1 TEST REPORT

1.1 System test configuration

1.1.1 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 GCR412 reader, which was itself connected to a personal computer. It has been tested with a Hewlett Packard Vectra 515series D4136A Personal computer. Each ports of the Personal Computer were loaded with a typical peripheral device.

1.1.2 EUT Exercise software

The EUT exercise program (testcem 1.exe running under DOS) used during radiated and conducted testing was designed to exercise the GCR412 reader in a manner similar to a typical use (reading the smart card in loop).

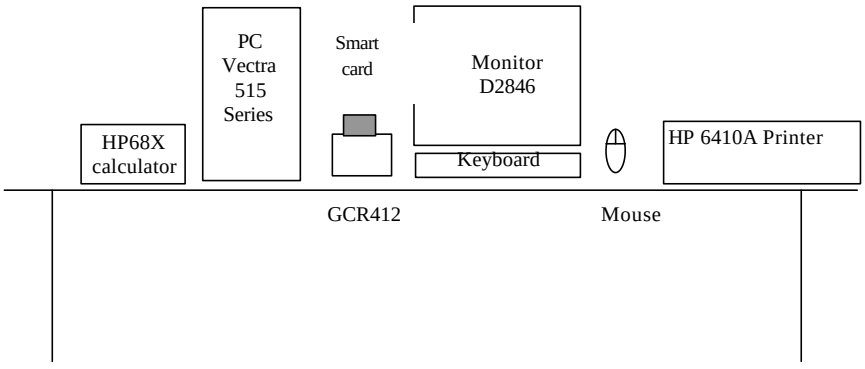
1.1.3 Special accessories

The cable used to connect the GCR412 reader to the keyboard and RS232 ports of the Personal Computer is shielded and attached to the product. It is connected to Com 1(Serial calculator to Com2).
The smart card used in the GCR412 is a GemPlus MPC0S64K.
As shown in Figure 3.1, 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



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 120V / 60Hz power line voltage and compared to the CISPR22 Class B limits. Measurement bandwidth was 9KHz from 150 KHz to 30 MHz.

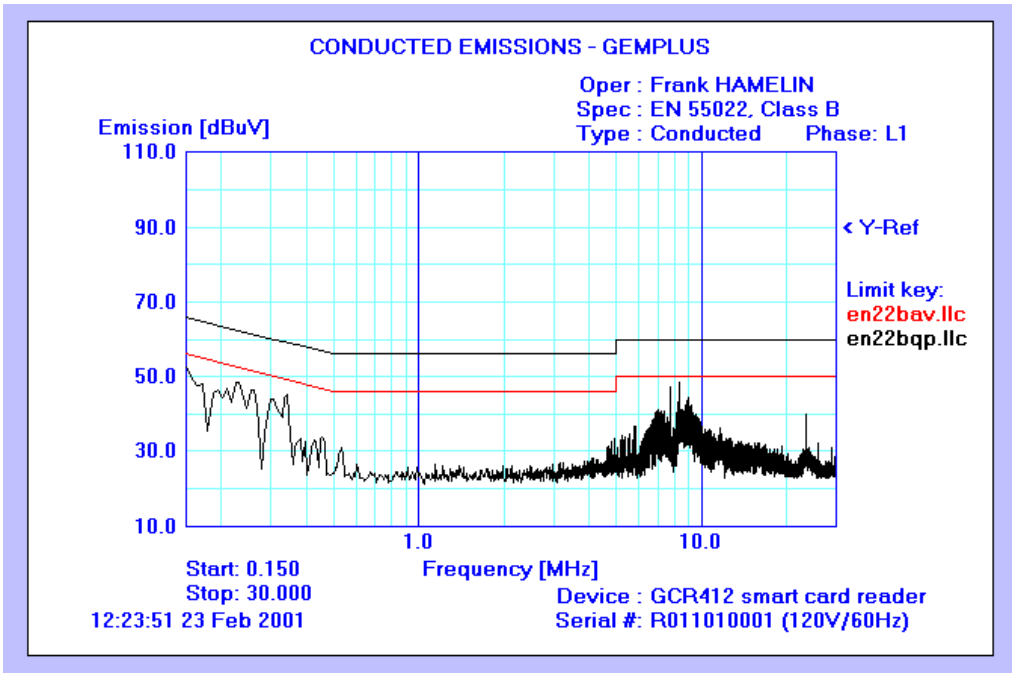
Measurement was initially made with an HP-8591EM Spectrum Analyzer in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement with the Rohde & Schwarz ESH3 receiver for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits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

