.4**	241	V	116	13	
160.013	30.0	22.2	**-7.8**	165	V	298	17.5	
197.022	30.0	23.8	**-6.3**	193	H	393	19.8	
208.133	30.0	20.2	**-9.8**	3	V	103	15.6	
599.641	37.0	29.7	**-7.3**	318	V	314	23.5	
732.919	37.0	31.2	**-5.8**	292	V	258	26.3	

2.6. 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.

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 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.

3.1. SET-UP USB cable

Mains: 110V/60Hz

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

3.2. SET-UP RS232 cable

Mains: 110V/60Hz

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

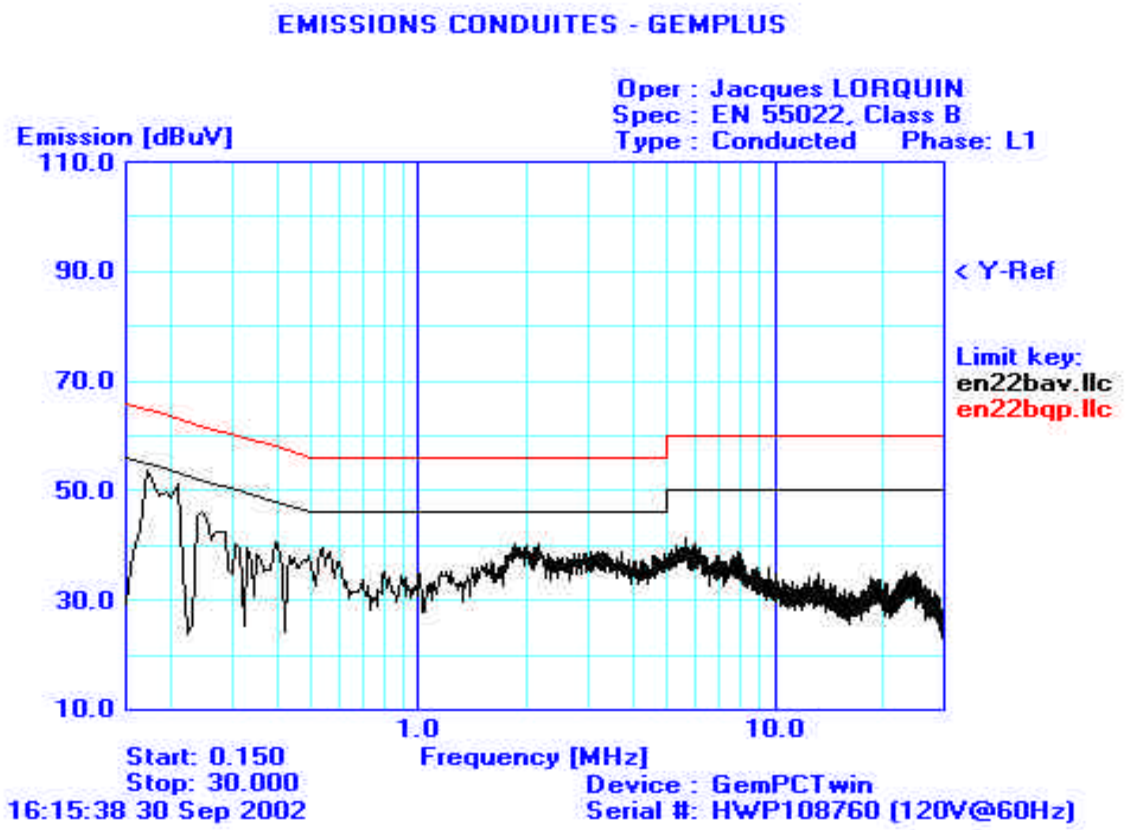
3.3. TEST EQUIPMENT

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

3.4. TEST SEQUENCE AND RESULTS

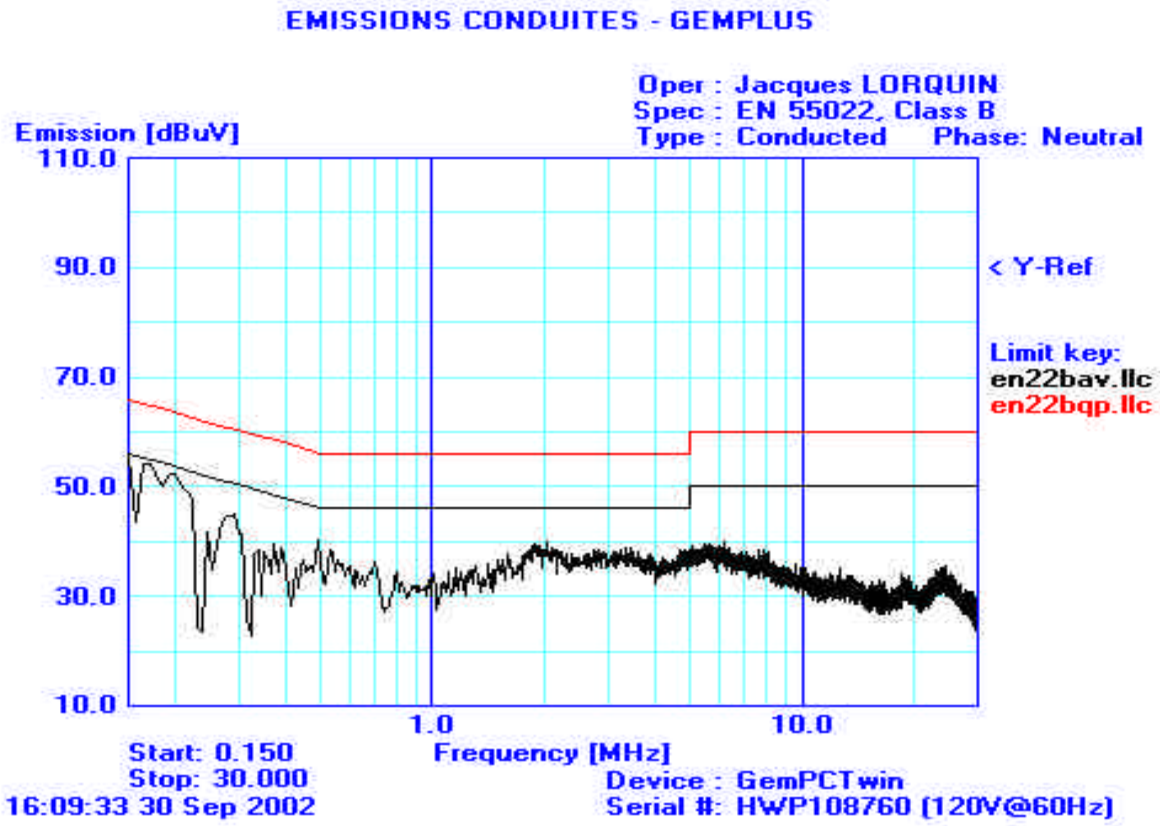
Measures are performed on line 1 and line 2 of the power supply of the PC,

