1 TEST REPORT

1.1 System test configuration

1.1.1 Justification

GemPC433-SL7 and GemPC433-SW7 are similar products with the same architecture. The GemPC433-SL7 has an added LED connected to the PCB, which is not present in the GemPC433-SW7. (See detailed internal pictures of products).
The 10-meters open site measurement was performed with the GemPC433-SL7. It was found during the 3-meters pre-characterization to have highest radiated emission level than the GemPC433-SW7.

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 GemPC433-SL7 (or -SW7) reader, which was itself connected to a personal computer. It has been tested with a Dell Latitude Personal computer laptop. Each ports of the Personal Computer were loaded with a typical peripheral device.

1.1.2 EUT Exercise software

The EUT exercise program (Apitest V1.0, running in loop under Windows 98) used during radiated and conducted testing was designed to exercise the GemPC433-SL7 (or -SW7) reader in a manner similar to a typical use .

1.1.3 Special accessories

The cable which connect the GemPC433 reader to USB port of the Personal Computer, is shielded and attached to the GemPC433.
The smart card used in the GemPC433 is a ISO 7816 type.
Figure #1, shows the installation of the GemPC433. 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.

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

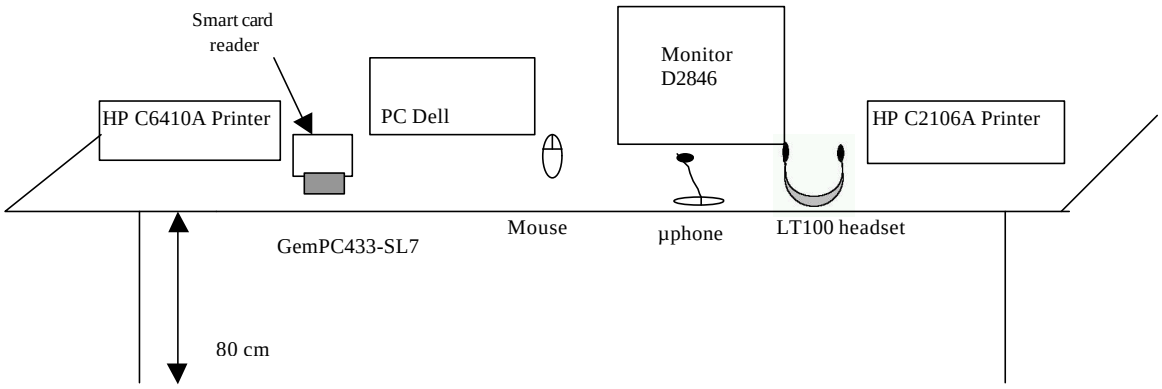


Fig #1

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.

