

TEST REPORT
of the accredited test laboratory

TÜV Nr.:M/EMV-02/225

about
the following EMC - test/- research

Applicant: Fronius International GmbH
Günther Fronius Str. 1
A-4600 Wels/Thalheim

Product: RFID-Module, RCU5000i

Serial Number: Module produced for testing

Standard: 47 CFR Ch. I Part 15

Division Medical
Technology/
Communication
Technology/ EMC

Testing Body for
Communication
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Ing. Wilhelm Seier



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The results of this test report only refer to the provided equipment.

Contents

	Designation	page
1.	Applicant	3
2.	Description of EUT	4
3.	Standards / Final result	5
4.	Test results	6-9

Appendix	Designation	pages
1	Test equipment used	3
2	Photodocumentation	8
3	Measurement diagrams	4

1. Applicant

Company Fronius International GmbH

Department

Address A-4600 Wels/Thalheim; Günther Fronius Str. 1

Contact person Hr. Peter Mair

EUT received on 12th August 2002

Tests were performed on 12th and 13th August 2002

2. Description of EUT

EUT	RFID Module; RCU5000i
Serial Number	Module produced for testing
Manufacturer	Fronius International GmbH A-4600 Wels/Thalheim; Günther Fronius Str. 1
Description	Fronius International GmbH provided the following configuration for the measurements: Module produced for testing powered by 5VDC The rest of PCB without placed components
Operating mode	The measurements were carried out at the following running states: continuous transmission with carrier unmodulated / normal puls modulation

3. Standards / Final result

Name	Title	Deviation	Result
47 CFR Ch. I Part 15	Radio Frequency Devices	none	PASS
PASS EUT passed FAIL EUT failed			

4. Test results

4.1. Radiated emission

Limits

Frequency range	Detector Quasi Peak	
	Limit	Measurement distance
0,009 – 0,490 MHz	2400 μ V / f(kHz)	300 m
0,490 – 1,705 MHz	24000 μ V / f(kHz)	30 m
1,705 - 30 MHz	30	30 m
30 – 88 MHz	100	3 m
88 – 216 MHz	150	3 m
216 – 960 MHz	200	3 m
Above 960 MHz	500	3 m
Remark:	The Limit was increased for a constant measurement distance of 3m with a factor of 40 dB per Decade.	

Operating mode	Measuring result
Continuous unmodulated carrier	Measurement diagram 1
Continuous pulse-modulated carrier transponder card attached to the equipment	Measurement diagram 2
Continuous unmodulated carrier	Measurement diagram 3
Continuous unmodulated carrier	Measurement diagram 4

Test result:

4. 2.1.) Measurement in the frequency range 9 kHz to 30 MHz with unmodulated carrier and no transponder card attached:

Frequency kHz	Level QP dB μ V/m	Limit dB μ V/m	Margin dB	Exceed- Mark
134,475	72,9	105,0	32,1	

4. 2.2.) Measurement in the frequency range 9 kHz to 30 MHz with pulse-modulated carrier and transponder card attached:

Frequency kHz	Level QP dB μ V/m	Limit dB μ V/m	Margin dB	Exceed- Mark
134,475	72,0	105,0	33,0	

4. 2.2.) Measurement in the frequency range 30 MHz to 200 MHz

Frequency MHz	Level dB μ V/m	Limit dB μ V/m	Margin dB	Exceed- Mark	Height cm	Azimuth deg	Polarization
39,00	31,8	40,0	8,2		100	80	vertical
80,00	30,3	40,0	9,7		246	196	horizontal
112,30	33,9	43,5	9,6		265	196	horizontal
128,30	33,8	43,5	9,7		285	0	horizontal

4. 2.3.) Measurement in the frequency range 200 MHz to 1000 MHz

Due to the large margin of the pre-measurement to the limit, no final measurement was performed.