3.4.1.Line conducted emission data on GemPC Twin USB Setup



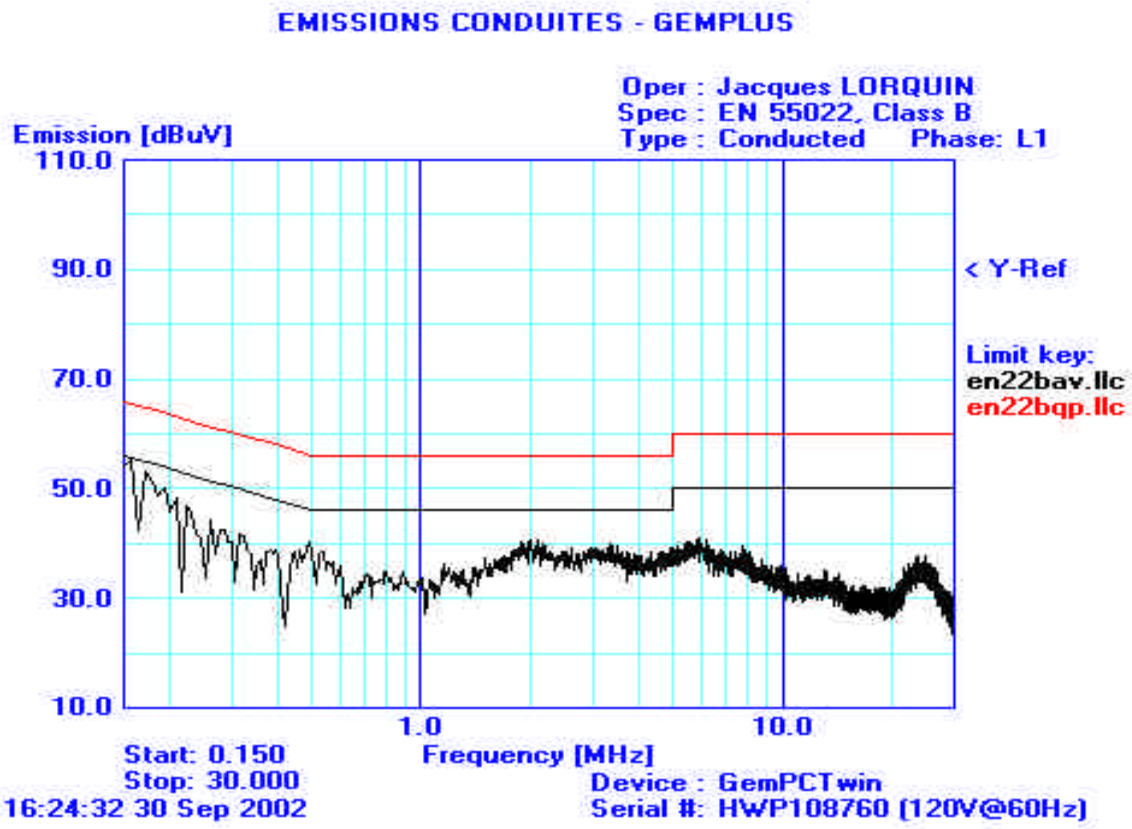
Num.	Freq. [MHz]	Peak [dBµV]	Q-Peak [dBµV]	QP limit [dBµV]	QP delta [dBµV]	Average [dBµV]	AVG Limit [dBµV]	AVG Delta [dBµV]
1	0.15	58.36	51.84	66	**-14.16**	24.07	56	**-31.93**
2	0.17	55.18	48.40	64.96	**-16.56**	29.04	54.96	**-25.92**
3	0.20	54.59	48.17	63.61	**-15.44**	37.79	53.61	**-15.82**
4	0.21	54.06	45.32	63.21	**-17.89**	33.65	53.21	**-19.56**
5	0.25	47.94	40.24	61.76	**-21.52**	17.27	51.76	**-34.49**
6	0.28	45.93	37.42	60.82	**-23.40**	26.31	50.82	**-24.51**
7	2.01	39.19	35.44	56	**-20.56**	29.71	46	**-16.29**
8	5.64	39.53	36.71	60	**-23.29**	31.80	50	**-18.2**

