MEASUREMENT / TECHNICAL REPORT

Fujitsu Siemens Computers

Model: PCMCIA board TopSec 701

FCC ID: L82TOPSEC701

Aug. 24, 2000

This report concerns:	☒ Original grant	☐ Class II change
Equipment type:	Audio board	

Request issue of grant:

- ☒ Immediately upon completion of review
- ☐ Defer grant per 47 CFR 0.457(d)(1)(ii) until _____ date _____. Company Name agrees to notify the Commission by _____ date _____ of the intended date of announcement of the product so that the grant can be issued on that date.

Measurement procedure used:

- ☒ ANSI C63.4-1992
- ☐ FCC/OET MP-4(1987)
- ☐ other _____

Limits on compliance with: CISPR 22 resp. FCC class B

Application for Certification
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Applicant for this device:

Siemens AG
Hofmannstr. 51
81359 München
Germany

Table of Contents

1 GENERAL INFORMATION

1.1 Product Description

Siemens offers a family of line encryption devices. The TopSec 701 is designed to encrypt modem lines. The modem may be a terminal device in analog nets, ISDN nets or even integrated modems in mobile phones. The TopSec 701 is realized as a PC card and behaves like a modem card. It is not a modem card itself but feeds through the modem functionality from a connected modem to a PC. This modem will be connected to the TopSec 701 via a serial cable or via an infrared interface.

The TopSec 701 interprets the modem commands from the PC and sets up a modem connection to the partner device. If there is also a TopSec device available at the far end, keys will be exchanged. After successful key exchange, a transparent encrypted line will be provided by the TopSec devices.

The TopSec cryptology supports a combination of asymmetric algorithms for key exchange (Diffie Hellmann with 1024 bit key length), authentication (RSA with 1024 bit key length) and a symmetric algorithm for data encryption with 128 bit key length.

The PCMCIA board is assembled by Siemens AG, Hofmanstraße 51, 81359 München.

1.2 Related Submittal Grant

N/A

1.3 Tested System Details

The FCC IDs for all equipment, plus description of all cables used in the tested system are:

Pos	Model Number (Serial Number)	FCC ID	Description	Cable Description (length in [cm])
1	Fujitsu Siemens Computers Notebook	HSSMOB800001	Mobile 800S (AGP) PIII 500 MHz	unshielded power cord [292]
2	Fujitsu Siemens Computers MCM 17P1 YEDA175914	A3LCSE783	Monitor	unshielded power cord [175] shielded video cable [168]
3	Logitech M-UB48 LZA83300044	DOC: m/n:IM1	USB-Mouse	shielded mouse cable [197]
4	Microsoft MS 2.1A 0056712-2	C3KKMP1	Mouse	shielded mouse cable [183]
5	Fujitsu Siemens Computers S26381-K240-V120	HSS01TASTK240	Keyboard	shielded keyboard cable [143]

Pos	Model Number (Serial Number)	FCC ID	Description	Cable Description (length in [cm])
6	Hewlett Packard HP 2225C+ (3002S66627)	DSI6XU2225	Printer, parallel I/F	unshielded AC cable [180], shielded centronics cable [190]
7	Hewlett Packard HP 2225D+ (2952S61229)	DSI6XU2225	Printer, serial I/F	unshielded power cord [185], shielded serial cable [190]
8	3COM US Robotnics 5630 UFR73C89B79A245 630-01	N/A	Modem	unshielded power cord [152]
9	Fujitsu Siemens Computers S26113-E428-V30	N/A	AC/DC-Adapter	shielded DC cable [149]; unshielded AC cable [152]
10	Labtec AM-32	N/A	Microphone	shielded cable [142]
11	Chairman Power Beat P-10	N/A	Loud-speakers	shielded cable [166 + 124]
12	Line In			shielded cable
	Pos 1 contains:			
a	Siemens AG TopSec 701	L82TOPSEC701	PCMCIA board **(EUT)**	shielded [150], with ferrite beat (Würth Elektronik, model 742 711 4)

Remark:

1.4 Test Methodology

Both, conducted and radiated tests were performed according to the procedures in ANSI C63.4-1992. Radiated testing below 1 GHz was performed at an antenna to EUT distance of 10 meters above 1 GHz at an antenna to EUT distance of 3 meters. All radiated emission measurements were done in an anechoic chamber. Limits for radiated and conducted emission are in compliance with CISPR 22 resp FCC class B.