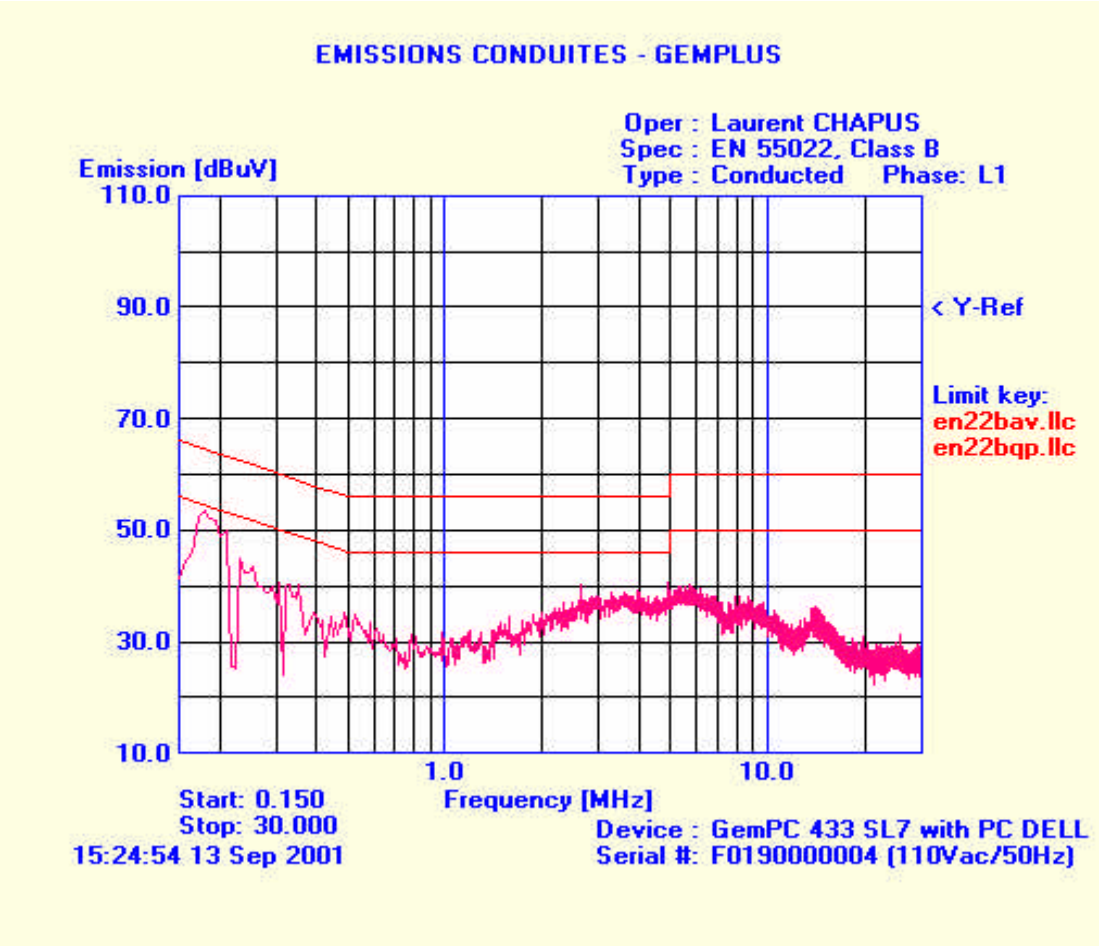
Measurement was initially made with an HP-8591EM Spectrum Analyzer in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement with the Rohde & Schwarz ESH3 receiver for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits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

