emcec

TEST REPORT

Date: ESPOO 27.09.1999

Page: 1 (15)

Appendices: 1

Number: TL 990280

Date of handing in: 02.11.1998

Tested by:

Timo Leismala, Test Engineer

FINAS AKKREDITOINTI SUOMI FINLAND

T017 (EN 45001)

Reviewed by:

Janne Nyman, Product Manager, EMC

SORT OF EQUIPMENT: **Smart card reader**

MARKETING NAME: ***SetCAD 203 Smart Card Reader***

TYPE: ***SetCAD 203 Smart Card Reader***

MANUFACTURER: ***Setec Oy, Finland***

SERIAL NUMBER: **9811448**

CLIENT: **Setec Oy**

ADDRESS: **P.O. Box 31, FIN-01741 Vantaa, Finland**

TELEPHONE: **+358-9-8941 4453**

TEST SPECIFICATION: **CISPR 22 (1997)**

SUMMARY:

In regard to the performed tests the equipment under test fulfils the requirements defined in the test specification CISPR 22 (1997), see page 3 for details.

Contents

Summary of performed tests and test results

Emission tests according to the test specification CISPR 22 (1997)

Emission test	Test method	Conclusion
Radiated disturbance	CISPR 22 (1997)	Pass, class B, margin 5.3 dB or more
Conducted disturbance at mains ports	CISPR 22 (1997)	Pass, class B, margin 24.1 dB or more

1. General

The equipment under test (EUT) was a smart card reader. The purpose of the performed tests was to see if in regard to these the EUT fulfils the EMC requirements defined in the publication CFR 47 Part 15, Subpart B, Class B. The tests were performed according to the test specification CISPR 22 (1997) by using accredited test method.

2. System configuration

2.1 Test set-up

Equipment under test (EUT):

- SetCAD 203 smart card reader, S/N: 9811448
  Test program: Card_tst 1.0

Peripheral devices (see picture 1 of the test set-up on page'5):

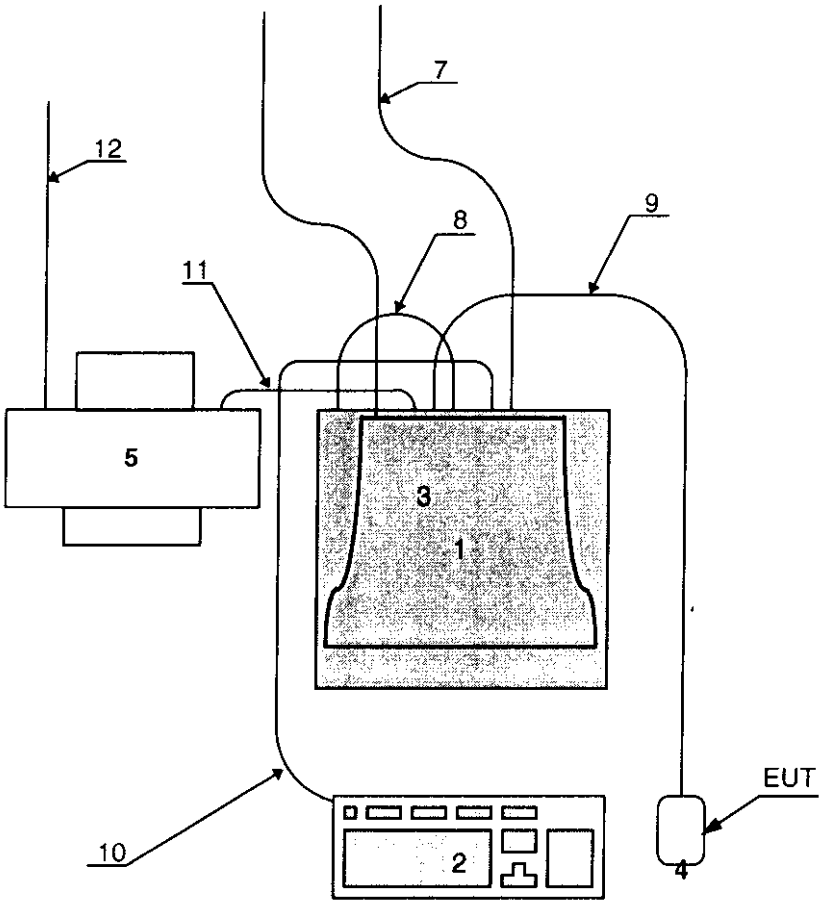
No.	Device
1	Microcomputer, type ICL MikroMikko 5 CX 386 CC3, S/N: 7213571167
2	Nokia keyboard, type MN 85062 102/S, S/N: 7050120073
3	Display, type DU146B, S/N: 9224377808
4	Test smart card: Setcos 3.2 test card 0001, placed inside the smart card reader
5	Printer, Epson Stylus color 600, model P954A, S/N: AAK7 852664