Appendix 1

Test equipment used

<input checked="" type="checkbox"/>	Anechoic Chamber with 3m measurement distance	NT-100	<input type="checkbox"/>	ESPC - Test receiver 9 kHz - 2,5 GHz	NT-203
<input checked="" type="checkbox"/>	MA 240 - Antenna mast 1 - 4 m height	NT-110	<input checked="" type="checkbox"/>	ESI26 - Test receiver 20 Hz - 26,5 GHz	NT-207
<input checked="" type="checkbox"/>	DS 412 - Turntable 0 - 400 ° Azimuth	NT-111	<input type="checkbox"/>	Digital Radio Tester CTS55	NT-208
<input checked="" type="checkbox"/>	HD 100 Controller Mast+Turntable	NT-112	<input type="checkbox"/>	Noise-gen., ITU-R 559-2 20 Hz - 20 kHz	NT-209
<input type="checkbox"/>	HUF-Z2 - Bicon. Antenna 20 - 300 MHz	NT-120	<input type="checkbox"/>	CMTA - Radiocommunication analyzer ; 0,1 - 1000 MHz	NT-210
<input type="checkbox"/>	HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz	NT-121	<input type="checkbox"/>	3271 - Spectrum analyzer 100 Hz - 26,5 GHz	NT-211
<input checked="" type="checkbox"/>	HFH-Z2 - Loop Antenna. 9 kHz - 30 MHz	NT-122	<input type="checkbox"/>	Radiocommunicationanalyzer Marconi 2945A	NT-212
<input type="checkbox"/>	HFH-Z6 - Rod Antenna 9 kHz - 30 MHz	NT-123	<input type="checkbox"/>	2855S - Communication analyzer	NT-213
<input type="checkbox"/>	3121C - Dipole Antenna 28 - 1000 MHz	NT-124	<input type="checkbox"/>	Mixer M28HW 26,5 GHz - 40 GHz	NT-214
<input type="checkbox"/>	3115 - Horn Antenna 1 - 18 GHz	NT-125	<input type="checkbox"/>	Diode Detector 0,01 GHz - 26,5 GHz	NT-215
<input type="checkbox"/>	3116 - Horn Antenna 18 - 40 GHz	NT-126	<input type="checkbox"/>	3160-10 Horn Antenna 26,5 GHz - 40 GHz	NT-216
<input type="checkbox"/>	SAS-200/543 - Bicon. Ant. 20 MHz - 300 MHz	NT-127	<input type="checkbox"/>	Radiocommunicationanalyzer SWR 1180 MD	NT-217
<input type="checkbox"/>	AT-1080 - Log. Per. Ant. 80 - 1000 MHz	NT-128	<input type="checkbox"/>	Mixer M19HWD 40 GHz - 60 GHz	NT-218
<input checked="" type="checkbox"/>	HK-116 - bicon. Ant. 20 MHz - 300 MHz	NT-129	<input type="checkbox"/>	Mixer M12HWD 60 GHz - 90 GHz	NT-219
<input type="checkbox"/>	HK-116 - bicon. Ant. 20 MHz - 300 MHz	NT-130	<input type="checkbox"/>	TDS - 540 DSO Digital scope	NT-220
<input checked="" type="checkbox"/>	3146 - Log. Per. Ant. 200 - 1000MHz	NT-131	<input type="checkbox"/>	PM97 Scopemeter	NT-221
<input type="checkbox"/>	Loop Antenna H-Field	NT-132	<input type="checkbox"/>	B9-DSP-IS Digital Analyzer for voltage fluctuations	NT-230
<input type="checkbox"/>	Horn Antenna 500 MHz - 2900 MHz	NT-133	<input type="checkbox"/>	DFT 555 - Power and harmonics analyzer	NT-231
<input type="checkbox"/>	Log. per. Antenna 800 MHz - 2500 MHz	NT-134	<input type="checkbox"/>	EFA-3 H-field- / E-field probe	NT-243
<input type="checkbox"/>	Log. per. Antenna 800 MHz - 2500 MHz	NT-135	<input type="checkbox"/>	E-field measuring instrument EMR-200; 100 kHz - 3 GHz	NT-244
<input type="checkbox"/>	BiConiLog Antenna 26 MHz - 2000 MHz	NT-137	<input type="checkbox"/>	E-field probe 100 kHz - 3 GHz	NT-245
<input type="checkbox"/>	Conical Dipol Antenna PCD8250	NT-138	<input type="checkbox"/>	Magneticfield-Sensor 300 kHz - 30 MHz	NT-246
<input type="checkbox"/>	HZ-1 Antenna tripod	NT-150	<input type="checkbox"/>	E-field probe 10 MHz - 18 GHz	NT-247
<input checked="" type="checkbox"/>	BN 1500 Antenna tripod	NT-151	<input type="checkbox"/>	H-field probe 10 MHz - 1 GHz	NT-248
<input type="checkbox"/>	ESVP - Test receiver 20 - 1000 MHz	NT-201	<input type="checkbox"/>	MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250
<input type="checkbox"/>	Switchbox	NT-202	<input type="checkbox"/>	FCC-2031 EM Injection clamp	NT-251