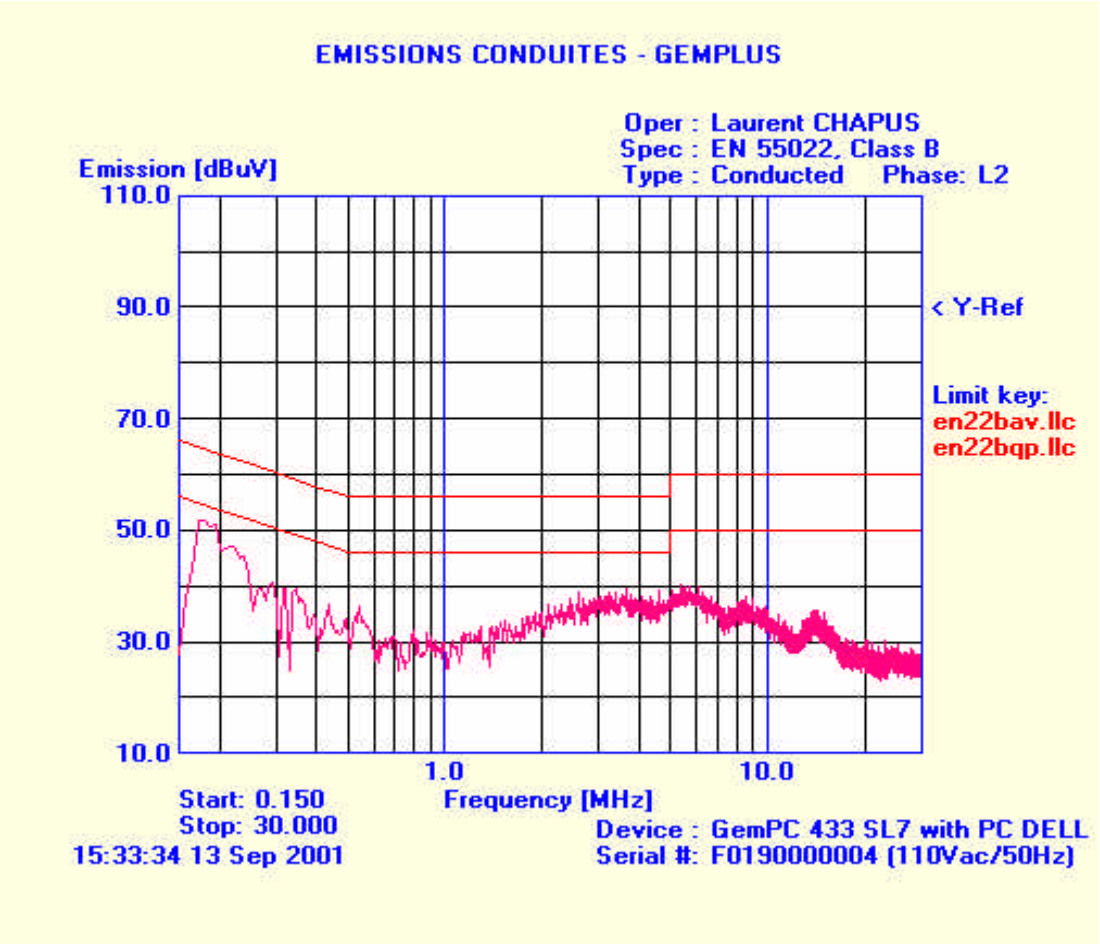
Test equipment :
HP 8591EM Spectrum Analyzer
Rhode & Schwarz ESH3 Receiver
EMCO 3810/2SH LISN N°1
TELEMETER NNB-2/16L LISN N°2

1.2.2 Neutral conducted emission data on GemPC433-SL7



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	55.97	49.87	64.5	**-14.5**	37.79	54.5	**-16.7**
2	0.250	45.94	39.37	61.7	**-22.3**	18.15	51.7	**-33.5**
3	0.350	39.87	31.57	58.9	**-27.3**	18.78	48.9	**-30.1**
4	2.640	41.66	36.97	56.0	**-19.0**	29.31	46.0	**-16.7**
5	4.930	39.55	35.07	56.0	**-21.0**	29.28	46.0	**-16.7**
6	5.780	40.93	36.06	60.0	**-24.0**	29.62	50.0	**-20.4**

1.2.3 Line conducted emission data on GemPC430-SL7



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	55.92	48.58	64.5	**-16.1**	34.92	54.5	**-19.6**
2	0.220	48.89	42.31	62.8	**-20.5**	19.03	52.8	**-33.8**
3	0.290	44.74	37.37	60.5	**-23.1**	27.26	50.5	**-23.2**
4	0.370	38.04	31.44	58.5	**-27.1**	25.85	48.5	**-22.6**
5	3.36	40.10	35.53	56.0	**-20.5**	29.16	46.0	**-16.8**
6	4.58	39.07	35.31	56.0	**-20.7**	28.46	46.0	**-17.5**
7	5.48	41.18	36.91	60.0	**-23.1**	29.91	50.0	**-20.1**