Cables (see picture 1 of the test set-up on page 5):

No.	Type	Length [m]
6	Mains cable of the microcomputer, unshielded	2.4
7	Mains cable of the display, unshielded	2.4
8	Monitor data cable, ferrite at both ends of the cable	~1.5
9	RS-232 serial cable	~1.0
10	Keyboard cable	~2.0
11	Printer data cable, ferrite at the microcomputer end of the cable	1.8
12	Mains cable of the printer, unshielded	2.4

Operating voltage of the EUT:

- Smart card reader: ± 12 V DC
- Microcomputer: 230 V AC, 50 Hz



Picture 1. Test set-up.

2.2 Operating conditions of the EUT

See appendix 1.

3. Test procedures

3.1 Radiated disturbance emission test

The test was performed as a compliance test. The test parameters concerned were as follows:

Parameter	Specification
Test method	CISPR 22 (1997)
Frequency range	30 - 1000 MHz
Site name	EMCEC Ltd., Perkkaa
Date of testing	24.09.1999
Test equipment	184, 319, 338, 350, 397
Test uncertainty U95	+3.1 dB / -4.0 dB
Test conditions	22 °C, 30 % RH

The test was performed in a semi-anechoic shielded room. For the duration of the test the EUT was placed on a non-conductive table 0.8 m high standing on the turntable (see photographs 1 to 4). During the test the distance from the EUT to the measuring antenna was 10 meters. The excess length of the cables of the EUT were made into bundles 30-40 cm in length except mains cables. In order to find the maximum levels of the disturbance radiation the angle of the turntable, the height of the measuring antenna and the layout of the EUT cables were varied during the test. The test was performed separately with the measuring antenna being both in horizontal and vertical polarisations.

3.1.2 Conducted disturbance at mains ports emission test

The test was performed as a compliance test. The test parameters concerned were as follows:

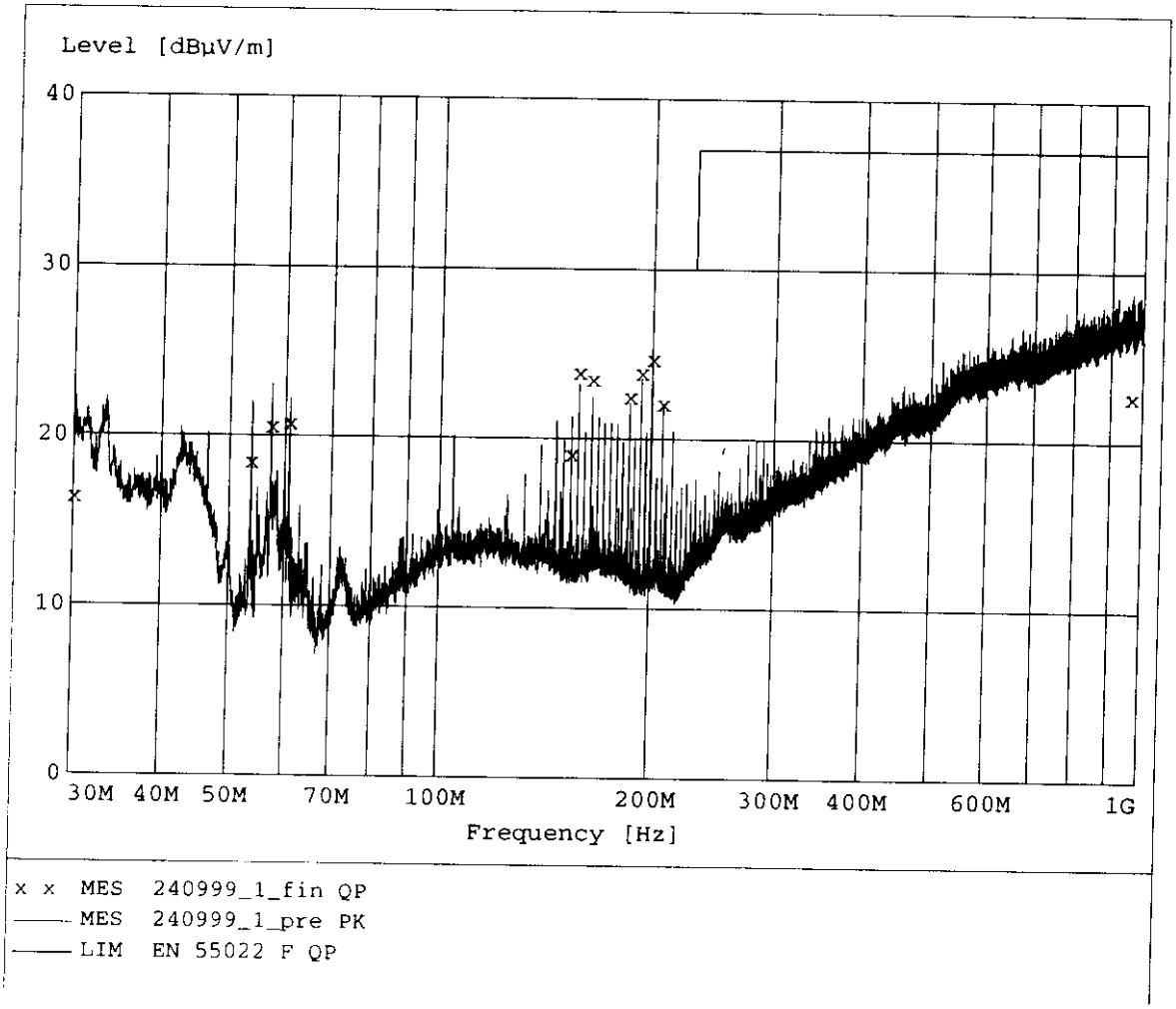
Parameter	Specification
Test method	CISPR 22 (1997)
Frequency range	0.150 - 30 MHz
Site name	EMCEC Ltd. / Perkkaa
Date of testing	24.09.1999
Test equipment	5, 168, 184, 343, 348
Test uncertainty U95	+2.3 dB / -2.9 dB
Test conditions	23 °C, 47 % RH

