

Straubing, 16 January 2003

TEST-REPORT

No. 51905-20107

for

MOBY E MIFARE SLA 71

Inductive Tag Reader

Applicant: Siemens AG, Fürth

Purpose of testing: To show compliance with

FCC Code of Federal Regulations, CFR 47, Part 15, Subpart C, Section 15.225

Note:

The test data of this report relate only to the individual item which has been tested. This report shall not be reproduced except in full extent without the written approval of the testing laboratory.

FCC-ID: NXWMOBYE-SLA71



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1. Administrative Data

Equipment Under Test (EUT):	MOBY E MIFARE SLA 71		
Serial number(s):	Sample no. 1		
Type of equipment:	Inductive Tag Reader		
Type of emission:	7K0A1D		
Parts/accessories:			
FCC-ID:	NXWMOBYE-SLA71		
Applicant:	Siemens AG, Fürth Würzburger Str. 121 D-90766 Fürth		
(full address)			
Contract identification:			
Contact person:	Mr. Horst		
Manufacturer:	Siemens AG, Fürth		
Receipt of EUT:	01 July 2002		
Dates of test:	July 2002 to January 2003		
Note:			
Responsible for testing:	Thomas Eberl		
Responsible for test report:	Thomas Eberl		



2. Identification of Test Laboratory

Test Laboratory: (full address):	Senton GmbH EMI/EMC Test Center Aeussere Fruehlingstrasse 45 D-94315 Straubing Germany			
Contact person:	Mr. Johann Roidt			
Communication:	Telephone Fax eMail:	(+49) 0 94 21 / 55 22-0 (+49) 0 94 21 / 55 22-99 Office@senton.de		
FCC registration number: Industry Canada file number:	90926 IC 3050			



3. Summary of Test Results

The tested sample complies with the requirements for set forth in the

The Code of Federal Regulations 47, Part 15, Subpart C, Section 15.225

of the Federal Communication Commission (FCC).

(lu

Johann Roidt Technical Manager

Thomas Ged

Thomas Eberl Test Engineer



4. Operation Mode of EUT

Continuously reading a TAG



5. Configuration of EUT and Peripheral Devices

Configuration of cables of EUT

Not applicable

Configuration of peripheral devices connected to EUT

The EUT was connected to a Fujitsu Notebook PC via standard RS 232 interface.



6. Measuring Methods

6.1. Field strength of in-band emissions (§15.225 (a)) and unwanted emissions < 30 MHz (§15.225 (b))

Radiated emissions in the frequency range 9 kHz – 30 MHz will be measured initially at a distance of 3 meters. A prescan at 3 meter distance will be performed in a shielded room with the detector of the spectrum analyzer or EMI Receiver set to peak. Final measurement is then performed at 30 meter distance. In case the regulation requires testing at other distances, the result will be extrapolated. The extrapolation factor will be determined by making a second measurement at 10 meter distance. The provisions of 15.31 (d) apply.

According to section 15.209 (d) final measurementis performed with the detector set to Quasi Peak except for the frequency bands 9 - 90 kHz and 110 - 490 kHz where average detector is employed.



6.2. Frequency tolerance (§15.225 (c))

6.2.1. Frequency stability vs. temperature

The frequency stability vs. temperature was measured with a spectrum analyzer connected to the output of the transmitter power amplifier (conducted measurement) via dummy load while EUT was operating in transmit mode using the assigned frequency.

The trace mode of the spectrum analyzer was set to write with frequency count mode activated:

RBW = 100 Hz, VBW = 100 Hz, span = 20 kHz, sweep = 1.5 s (auto mode)

See figure 1 for the measurement setup.

Test equipment used (see equipment list for details): 02, 18, 51, 54, 69, 70, 71

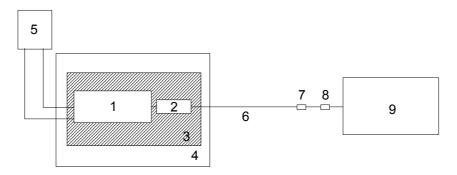


Figure 1: Measurement setup for testing within temperature test chamber

- 1 Transmitter (EUT)
- 2 Probe antenna
- 3 Wooden support
- **4** Temperature test chamber
- 5 DC power supply

- 6 Test cable
- 7 DC-block
- 8 Attenuator
- 9 Spectrum analyzer



6.2.2. Frequency stability vs. supply voltage

The frequency stability vs. supply voltage was measured with a spectrum analyzer connected to the output of the transmitter power amplifier (conducted measurement) via dummy load while EUT was operating in transmit mode using the assigned frequency.