3.4.2.Neutral conducted emission data on GemPC Twin USB Setup



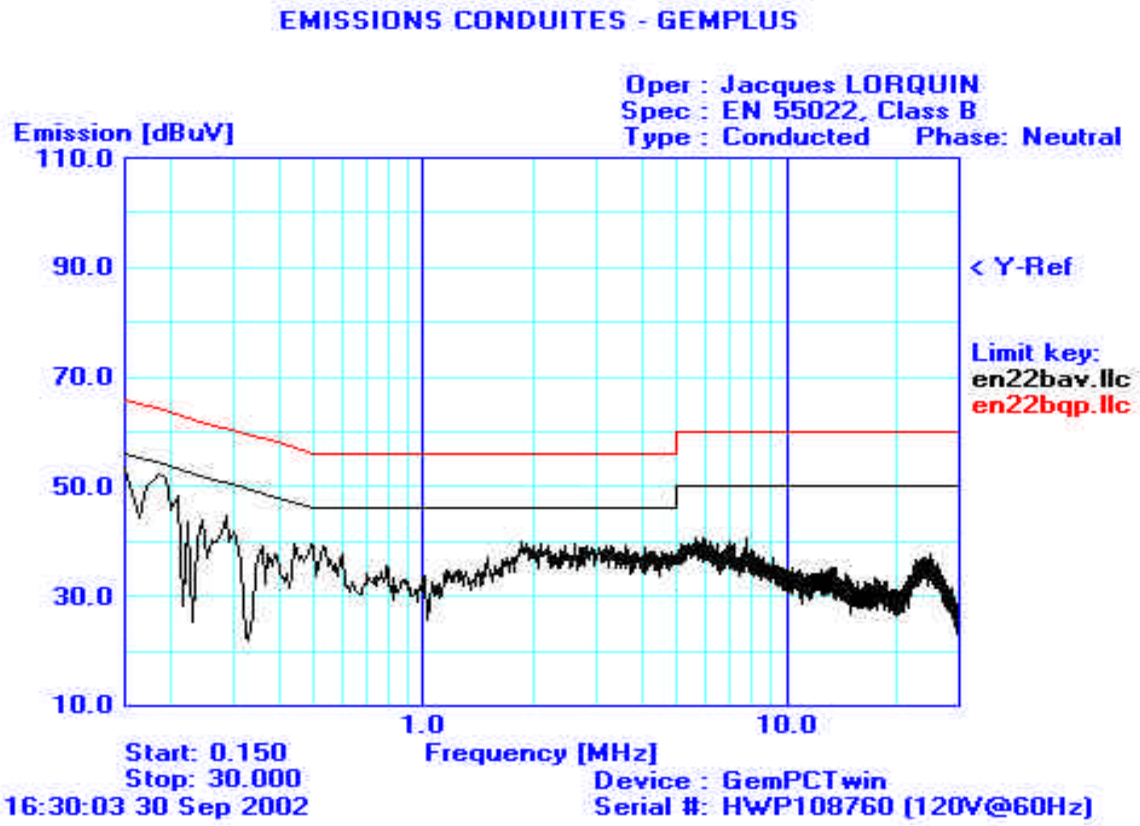
Num.	Freq. [MHz]	Peak [dBµV]	Q-Peak [dBµV]	QP limit [dBµV]	QP delta [dBµV]	Average [dBµV]	AVG Limit [dBµV]	AVG Delta [dBµV]
1	0.15	58.28	51.12	66	**-14.88**	23.59	56	**-32.41**
2	0.17	56.01	49.10	64.96	**-15.86**	25.24	54.96	**-29.72**
3	0.20	55.08	48.29	63.61	**-15.32**	37.65	53.61	**-15-96**
4	0.28	46.48	37.91	60.82	**-22.91**	26.27	50.82	**-24.55**
5	1.91	41.09	37.35	56	**-18.65**	32.90	46	**-13.1**
6	5.56	40.60	35.59	60	**-24.41**	28.94	50	**-21.06**

3.4.3.Line conducted emission data on GemPC Twin Serial Setup



Num.	Freq. [MHz]	Peak [dBµV]	Q-Peak [dBµV]	QP limit [dBµV]	QP delta [dBµV]	Average [dBµV]	AVG Limit [dBµV]	AVG Delta [dBµV]
1	0.15	58.02	51.56	66	**-14.44**	23.38	56	**-32.62**
2	0.17	54.57	47.79	64.96	**-17.17**	35.04	54.96	**-19.92**
3	0.19	54.11	46.10	64.04	**-17.94**	32.51	54.04	**-21.53**
4	0.21	51.14	43.40	63.21	**-19.81**	31.60	53.21	**-21.61**
5	0.23	48.95	41.88	62.45	**-20.57**	17.91	52.45	**-34.54**
6	0.28	45.91	36.95	60.82	**-23.87**	28.26	50.82	**-22.56**
7	2.00	40.51	37.42	56	**-18.58**	32.86	46	**-13.14**

3.4.4.Neutral conducted emission data on GemPC Twin Serial Setup



Num.	Freq. [MHz]	Peak [dBµV]	Q-Peak [dBµV]	QP limit [dBµV]	QP delta [dBµV]	Average [dBµV]	AVG Limit [dBµV]	AVG Delta [dBµV]
1	0.15	59.29	51.69	66	**-14.31**	24.09	56	**-31.91**
2	0.18	56.42	49.01	64.49	**-15.48**	36.20	54.49	**-18.27**
3	0.19	54.73	47.47	64.04	**-16.57**	35.79	54.04	**-18.25**
4	0.25	46.72	39.61	61.76	**-22.15**	17.24	51.76	**-34.52**
5	0.29	46.08	37.06	60.52	**-23.46**	27.11	50.52	**-23.41**
6	0.36	40.67	32.17	58.73	**-26.56**	23.45	48.73	**-25.28**
7	2.11	40.78	37.64	56	**-18.36**	32.94	46	**-13.06**
8	5.60	40.62	36.71	60	**-23.29**	31.31	50	**-18.69**

End of Tests