The test was performed inside a shielded room where the floor and one of the walls of the test site comprised the reference ground plane (RGP). For the duration of the test the EUT was placed on a non-conductive table 0.8 m high standing on the RGP and 0.4 m apart from the vertical RGP (see photographs 5 to 7). The excess length of the cables of the EUT were made into bundles 30-40 cm in length. The power input cable of the EUT was connected to an artificial mains network. The test was performed separately on each phase and also on the neutral wire.

The disturbances were first examined by performing a spectrum scan by using a peak detector. The general procedure in the conducted disturbance emission test is that no further measurements are necessary if the disturbance levels measured by using the peak detector are below the limit value defined for the measurement performed by using an average detector. If not, then at the test frequencies concerned the measurement is performed also by using a quasi-peak detector. If the disturbance levels measured by using the quasi-peak detector are below the limit value defined for the measurement performed by using an average detector, then measurements by using the average detector are not necessary.

4. Test results

4.1 Radiated disturbance emission test

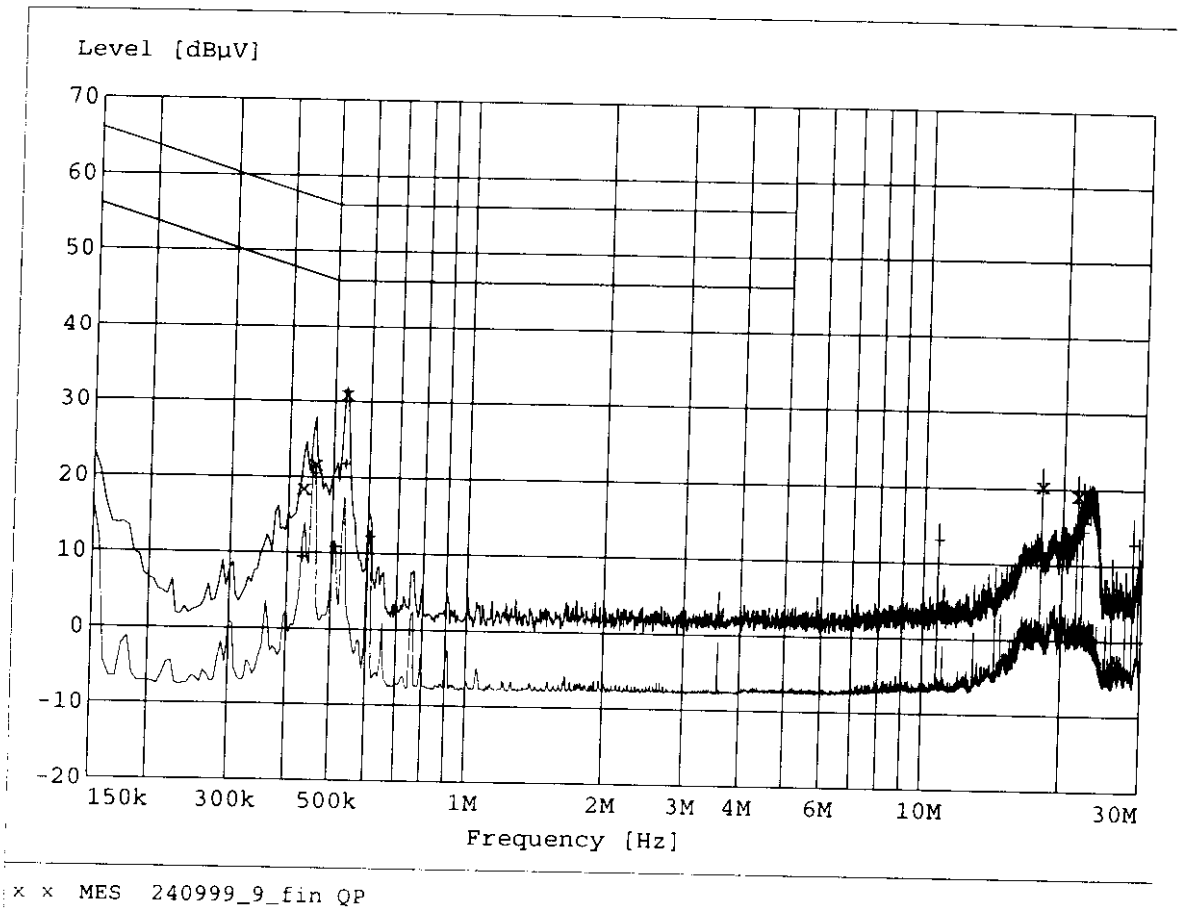


Horizontal and vertical polarisations in the frequency range 30 – 1000 MHz measured by using the peak detector. During the peak detector scan, the turntable was rotated from 0° to 360° with 30° step with the antenna heights 1.0 m and 3.0 m. The highest levels of the radiated interference field strength measured by using the quasi-peak detector were recorded.