The trace mode of the spectrum analyzer was set to write with frequency count mode activated: RBW = 100 Hz, VBW = 100 Hz, span = 20 kHz, sweep = 1.5 s (auto mode)

See figure 1 for the measurement setup.

Test equipment used (see equipment list for details): 02, 18, 51, 69, 70, 71



6.3. Unwanted Emission 30 MHz - 1 GHz (§15.225 (b))

Radiated emissions were measured over the frequency range from 30 MHz to 1 GHz. For final testing the detector-function of the spectrum analyzer was set to quasi peak

Measurements were made in both the horizontal and vertical planes of polarization. Preliminary scans were taken in a semi-anechoic room using a spectrum analyzer with the detector function set to peak and resolution bandwidth set to 100 kHz. All tests were performed at a test-distance of 3 meters. Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing. For final testing an open-area test-site was used. During the tests the EUT was rotated all around and the receiving-antenna was raised and lowered from 1 meter to 4 meters to find the maximum levels of emissions. The cables and equipment were placed and moved within the range of position likely to find their maximum emissions.

See figure 2 for the measurement setup.

Test equipment used (see equipment list for details): 01, 06, 12, 15, 38, 39, 40, 41, 55, 58, 61, 64, 66



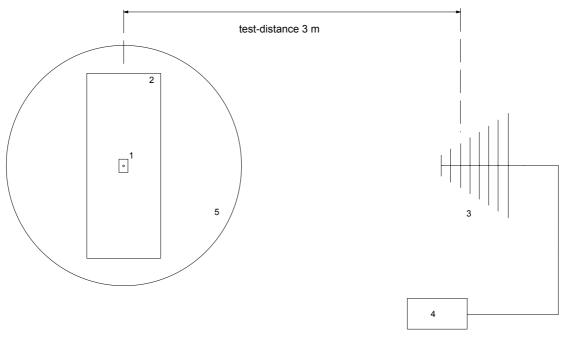


Figure 2: Measurement setup for radiated emission test

- 1 Transmitter (EUT)
- 2 Wooden table

- 3 Measurement antenna
- 4 Test receiver
- 5 Turn table



7. Photographs of Test Setups





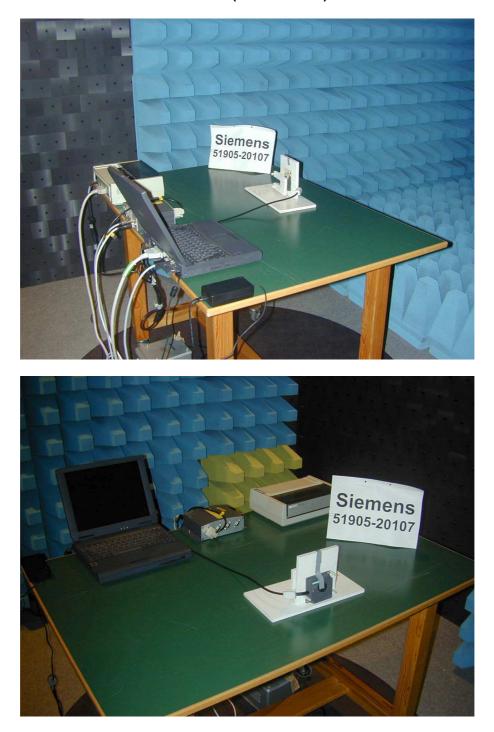
7.1. Radiated Emissions 10 kHz – 30 MHz (prescan 3 m)