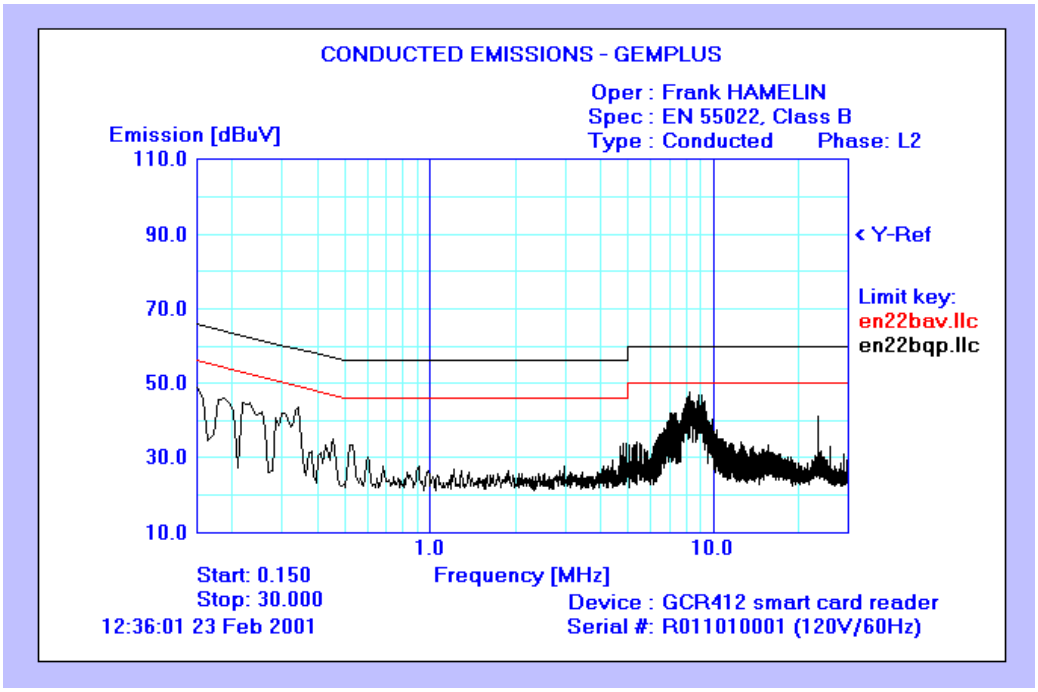
Test equipment :
HP 8591EM Spectrum Analyzer
Rhode & Schwarz ESH3 Receiver
EMCO 3810/2SH LISN N°1
TELEMETER NNB-2/16L LISN N°2

1.2.2 Neutral conducted emission data on GCR412



Num.	Freq.	Peak	Q-Peak	QP limit	***QP delta***	Average	AVG Limit	***AVG Delta***
	[MHz]	[dBµV]	[dBµV]	[dBµV]	***[dBµV]***	[dBµV]	[dBµV]	***[dBµV]***
1	0.150	52.71	47.58	64,00	**-16.42**	45.73	54.00	**-8.27**
2	0.230	49.69	47.88	62,00	**-14.12**	45.66	52.00	**-6.34**
3	0.260	46.67	39.65	60,00	**-20.35**	36.74	50.00	**-13.26**
4	0.300	45.91	42.67	60,00	**-17.33**	39.90	50.00	**-10.1**
5	0.340	45.67	44.97	58,00	**-13.03**	42.68	48.00	**-5.32**
6	7.770	41.21	34.73	60,00	**-25.27**	33.94	50.00	**-16.06**
7	8.320	40.15	38.29	60,00	**-21.71**	36.49	50.00	**-13.51**
8	8.980	38.34	37.62	60,00	**-22.38**	36.21	50.00	**-13.79**
9	23.35	41.55	36.77	60,00	**-23.23**	25.17	50.00	**-24.83**