Measurement results (Quasi-peak):

Frequency MHz	Level dBµV/m	Limit dBµV/m	Margin dB	Exceed	Height cm	Azimuth deg	Polarisation
30.12	16.4	30.0	13.6	–	140.0	52.0	Vertical
53.68	18.5	30.0	11.5	–	101.0	66.0	Vertical
57.28	20.6	30.0	9.4	–	188.0	52.0	Vertical
60.84	20.8	30.0	9.2	–	167.0	66.0	Vertical
153.92	19.1	30.0	10.9	–	399.0	54.0	Horizontal
157.52	23.9	30.0	6.1	–	398.0	77.0	Horizontal
164.68	23.5	30.0	6.5	–	378.0	86.0	Horizontal
186.12	22.5	30.0	7.5	–	399.0	111.0	Horizontal
193.28	23.9	30.0	6.1	–	399.0	257.0	Horizontal
200.44	24.7	30.0	5.3	–	357.0	258.0	Horizontal
207.64	22.1	30.0	7.9	–	388.0	235.0	Horizontal
964.28	22.7	37.0	14.3	–	399.0	55.0	Horizontal

4.1.3 Conducted disturbance at mains ports emission test



Phases 0 (neutral) and 1 in the frequency range 0.15 – 30 MHz measured by using the peak and average detectors. The highest levels of the conducted disturbance voltage measured by using the quasi-peak and average detectors were recorded.

Measurement results (QP):

Frequency MHz	Phase	Conducted disturbance				Conclusion Pass/Fail
		Result Quasi-peak dB(µV)	Limit value Quasi-peak dB(µV)	Result Average dB(µV)	Limit value Average dB(µV)	
0.430	1	18.6	57.3	9.6	47.3	Pass
0.455	1	21.8	56.8	–	–	Pass
0.455	0	–	–	20.6	46.8	Pass
0.505	1	–	–	11.0	46.0	Pass
0.530	1	31.1	56.0	–	–	Pass
0.530	0	–	–	21.9	46.0	Pass
0.605	0	–	–	12.4	46.0	Pass
10.740	0	–	–	13.2	50.0	Pass
17.895	1	20.4	60.0	20.0	50.0	Pass
21.475	0	19.3	60.0	–	–	Pass
21.475	1	–	–	18.5	50.0	Pass
22.110	1	16.4	60.0	14.5	50.0	Pass
28.635	0	–	–	12.9	50.0	Pass