7.2. Radiated Emissions 10 kHz – 30 MHz (10m test distance)







7.3. Radiated Emissions 30 – 1000 MHz (Prescan 3 m)

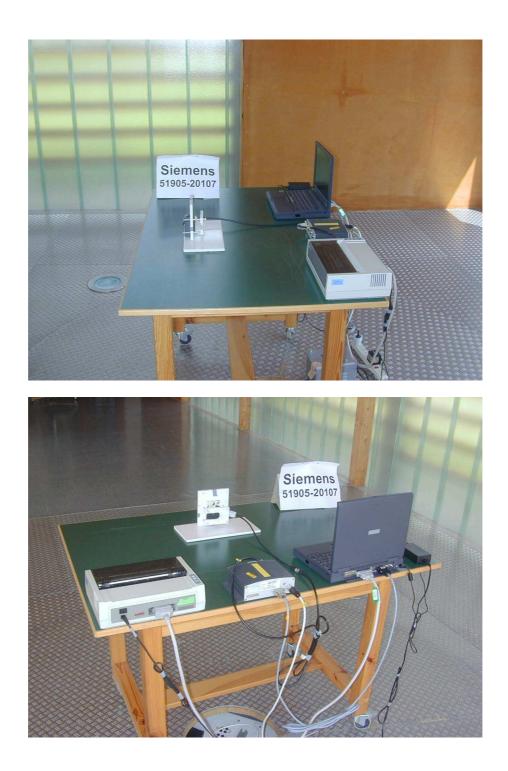


Radiated Emissions 30 – 1000 MHz (Prescan 3 m) - continued



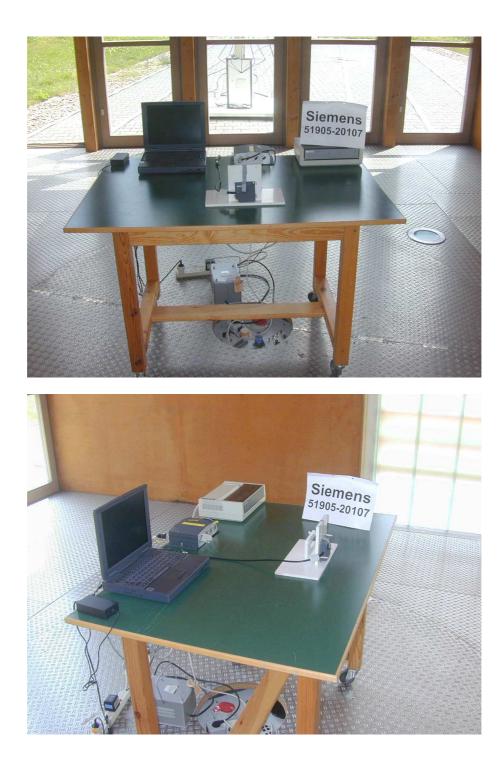


7.4. Radiated Emissions 30 – 1000 MHz (final test)





Radiated Emissions 30 – 1000 MHz (final test) - continued





8. Equipment List

To facilitate reference to test equipment used for related tests, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory.