1.5 Test Facility

The test site is located at Fujitsu Siemens Computers GmbH, Bürgermeister-Ulrich-Str. 100, 86199 Augsburg, Germany. This site consist of a 10 m semi anechoic chamber for radiated emission testing and of two shielded cabinets for conducted emission testing. The 10 m semi anechoic chamber is conform with the NSA-limits described in CISPR22, CISPR16 and ANSI C63.4.1992. The site is registered by the German accreditation body DAR-Registration No. TTI-P-G114 and by the Federal Communications Commission on April 07, 2000, Registration Number 90935.

1.6 Referenced Rules Sections

N/A

2 PRODUCT LABELING

2.1 FCC ID Label: see attached files

2.2 Location of Label on EUT: see attached files

3 SYSTEM TEST CONFIGURATION

3.1 Justification

The system was configured for testing in a maximum fashion (as a customer can use it). Each type of external ports was connected with a peripheral unit (e.g. serial port connected to a serial printer, external keyboard port connected to a keyboard, modem port connected to a modem and so on).

3.2 Video mode Justification

The system was tested in video graphic modes 1024 x 768, 60 Hz, because this is the most commonly used resolution and reflects the worst case for a notebook.

3.3 EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

The used sequence is:

- scrolling ”H” with applicable video mode (see 3.2)
- internal Floppy drive writes to the HD and reads back
- internal CD-ROM drive writes to the HD
- ”H`s” are sent to the printer ports
- data is sent to USB ports
- data is sent to PCMCIA board and from there to a modem

3.4 Special Accessories

As shown in Figure 3.1, all interface cables used for compliance testing are shielded like normally supplied by the manufacturer. All cable connectors feature integral metal hoods for shielding.

3.5 Equipment Modifications

To achieve compliance to Class B levels, the following modifications were made during compliance testing:

no modifications

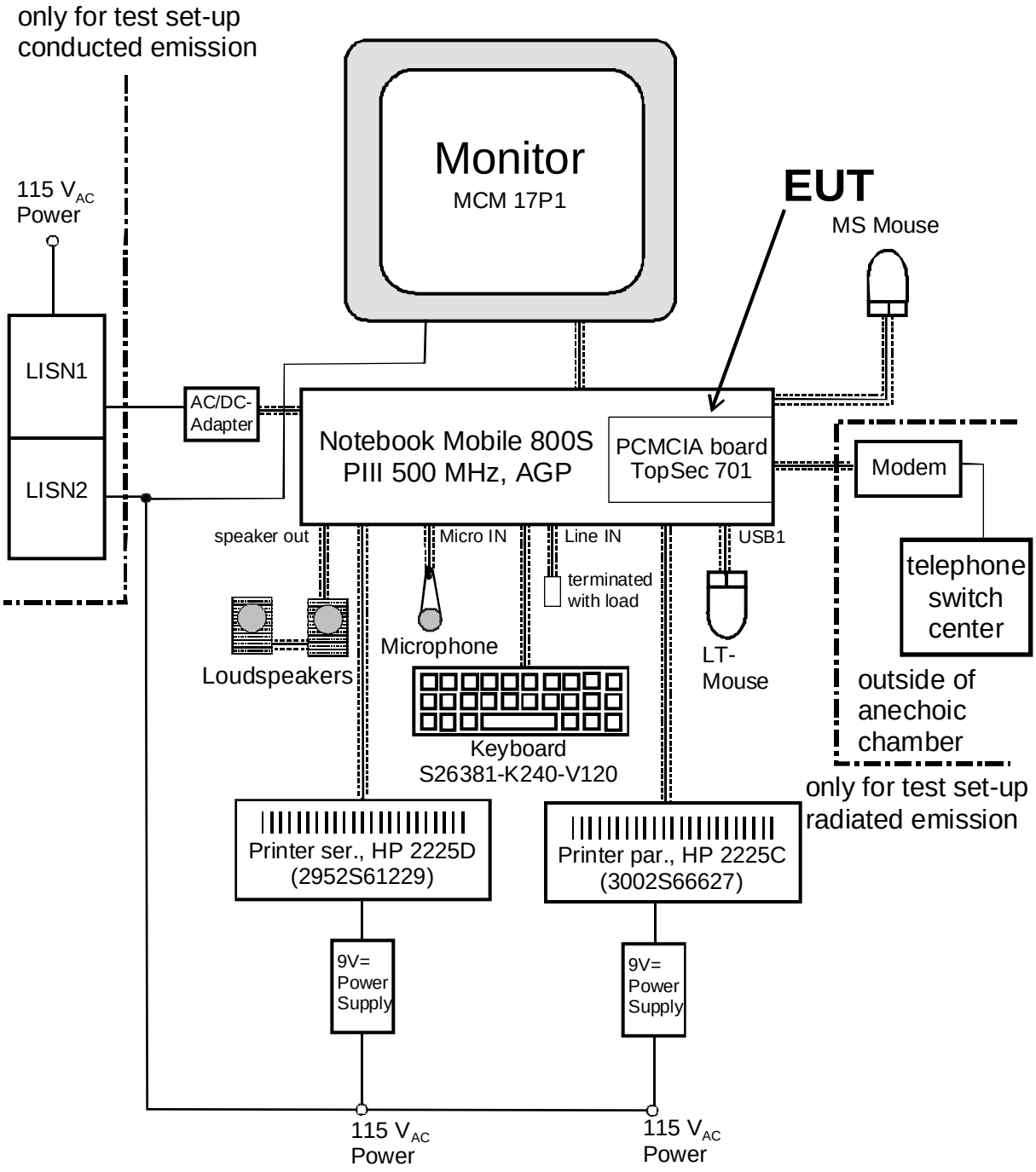
Applicant Signature _____ Date _____

Typed/Printed Name _____ Position _____

3.6 Configuration of Tested System

All necessary tests were carried out like figure 3.1. The system was used according to paragraph 1.1. During test for conducted emission the EUT was connected to a LISN. All peripherals were supplied by a second LISN. The equipment was configured according to ANSI C63.4-1992 Fig 11.

Figure 3.1 Configuration of Tested System



4 BLOCK DIAGRAM OF EUT

see fig 4.1 page 15

4.1 Block Diagram Description (see fig. 4.1)

The major parts of the system are (fig 4.1).