1.2.3 Line conducted emission data on GCR412



Num.	Freq.	Peak	Q-Peak	QP limit	***QP delta***	Average	AVG Limit	***AVG Delta***
	[MHz]	[dBµV]	[dBµV]	[dBµV]	***[dBµV]***	[dBµV]	[dBµV]	***[dBµV]***
1	0.160	51.24	42.86	64,00	-21.14	33.17	54.00	-20.83
2	0.190	48.42	40.50	64,00	-23.5	33.32	54.00	-20.68
3	0.230	47.22	41.58	62,00	-20.42	37.46	52.00	-14.54
4	0.340	44.02	43.13	58,00	-14.87	40.93	48.00	-7.07
5	8.200	38.99	35.92	60,00	-24.08	35.03	50.00	-14.97
6	8.870	40.64	39.30	60,00	-20.7	38.15	50.00	-11.85
7	9.080	33.45	29.62	60,00	-30.38	26.20	50.00	-23.8
8	9.290	40.54	34.48	60,00	-25.52	32.82	50.00	-17.18
9	23.35	40.30	33.23	60,00	-26.77	26.16	50.00	-23.84

1.3 RADIATED EMISSION DATA

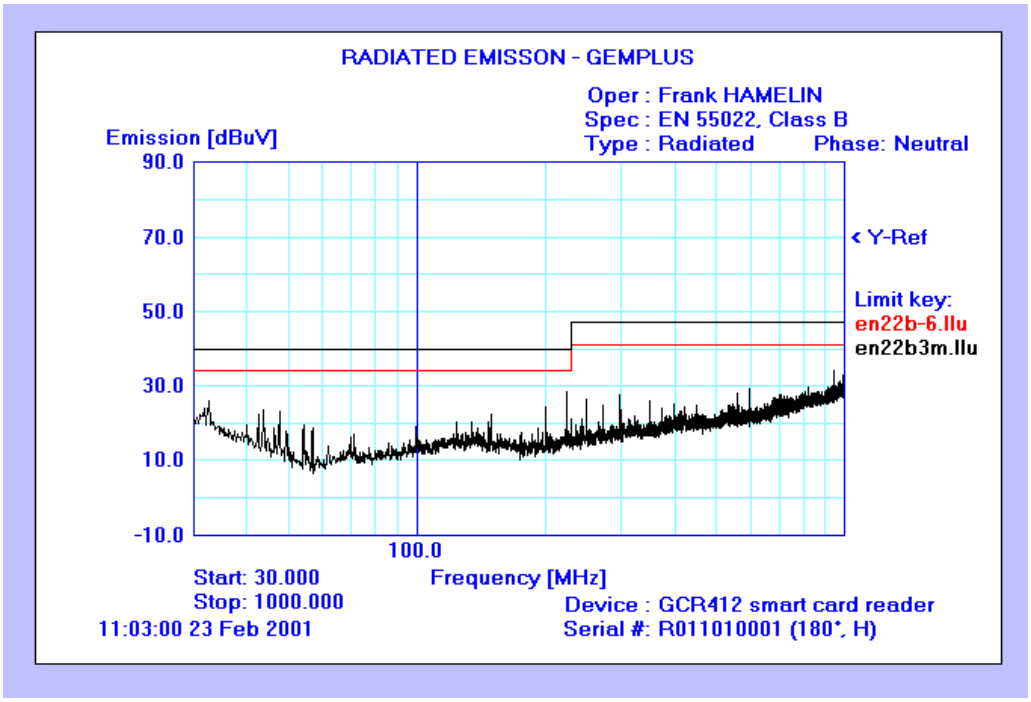
1.3.1 Test Procedure

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

Final result 30-1000 MHz



Graph abstract - 30-1000MHz

Frequency (MHz)	QPeak Lmt (dBµV/m)	QPeak (dBµV/m)	QPeak-Lmt (dB)	Angle (deg)	Pol	Hgt (cm)	Tot Corr (dB)
46.78	30.0	19.6	**-10.4**	151	V	105	12.0
57.30	30.0	22.3	**-7.7**	1	H	393	11.5
149.43	30.0	21.3	**-8.7**	144	V	105	15.5
174.33	30.0	23.4	**-6.6**	130	H	371	18.4
186.16	30.0	23.4	**-6.6**	277	V	105	19.1
195.98	30.0	22.1	**-8.0**	116	H	395	19.7
199.23	30.0	21.7	**-8.3**	130	H	374	19.9
200.00	30.0	24.3	**-5.7**	130	H	297	19.9
203.83	30.0	21.3	**-8.7**	117	H	405	14.0
219.94	30.0	16.7	**-13.3**	145	H	223	14.2
224.14	30.0	20.5	**-9.5**	317	H	362	14.3
249.03	37.0	25.2	**-11.8**	309	V	108	14.6
298.84	37.0	26.1	**-10.9**	339	V	104	16.7
697.29	37.0	34.5	**-2.5**	1	V	223	26.2

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.