No.	Туре	Model	Serial Number	Manufacturer
01	Spectrum Analyzer	R 3271	05050023	Advantest
02	EMI Test Receiver	ESMI	839379/013 839587/006	Rohde & Schwarz
03	Test Receiver	ESH 3	880112/032	Rohde & Schwarz
04	Test Receiver	ESHS 10	860043/016	Rohde & Schwarz
05	Test Receiver	ESV	881414/009	Rohde & Schwarz
06	Test Receiver	ESVP	881120/024	Rohde & Schwarz
07	Audio Analyzer	UPA	862954	Rohde & Schwarz
80	Power Meter	NRVS	836856/015	Rohde & Schwarz
09	Power Sensor	NRV-Z52	837901/030	Rohde & Schwarz
10	Power Sensor	NRV-Z4	863828/015	Rohde & Schwarz
11	Preamplifier	ESV-Z3	860907/004	Rohde & Schwarz
12	Preamplifier	R14601		Advantest
13	Preamplifier	ACX/080-3030	32640	CTT
14	Preamplifier	ACO/180-3530	32641	CTT
15	Signal generator	SMY 01	830694/001	Rohde & Schwarz
16	Signal Generator	HP 8673 D	2930A00966	Hewlett Packard
17	Waveform Generator	HP 33120 A	US34005375	Hewlett Packard
18	Attenuator 20 dB	4776-20	9503	Narda
19	Attenuator 10 dB	4776-10	9412	Narda
20	Pulse Limiter	ESH 3-Z2	1144	Rohde & Schwarz
21	Pulse Limiter	11947 A	3107A00566	Hewlett Packard
22	V-Network	ESH 3-Z5	862770/018	Rohde & Schwarz
23	V-Network	ESH 3-Z5	894785/005	Rohde & Schwarz
24	V-Network	ESH 3-Z5	830952/025	Rohde & Schwarz
25	V-Network	ESH 3-Z6	830722/010	Rohde & Schwarz
26	V-Network	NSLK 8127	8127152	Schwarzbeck
27	V-Network	NNLA 8119	8119148	Schwarzbeck
28	V-Network	SE 01	01	Senton
29	T-Network	ESH 3-Z4	890602/011	Rohde & Schwarz
30	T-Network	ESH 3-Z4	890602/012	Rohde & Schwarz
31	High Impedance Probe	TK 9416	01	Schwarzbeck
32	High Impedance Probe	TK 9416	02	Schwarzbeck
33	Current Probe	ESH 2-Z1	863366/18	Rohde & Schwarz
34	Current Probe	ESV-Z1	862553/3	Rohde & Schwarz



No.	Туре	Model	Serial Number	Manufacturer
35	Absorbing Clamp	MDS 21	80911	Lüthi
36	Absorbing Clamp	MDS 21	79690	Lüthi
37	Loop Antenna	HFH2-Z2	882964/1	Rohde & Schwarz
38	Biconical Antenna	HK 116	842204/001	Rohde & Schwarz
39	Biconical Antenna	HK 116	836239/02	Rohde & Schwarz
40	Log. Periodic Antenna	HL 223	841516/023	Rohde & Schwarz
41	Log. Periodic Antenna	HL 223	834408/12	Rohde & Schwarz
42	Horn Antenna	3115	9508-4553	Emco
43	Horn Antenna	3160-03	9112-1003	Emco
44	Horn Antenna	3160-04	9112-1001	Emco
45	Horn Antenna	3160-05	9112-1001	Emco
46	Horn Antenna	3160-06	9112-1001	Emco
47	Horn Antenna	3160-07	9112-1008	Emco
48	Horn Antenna	3160-08	9112-1002	Emco
49	Horn Antenna	3160-09	9403-1025	Emco
50	Digital multimeter	199	463386	Keithley
51	DC Power Supply	NGSM 32/10	203	Rohde & Schwarz
52	DC Power Supply	NGB	2455	Rohde & Schwarz
53	DC Power Supply	NGA	386	Rohde & Schwarz
54	Temperature Test Chamber	HT4010	07065550	Heraeus
55	Cable	RG214	1309	Senton
56	Cable	200CM_001	1357	Rosenberger
57	Cable	150CM_001	1479	Rosenberger
58	Cable Set EG1	RG214	1189 - 1191	Senton
59	Cable Set Cabine 1	RG214		Senton
60	Cable Set Cabine 2	RG214		Senton
61	Cable Set Cabine 3	RG214		Senton
62	Shielded Room	No. 1	1451	Senton
63	Shielded Room	No. 2	1452	Senton
64	Semi-anechoic Chamber	No. 3	1453	Siemens
65	Shielded Room	No. 4	1454	Euroshield
66	Open Area Test Site	EG 1		Senton
67	Cable for Antenna Connector			Lucent Technologies
68	DC Block 0.01-18GHz		8037	Inmet Corp.
69	High pass filter			Lucent Technologies
69	DC Block	7006	A2798	Weinschel Corp.
70	Cable for Antenna Connector			Senton
71	Dummy load			Futaba Corporation



9. Referenced Regulations

All tests were performed with reference to the following regulations and standards:

	CFR 47 Part 2	Code of Federal Regulations Part 2 (Frequency Allocations And Radio Treaty Matters, General Rules And Regulations) of the Federal	October 1, 1999
	CFR 47 Part 15 Subpart A	Communication Commission (FCC) Code of Federal Regulations Part 15 (Radio Frequency Devices), Subpart A (General) of the Federal Communication Commission (FCC)	May 2002
	CFR 47 Part 15 Subpart B	Code of Federal Regulations Part 15 (Radio Frequency Devices), Subpart B (Unintentional Radiators) of the Federal Communication Commission (FCC)	May 2002
\boxtimes	CFR 47 Part 15 Subpart C	Code of Federal Regulations Part 15 (Radio Frequency Devices), Subpart C (Intentional Radiators) of the Federal Communication Commission (FCC)	May 2002
	CFR 47 Part 95 Subpart C/E	Code of Federal Regulations Part 95 (Personal Radio Services), Subpart C/E (Radio Control(R/C) Radio Service) of the Federal Communication Commission (FCC)	May 2002
	ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment	October 1992
\bowtie	RSS-210	in the Range of 9 kHz - 40 GHz Radio Standards Specification RSS-210 Issue 5 for Low Power Licence-Exempt	November 2001
	TIA/EIA-603	Radiocommuniction Devices of Industry Canada Land Mobile FM or PM Communications Equipment Measurement and Performance	February, 1993
	TIA/EIA-603-1	Standards Addendum to TIA/EIA-603	March 4, 1998



10. List of Measurements

CFR 47 Part 15 Subpart C							
Section(s):	Test	Page	Result				
§15.207	Conducted powerline emissions		Not Applicable				
§15.225 (a)	Maximum in-band field strength		Passed				
§15.225 (b)	Out-of-band emissions		Passed				
§15.225 (c)	Frequency tolerance of carrier signal		Passed				



11. Test Results



Field Strength of Emissions according to FCC Rules, Part 15, Subpart C, Section 15.225 (a), (b) Frequency Band < 30 MHz

Model:	MOBY E MIFARE SLA 71
Туре:	Inductive Reader
Serial No.	Prototype 1
Applicant:	Siemens AG, Fürth
Test Site:	Open Field Test Site (without Ground Plane)
Distance:	10 Meter
Date of Test:	16 July 2002

Frequency (MHz)	Detector	Antenna Polariz.	Analyzer Reading (dBµV) 10m	Correction Factor (dB)	Field Strength (dBµV/m) 10m	Field Strength (dBµV/m) 30m	Limit dBµV/m	Margin dB
13.553	Q.P.	N/A	***	20			29.5	
13.560	Q.P.	N/A	30,8	20	50.8	30.8	80.0	
13.567	Q.P.	N/A	***	20			29.5	
27.125	Q.P.	N/A	***	20			29.5	

*** = No emissions above noise floor detected

Sample calculation of field strength values:

Field Strength ($dB\mu V/m$) = Analyzer Reading ($dB\mu V$) + Correction Factor (dB)

Test equipment used (see equipment list for details): 02, 13, 14, 16, 38, 40, 42, 57, 64, 67



Field Strength of Emissions according to FCC Rules, Part 15, Subpart C, Section 15.225 (b) Frequency Band > 30 MHz

Model:	MOBY E MIFARE SLA 71
Туре:	Inductive Reader
Serial No.	Prototype 1
Applicant:	Siemens AG, Fürth
Test Site:	Open Field Test Site
Distance:	3 Meter
Date of Test:	15 July 2002

Frequency (MHz)	Detector	Antenna Polarization	Analyzer Reading (dBµV)	Correction Factor (dB)	Field Strength (dBµV/m)	Limit dBµV/m	Margin dB
36.400	Q.P.	V	21.5	13.7	35.2	40.0	4.8
38.165	Q.P.	V	17.3	13.4	30.7	40.0	9.3
40.68	Q.P.	V	13.5	13.0	26.5	40.0	13.5
108.48	Q.P.	Н	18.0	13.2	31.2	43.5	12.3
135.60	Q.P.	Н	12.5	15.7	28.2	43.5	15.3
149.16	Q.P.	Н	14.5	16.4	30.9	43.5	12.6
176.28	Q.P.	V	16.7	18.0	34.7	43.5	8.8
189.84	Q.P.	Н	17.8	18.9	36.7	43.5	6.8
203.40	Q.P.	Н	18.2	19.6	37.8	43.5	5.7
257.60	Q.P.	Н	8.3	20.9	29.2	43.5	13.8
348.75	Q.P.	V	6.5	21.0	27.5	46.0	18.5
443.20	Q.P.	Н	15.5	23.8	39.3	46.0	6.7
699.00	Q.P.	V	2.3	31.5	33.8	46.0	12.2