- PCMCIA Controller
- Processor IC
- PLL Clock Multiplier

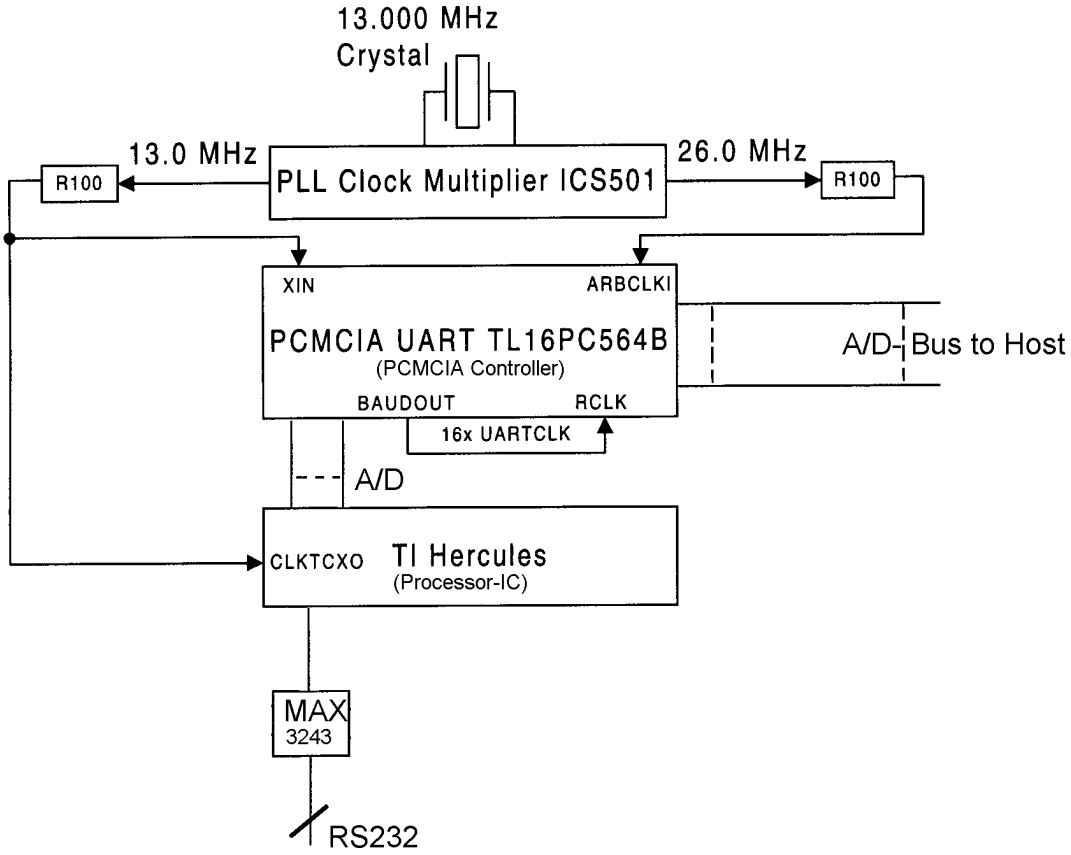
4.2 Clockfrequencies of EUT

Quarz frequency		13.000 MHz
UART:	XIN clock	13.000 MHz
	ARB clock	26.000 MHz
	R clock	108.000 MHz

4.3 Theory of Operation

The PCMCIA-UART TL16PC564B realizes the communication between the PCMCIA bus and the “Hercules” processor. The Hercules” processor provides the data encryption, the encrypted data is converted via the RS232 converter. The encrypted RS323 signal can be blad to a conventional modem.

4.1 Block Diagram of the EUT



5 CONDUCTED EMISSION DATA

5.1 Test Procedure

The initial step in collecting conducted emission data is a Rohde & Schwarz Test Receiver (ESHS10). During first scan all data in peak mode is measured, then all significant peaks are explored either in quasi-peak mode or in average mode. In case of low noise (no peak value reaches the quasi peak limit), only average checks are done.

5.2 Measured Data

The conducted emission was measured the following way:

1. Peak noise on L
2. Peak noise on N

During the emission measurement the printers and the monitor are supplied with power via a second LISN.

Judgement: Passed by

	Frequency [MHz]	Measured [dB(µV)]	Kind of value	Limit [dB(µV)]
phase	0.258	46.2	QP	62.0
neutral	0.546	42.7	QP	56.0
phase	0.636	44.4	QP	56.0
phase	0.684	40.0	QP	56.0
phase	13.554	42.2	QP	60.0

Judgement: Passed by

	Frequency [MHz]	Measured [dB(µV)]	Kind of value	Limit [dB(µV)]
phase	0.270	39.4	AV	51.0
neutral	0.528	38.3	AV	46.0
neutral	0.636	39.1	AV	46.0
phase	0.732	34.4	AV	46.0
neutral	1.188	33.6	AV	46.0

AV: average
QP: quasi peak

Test Personnel:

Tester Signature: _____ Date: _____

Printed Name: C. Brummer

Measurement Protocols: see attached file

EUT with Notebook Mobile 800S PIII 500 MHz
video resolution 1024 x 768/60 Hz

5.3 Referenced Rules Sections

N/A

5.4 Test Instrumentation Used, Conducted Measurement

Type	Manufacturer/ Model No.	Serial No.	Last Cal.	Cal. Interval
Receiver	ESHS10 Rohde&Schwarz	842884/011	May 00	12 months
Receiver	ESH3 Rohde&Schwarz	879599/019	May 00	12 months
LISN	ESH2-Z5 Rohde&Schwarz	871884/004	May 00	12 months
LISN	ESH3-Z5 Rohde&Schwarz	883650/027	May 00	12 months
Pulse limiter	ESH3-Z2 Rohde&Schwarz	---	May 00	12 months

6 RADIATED EMISSION DATA

6.1 Test Procedure

The radiated emission was measured in two parts:

1. in the frequency range from 30 MHz to 1000 MHz. The bandwidth of the EMI-receiver was set to 120 kHz and the detector was set to peak. During prescan all data in peak mode are accumulated automatically. At final measurement the detector was set to CISPR quasi peak and values above the acceptance line were verified automatically.