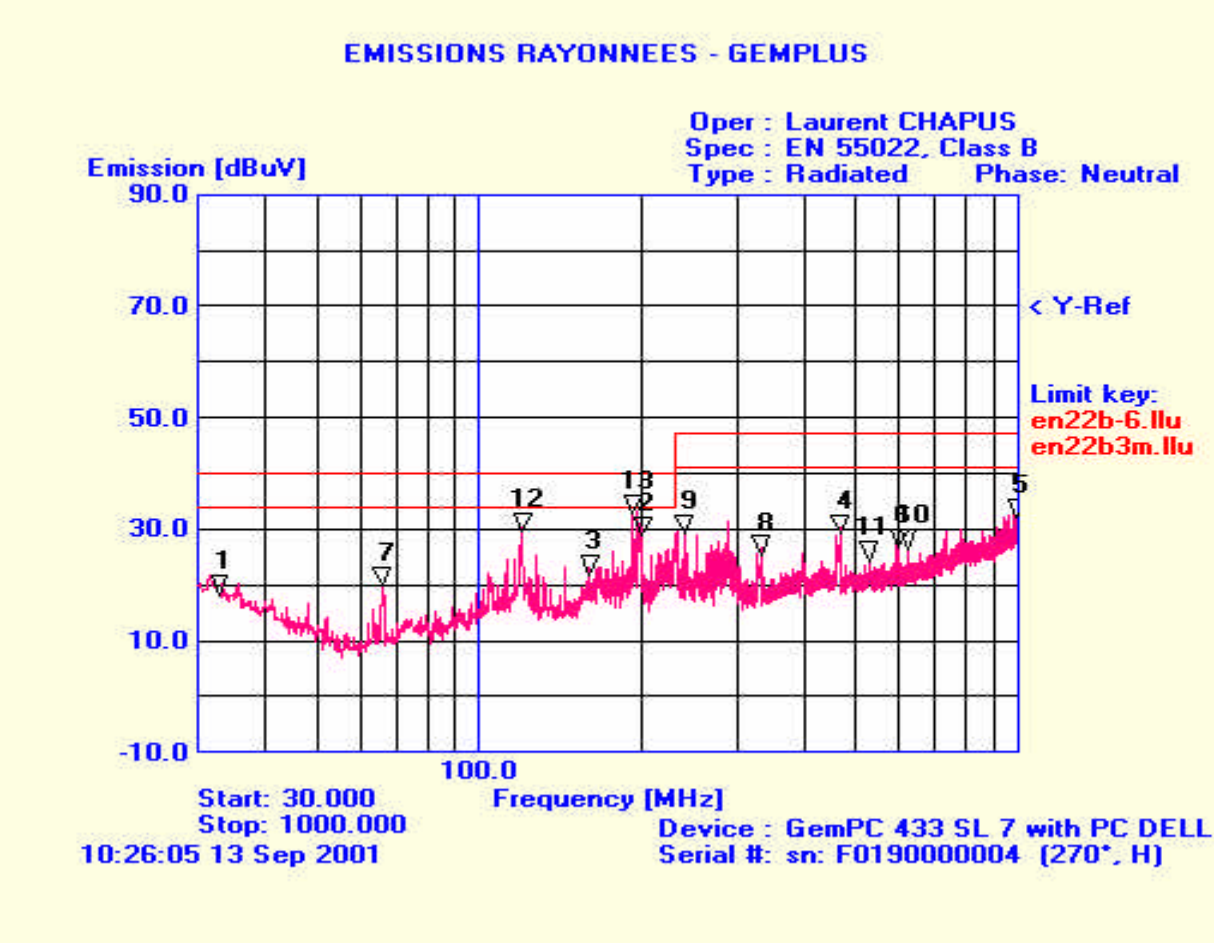
1.3 Radiated emission data

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 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 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



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
33.276	30.0	27.0	**-3.0**	254	V	109	12.4	
120.007	30.0	20.0	**-10.0**	210	V	359	17.1	
127.993	30.0	20.3	**-9.7**	269	H	378	15.2	
160.015	30.0	23.6	**-6.4**	248	H	386	17.4	
192.002	30.0	26.2	**-3.9**	349	H	393	19.5	
199.999	30.0	23.3	**-6.7**	316	H	244	20.0	
333.067	37.0	25.4	**-11.6**	247	H	274	18.1	
466.308	37.0	31.4	**-5.6**	24	H	193	20.7	
528.036	37.0	27.0	**-10.1**	336	H	205	22.1	
599.553	37.0	29.7	**-7.3**	183	H	159	23.8	

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.