*** = No emissions above noise floor detected

Sample calculation of field strength values:

Field Strength ($dB\mu V/m$) = Analyzer Reading ($dB\mu V$) + Correction Factor (dB)

Test equipment used (see equipment list for details): 02, 13, 14, 16, 38, 40, 42, 57, 64, 67



FREQUENCY STABILITY VS. TEMPERATURE

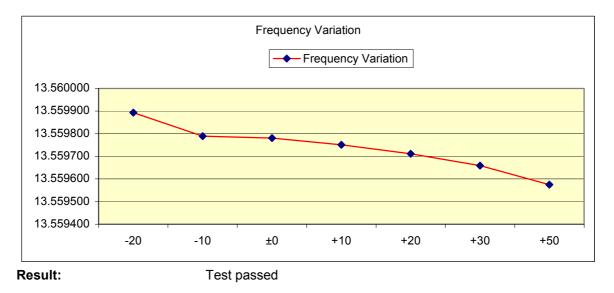
Section 15.225 (c)

Model:	MOBY E MIFARE SLA 71
Туре:	Inductive Reader
Serial No.	Prototype 1
Applicant:	Siemens AG, Fürth
Date of Test:	16 July 2002

Test conditions:

Temperature:	see table below
Supply voltage:	24.0 V DC
Specifications:	
Frequency tolerance:	± 0.01 % of nominal carrier frequency
Temperature range:	-20 to +50°C

Temperature (°C)	Nominal carrier frequency (MHz)	Frequency measured (MHz)	Frequency deviation (Hz)	Frequency deviation (%)	Limit (%)
-20	13.560000	13.559893	-107	-0.0008	0.01
-10	13.560000	13.559903	-97	-0.0007	0.00
±0	13.560000	13.559907	-93	-0.0007	0.01
+10	13.560000	13.559911	-89	-0.0007	0.01
+20	13.560000	13.559901	-99	-0.0007	0.01
+30	13.560000	13.559899	-101	-0.0007	0.01
+40	13.560000	13.559923	-77	-0.0006	0.01
+50	13.560000	13.559961	-39	-0.0003	0.01



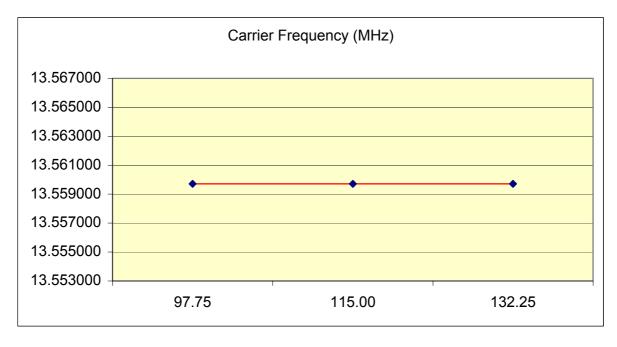


FREQUENCY STABILITY VS. SUPPLY VOLTAGE

Section 15.225 (c)

Model:	MOBY E MIFARE SLA 71
Туре:	Inductive Reader
Serial No.	Prototype 1
Applicant:	Siemens AG, Fürth
Date of Test:	16 July 2002
Test conditions:	
Temperature:	see table below
Supply voltage:	24.0 V DC
Specifications:	
Frequency tolerance:	±0.01 % of nominal carrier frequency
Supply voltage range:	+/- 15 % of nominal supply voltage

Supply voltage (V)	Nominal carrier frequency (MHz)	Frequency measured (MHz)	Frequency deviation (Hz)	Frequency deviation (%)	Limit (%)
20.40	13.560000	13.559901	-99	-0.00073	0.01
24.00	13.560000	13.559901	-99	-0.00073	0.01
27.60	13.560000	13.559901	-99	-0.00073	0.01



Result:

Test passed



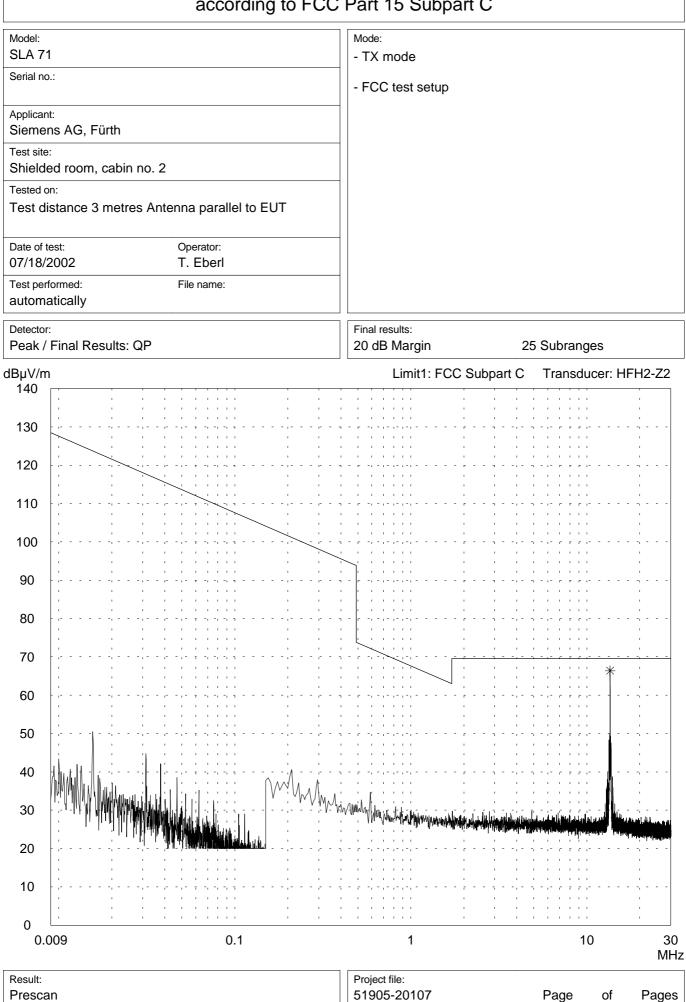
12. Charts taken during testing

Radiated Emission Test 9 kHz - 30 MHz
according to FCC Part 15 Subpart C

	Part 15 Subpart C	
Model: SLA 71	Mode: - TX mode	
Serial no.:	- FCC test setup	
Applicant:		
Siemens AG, Fürth		
Test site: Shielded room, cabin no. 2		
Tested on:		
Test distance 3 metres Antenna orthogonal to EUT		
Date of test:Operator:07/18/2002T. Eberl		
Test performed: File name:		
automatically	E'sslave lie	
Detector: Peak / Final Results: QP	Final results:20 dB Margin25 state	Subranges
dBµV/m 140	Limit1: FCC Subpart C	Transducer: HFH2-Z2
130		
120	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
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0.009 0.1	1	10 30 MHz
Result: Prescan	Project file: 51905-20107	Page of Pages

Senton GmbH / EMI/EMC Laboratories / Aeussere Fruehlingsstrasse 45 / D-94315 Straubing / Tel. +49 9421 55220

Radiated Emission Test 9 kHz - 30 MHz	
according to FCC Part 15 Subpart C	



Senton GmbH / EMI/EMC Laboratories / Aeussere Fruehlingsstrasse 45 / D-94315 Straubing / Tel. +49 9421 55220

Radiated Emission Test 30 MHz - 200 MHz acc. to FCC Part 15 (Fully Anechoic Chamber)

				- (•				
Model:					Commer	nt:			
SLA 71					- TX m	ode			
Serial no).: 				- 1 / 11	loue			
Applican	t:				- FCC	test setup			
	ns Ag, Fürth								
Test site	:								
	nechoic room								
Tested o									
	istance 3 metres ntal Polarization								
Date of to 07/15/2		Operato T. Ebe							
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automa		defaul	t.emi						
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Peak						Margin	8 Subrai		
dBµV/m 60)				Limit1	: FCC Part 18	5 Transducer: I	HK 116 (A-1560)
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Radiated Emission Test 200 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