2. in the frequency range from 1000 MHz to 5000 MHz. The bandwidth of the EMI-receiver was set to 1 MHz and the detector was set to peak. During prescan all data in peak mode are accumulated automatically. At final measurement the detector was set to average and values above the acceptance line were verified automatically.

Both tests were performed in a semi anechoic chamber, measurements below 1000 MHz in a distance of 10 meters between antenna and EUT, above 1 GHz with a distance of 3 meters between antenna and EUT. During tests the EUT was turned 360° and the actual used receiving antenna was moved from 1 to 4 meters and the antenna polarisation was changed from horizontal to vertical for finding the maximum levels of emission.

For each range one antenna for the whole span was used

1. 30 MHz to 1000 MHz: log.-per antenna
2. 1000 MHz to 5000 MHz: rigid tensor antenna

After automatic tests during manual verification the cables and the equipment were placed and moved within the range of position in order to find the maximum of emission.

6.2 Measured Data

The EUT was measured with the Notebook Mobile 800S (PIII 500 MHz, AGP) in video mode 1024 x 768, 60 Hz. The test results below reflect the worst case with:

Part 1: frequency range 30 MHz - 1000 MHz:

Judgement: Passed by

Frequency [MHz]	Level* [dB(µV/m)]	10 Meter Limit [dB(µV/m)]	Exceeding [dB]	Ant Pol	Height in [m]	Angle in deg
115.80000	26.90	30.000	-3.1	ver	1.00	59.000
217.14000	27.40	30.000	-2.6	ver	1.00	210.000
260.58000	34.00	37.000	-3.0	ver	1.00	150.000
496.83000	34.40	37.000	-2.6	hor	2.00	210.000
599.91000	31.40	37.000	-5.6	hor	2.00	180.000
720.00000	32.40	37.000	-4.6	hor	1.00	0.000
912.03000	32.40	37.000	-4.6	hor	1.00	0.000

all levels are quasi-peak levels

***The correction factor is considered automatically by the test receiver. A table of correction factors is listed in paragraph 7.4.

Part 2: frequency range 1 GHz - 5 GHz:

Judgement: Passed by

Frequency [MHz]	Level* [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Exceed Mark	Height [cm]	Azimuth [deg]	Ant Pol
1036.60000	36.60	53.9	17.3		140.00	0.00	ver
1103.80000	31.10	53.9	22.8		140.00	59.00	ver
1275.70000	30.10	53.9	23.8		140.00	59.00	ver

Frequency [MHz]	Level* [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Exceed Mark	Height [cm]	Azimuth [deg]	Ant Pol
1291.90000	31.50	53.9	22.4		100.00	239.00	hor
1788.70000	30.10	53.9	23.8		100.00	0.00	hor
4393.30000	37.30	53.9	16.6		140.00	210.00	hor
4969.90000	32.90	53.9	21.0		300.00	239.00	hor

all levels are average levels

*****The correction factor is considered automatically by the test receiver. A table of correction factors is listed in paragraph 7.4.

Test Personnel:

Tester Signature: _____ Date: _____

Printed Name: M. Heuser

Measurement Protocols: see attached files

Frequency range 30 MHz - 1 GHz:
EUT with Notebook Mobile 800S PIII 500 MHz, AGP
video resolution 1024 x 768/60 Hz

Frequency range 1 GHz - 5 GHz:
EUT with Notebook Mobile 800S PIII 500 MHz, AGP
video resolution 1024 x 768/60 Hz

6.3 Referenced Rules Sections

N/A

6.4 Test Instrumentation Used, Radiated Measurement

Type	Manufacturer/ Model No.	Serial No.	Last Cal.	Cal. Interval
Receiver	ESMI Rohde&Schwarz	840607/006	May 00	15 months
Antenna	CBL 6111 Chase	1345	May 99	12 months
Antenna	CBL 6112 Chase	2041	Aug 99	15 months
Active Ridged antenna	Tensor 4105 Rohde&Schwarz	2063	Dec 99	15 months

6.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor automatically to the measured value. The display of the Receiver shows the corrected value. The complete table of correction factors is given on next page. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF

where FS = Field Strength

AF = Antenna Factor (incl. Preamplifier factor)

CF = Cable Attenuation Factor

Assume a receiver reading of 28,5 dBµV is obtained. The Antenna Factor of 10,5 and a Cable Factor of 1,3 is added, giving a field strength of 40,3 dBµV/m.