5. List of test equipment

No.	Equipment	Type	Manufacturer	Serial Number
3	Test receiver	ESH-2	Rohde & Schwarz	871544/061
4	Test receiver	ESV	Rohde & Schwarz	872148/002
5	Test receiver	ESH-3	Rohde & Schwarz	894718/015
338	Test receiver	ESS	Rohde & Schwarz	847151/009
15	Quasi peak adapter	HP 85650A	Hewlett Packard	2521A00985
16	Quasi peak adapter	HP 85650A	Hewlett Packard	2412A00421
41	Spectrum analyzer	8566B	Hewlett Packard	2005A01452
42	Spectrum analyzer	8566B	Hewlett Packard	2637A04102
43	Spectrum analyzer	8568B	Hewlett Packard	2039A01256
41	Spectrum analyzer	8566B	Hewlett Packard	2005A01452
45	Spectrum analyzer	FSBS	Rohde & Schwarz	862563/010
46	Spectrum analyzer	MS2601A	Anritsu Corp.	MT 37253
47	Spectrum analyzer	MS2601A	Anritsu Corp.	MT 45942
63	RF amplifier	6203-414N	Watkins-Johnson	-
65	RF amplifier	6616-605N	Watkins-Johnson	-
66	RF amplifier	5325-507N	Watkins-Johnson	-
67	RF amplifier	8447D	Hewlett Packard	1726A01044
68	RF amplifier	01855A	Hewlett Packard	1726A01307
171	RF amplifier	01855A	Hewlett Packard	1726A01309
199	RF amplifier	ZHL-1042J	Mini-Circuits	012288-10
397	RF amplifier	ZFL-2000	Mini-Circuits	-
372	AC power source	500i-400	California Instr.	HK 52065
89	Antenna	3147	EMCO	9202-1078
90	Antenna	3109	EMCO	9109-2582
92	Antenna	VHA 9103 BBA 9106	Schwartzbeck	-
166	Antenna	3146	EMCO	3340
319	Antenna, bilog	CBL6112	Chase	2018
167	Artificial mains network	NSLK 8126	Schwartzbeck	8126101
168	Artificial mains network	NSLK 8127	Schwartzbeck	8127162
227	Artificial network	PRL 951	EMCEC Ltd.	150295
343	Artificial mains network	NSLK 8128	Schwartzbeck	8128177
169	Absorbing clamp	MDS 20	Rohde & Schwarz	73323
170	Absorbing clamp	MDS 21	Rohde & Schwarz	81922
215	Absorbtion clamp	ESH2-Z1	Rohde & Schwarz	871517/12
184	Temp. & Humidity meter	HMI 32	Vaisala	63837
289	Universal power analyzer	PM3000A	Voltech	8448
290	Reference impedance network	IEC555	Voltech	8448
348	Shielded room	RFSD-100	Euroshield Oy	1320
349	Shielded room	RFSD-100	Euroshield Oy	1319
350	Semianechoic shielded room	RFD-F-100	Euroshield Oy	1327

SetCAD 203 smart card reader CISPR22 test installation

SetCAD 203 offers an easy way to implement a smart card interface to PC via PC's RS-232C-serial port. Actually SetCAD 203 is a level converter, which converts RS-232C voltage levels (+/-12V) to TTL-levels (+5V/0V). RS-232C hand-shake signals takes care of RST-, CARD IN- and connects the power supply to the card. Power supplying to the smart card has been taken from RS-232C. Also reader has an internal crystal oscillator 3.58 MHz to the smart card.

Test program Card_tst 1.0, which is used under test, goes through sequencies: write, read and write/read the smart card in a endless loop. These are the all possible states where smart card is active. All of these test parts contains serial random data, which is generated under the test.

EUT:

Type:	SetCAD 203 smart card reader
Manufacturer:	Setec Oy
Ser no:	9811448

Test PC:

Type:	ICL MikroMikko 5 CX 386 CC3
Manufacturer:	ICL
Ser no:	7213571167
Part:	CC33105101N

Display:

Type:	DU146
Manufacturer:	ICL
Ser no:	9224377808
Part:	PD011007

Keyboard:

Type:	MN 85062 102/S
Manufacturer:	Nokia
Ser no:	7050120073

Parallel printer:

Type:	EPSON STYLUS COLOR 600
Manufacturer:	Epson
Ser no:	AAK7852664

Test smart card:	Setcos 3.2 test card 0001
Test program:	Card_tst 1.0

Power supply cable length 2.4 m in PC and display.