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Model: SLA 7	1			Comment:					
SLA 7 Serial no				- TX mode					
				- FCC test setu	p				
Applican Sieme	^{nt:} ns Ag, Fürth								
Test site	:								
	nechoic room								
Tested of Test di	^{on:} istance 3 metres								
	ntal Polarization								
Date of t		Operator: T. Eberl							
Test per		File name:							
	atically	default.emi							
Detector	:			List of values:					
Peak				10 dB Margin		8 Subr			
dBµV/m 60	ן 	T	Lir	nit1: FCC Part 15	Transd	ucer: EM	CO 3147	′ (A-1(009)
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]						MHz
Result: Presca	an			Project file: 51905-20107		Page	e of	Р	Pages

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Radiated Emission Test 30 MHz - 200 MHz acc. to FCC Part 15 (Fully Anechoic Chamber)

				``	- , -		
Model: SLA 7	4				Comment:		
SLA / Serial no					- TX mo	de	
Applicar					- FUU (6	est setup	
	ns Ag, Fürth						
Test site	nechoic room						
Tested o							
	istance 3 metres al Polarization	i					
Date of t 07/15/2		Operator T. Ebe					
Test per		File nam					
	atically	default					
Detector	:				List of valu		
Peak					10 dB M	largin	8 Subranges
dBµV/m	ı				Limit1: I	FCC Part 1	5 Transducer: HK 116 (A-1560)
60		· · ·	· · ·			· · ·	
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3	30 4	0 5	0 60	70	80	90 100	200 MHz
Result:					Project file	:	
Presca	an				51905-2		Page of Pages

Radiated Emission Test 200 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

		`	,		,		
Model: SLA 7 ²	1		Comment:				
SLA 7 Serial no			- TX mode				
			- FCC test setup				
Applican Sieme	^{ıt:} ns Ag, Fürth						
Test site	:		-				
Fully a	nechoic room						
	istance 3 metres						
	ntal Polarization						
Date of t							
Test per	formed: File name:						
autom	atically default.emi						
Detector Peak			List of values: 10 dB Margin		8 Subrange	25	
dBµV/m)	Liı	mit1: FCC Part 15		er: EMCO 3		009)
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0		400	500		700 00	0 000	
2	00 300	400	500	600	700 80	0 900	1000 MHz
Result: Presca	an		Project file: 51905-20107		Page	of F	Pages

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In Band Emission 15.553 - 13.567 MHz acc. FCC part 15.225

Model: SLA 71 Serial No.: Applicant: Siemens AG, Fürth		Mode: - TX mode - Value correction to	10 m distance	
Ref.Level 60 dBµV/m 10 dB/Div.	ATT 1	0 dB	Ref. (Offset 17 dB
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	· · ·	· · ·		
Start 13.535 MHz	- I I	· · ·	Ston	13 585 MHz
RBW 1 kHz	VBW 1	kHz	Siop	13.585 MHz WP 160 ms
	Multi Mar	ker List		
No. 2 13	8.553056 MHz 8.560278 MHz 8.567111 MHz	28.69 dBµV/m 50.66 dBµV/m 29.33 dBµV/m		
Tested by:		Project-No.:		
Thomas Eberl		51905-20107		
Date: 07/18/2002			Page of	pages

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Restricted Band Emission acc. FCC part 15.225

Model: SLA 71				Mode:				
Serial No.:				- TX mode - Value correction to 10 m distance				
Applicant: Siemens AG, Fürth								
Ref.Level 55 dBµV/m 2 dB/Div.	20 dB Ref. Offset 17 dB							
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Start 12.000 MHz Stop 17.000 MHz RBW 10 kHz VBW 10 kHz SWP 160 ms								
Multi Marker List								
	No. 1		0000 MHz		29 dBµV/	m		
	No. 2 No. 3		5556 MHz 1111 MHz	50.1 37.3	15 dBµV/ 35 dBµV/	m m		
					·			
Tested by: Thomas Eberl				Project-No.: 51905-20107				
Date:						D		
07/18/2002						Page	of	pages

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