FS = 28,5 + 10,5 + 1.3 = 40,3 dBµV/m

The 40,3 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

Level in µV/m =
Common Antilogarithm [(40,3 dBµV/m)/20] =

103,5 µV/m

6.6 Table of Correction Factors

Frequency range: 30 MHz to 1000 MHz (Antenna CBL6112)

Frequency [MHz]	Correction Bilog Antenna [dB]	Correction Cable [dB]	Correction Antenna + Cable [dB]
30.0	17.80	0.65	18.45
35.0	15.10	0.67	15.77
40.0	12.40	0.68	13.08
45.0	9.80	0.73	10.53
50.0	7.70	0.74	8.44
55.0	6.20	0.82	7.02
60.0	5.10	0.84	5.94
70.0	5.00	0.90	5,.90
80.0	6.60	0.95	7.55
90.0	8.50	0.99	9.49
100.0	10.30	1.10	11.40
120.0	11.40	1.14	12.54
140.0	10.40	1.27	11.67
160.0	9.40	1.35	10.75
180.0	8.50	1.45	9.95
200.0	9.10	1.51	10.61
250.0	11.80	1.71	13.51
300.0	13.00	1.84	14.84
350.0	14.10	2.00	16.10
400.0	16.00	2.18	18.18
450.0	16.30	2.35	18.65
500.0	17.10	2.43	19.53

Frequency [MHz]	Correction Bilog Antenna [dB]	Correction Cable [dB]	Correction Antenna + Cable [dB]
550.0	18.80	2.62	21.41
600.0	18.60	2.73	21.33
650.0	19.00	2.88	21.88
700.0	19.10	2.91	22.01
750.0	19.80	3.01	22.81
800.0	19.80	3.21	23.01
850.0	20.40	3.32	23.72
900.0	20.50	3.40	23.90
950.0	20.80	3.49	24.29
1000.0	21.10	3.69	24.79

Frequency range: 1 GHz to 5 GHz

Frequency [GHz]	Correction Tensor Antenna with Pre-amplifier [dB]	Correction Cable [dB]	Correction Antenna + Cable [dB]
1.0	5.70	1.62	7.32
1.1	4.80	1.68	6.48
1.2	5.10	1.75	6.85
1.3	5.00	1.80	6.80
1.4	5.10	1.96	7.06
1.5	5.90	2.00	7.90
1.6	5.60	2.15	7.75
1.7	6.70	2.30	9.00
1.8	6.60	2.32	8.92
1.9	5.90	2.35	8.25
2.0	7.20	2.44	9.64
2.1	7.30	2.62	9.92
2.2	7.40	2.75	10.15
2.3	8.40	2.70	11.10
2.4	8.00	2.69	10.69
2.5	9.30	2.65	11.95
2.6	8.70	2.75	11.45
2.7	8.70	2.92	11.62
2.8	9.00	2.98	11.98
2.9	8.60	3.10	11.70
3.0	9.50	3.12	12.62
3.1	9.20	2.37	11.57
3.2	8.60	2.40	11.00

7 Conducted And Radiated Emission Measurement Photos: see attached files

7.1 Test set-up, conducted emission, front side view

7.2 Test set-up, conducted emission, rear side view

7.3 Test set-up, radiated emission, front side view

7.4 Test set-up, radiated emission, rear side view

8 Photos of Tested EUT: see attached files

8.1 Front side of EUT
8.2 Rear side of EUT
8.3 Modem cable

9 Internal Photos of EUT: see attached files

9.1 Inside view of EUT
9.2 Encryption board, top side view
9.3 Encryption board, rear side view

9 User Manual: see attached files

The FCC statement place refer to the user manual, page 6.