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Department: EMV

Test report number:
M/EMV-02/225

Page: 1 of 3

Date: 14. 10. 2002

Checked by: *M*

Appendix 1 (continued)

Test equipment used

<input type="checkbox"/>	FCC-203I-DCN Ferrite decoupling network	NT-252	<input type="checkbox"/>	AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
<input type="checkbox"/>	PR50 Current Probe	NT-253	<input type="checkbox"/>	APA01 – RF-Amplifier 0,5 GHz – 2,5 GHz	NT-334
<input type="checkbox"/>	Model 2000 Digital Multimeter	NT-261	<input type="checkbox"/>	Preamplifier 1 GHz - 4 GHz	NT-335
<input type="checkbox"/>	Fluke 97 Digital Multimeter	NT-262	<input type="checkbox"/>	2-97201 Electronic load	NT-341
<input type="checkbox"/>	Fluke 97 Digital Multimeter	NT-263	<input checked="" type="checkbox"/>	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-344
<input type="checkbox"/>	ESH2-Z5 Artificial mains network 4x25A	NT-300	<input type="checkbox"/>	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-345
<input type="checkbox"/>	ESH3-Z5 Artificial mains network 2x10A	NT-301	<input type="checkbox"/>	VDS 200 Mobil-impuls-generator	NT-350
<input type="checkbox"/>	ESH3-Z6 Artificial mains network 1x100A	NT-302	<input type="checkbox"/>	LD 200 Mobil-impuls-generator	NT-351
<input type="checkbox"/>	ESH3-Z4 T-Artificial network	NT-303	<input type="checkbox"/>	MPG 200 Mobil-Impuls-Generators	NT-352
<input type="checkbox"/>	PHE 4500/B Power amplifier	NT-304	<input type="checkbox"/>	EFT 200 Mobil-impuls-generator	NT-353
<input type="checkbox"/>	EZ10 T-Artificial network	NT-305	<input type="checkbox"/>	FP 16/3-1 3 ph. Coupling filter (Burst)	NT-400
<input type="checkbox"/>	MidiStar Telephone exchange	NT-306	<input type="checkbox"/>	PHE 4500 - Mains impedance network	NT-401
<input type="checkbox"/>	SMG - Signal generator 0,1 - 1000 MHz	NT-310	<input type="checkbox"/>	FP-SURGE 32.1 3 ph. Coupling filter (Surge)	NT-402
<input type="checkbox"/>	PM 5518 TXVPS Video generator	NT-311	<input type="checkbox"/>	IP 6.2 Coupling filter for data lines (Surge)	NT-403
<input type="checkbox"/>	RefRad Reference generator	NT-312	<input type="checkbox"/>	ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
<input type="checkbox"/>	SMP 02 Signal generator 10 MHz - 20 GHz	NT-313	<input type="checkbox"/>	IP 4 - Capacitive clamp (Burst)	NT-411
<input type="checkbox"/>	PEFT - Burst generator up to 4 kV	NT-320	<input type="checkbox"/>	HV-Attenuator 54,5 dB (Burst)	NT-420
<input type="checkbox"/>	PSD - ESD generator up to 25 kV	NT-321	<input type="checkbox"/>	RF-Attenuator 20 dB 0,1 - 1000 MHz / 25 W	NT-421
<input type="checkbox"/>	ESD-Pistol	NT-322	<input type="checkbox"/>	RF-Attenuator 10 dB 0,1 - 1000 MHz / 20 W	NT-422
<input type="checkbox"/>	Vacuum-Relais up to 8 kV	NT-323	<input type="checkbox"/>	RF-Attenuator 30 dB 0,1 - 1000 MHz / 1 W	NT-423
<input type="checkbox"/>	PSURGE 4.1 Surge generator	NT-324	<input type="checkbox"/>	RF-Attenuator 30 dB	NT-424
<input type="checkbox"/>	TRANSIENT 1000 Immunity test system	NT-325	<input type="checkbox"/>	RF-Attenuator 6 dB 0,1 - 1000 MHz / 1 W	NT-425
<input type="checkbox"/>	VCS 500-M6 Surge-Generator	NT-326	<input type="checkbox"/>	RF-Attenuator 6 dB 0,1 - 1000 MHz / 1 W	NT-426
<input type="checkbox"/>	BTA-250 - RF-Amplifier 9 kHz - 220 MHz / 250 W	NT-330	<input type="checkbox"/>	Voltage-divider 1:100	NT-427
<input type="checkbox"/>	500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332	<input type="checkbox"/>	RF-Attenuator 6 dB	NT-428

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Nachrichtentechnik/EMV

Department: EMV

Test report number:
M/EMV-02/225

Page: 2 of 3

Date: 14. 10. 2002

Checked by: 

Appendix 1 (continued)

Test equipment used

<input type="checkbox"/>	RF-Attenuator 0 dB - 81 dB	NT-429	<input checked="" type="checkbox"/>	ES-K1 Test software	NT-520
<input type="checkbox"/>	WRU 27 - Band blocking 27 MHz	NT-430	<input type="checkbox"/>	ESPC-K1 Test software	NT-521
<input type="checkbox"/>	WHJ450C9 AA - High pass 450 MHz	NT-431	<input type="checkbox"/>	SPS_PHE - Test software voltage fluctuations/harmonics	NT-525
<input type="checkbox"/>	WHJ250C9 AA - High pass 250 MHz	NT-432	<input type="checkbox"/>	SPS_EM - Test software for PHE 4500/B	NT-527
<input type="checkbox"/>	RF-Load 150 W	NT-433	<input type="checkbox"/>	Noise power test apparatus according to EN 55014	NT-530
<input type="checkbox"/>	Impedance transducer 50 Ohm – 800 Ohm	NT-435	<input type="checkbox"/>	Vertical coupling plane (ESD)	NT-531
<input type="checkbox"/>	I+P 7780 Directional coupler 100 - 2000 MHz	NT-440	<input type="checkbox"/>	Equipment for ESD-pulse verification.	NT-532
<input type="checkbox"/>	ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441	<input type="checkbox"/>	TEM-Zelle	NT-533
<input type="checkbox"/>	Power Divider 6 dB/1 W/50 Ohm	NT-443	<input type="checkbox"/>	ESV-24 Plotter adapter	NT-540
<input type="checkbox"/>	Directional coupler 0,1 MHz – 70 MHz	NT-444	<input checked="" type="checkbox"/>	Test cables	NT-550
<input type="checkbox"/>	Directional coupler 0,1 MHz – 70 MHz	NT-445	<input type="checkbox"/>	Test cable #4 for EN 61000-4-6	NT-553
<input type="checkbox"/>	Tube imitations according to EN 55015	NT-450	<input type="checkbox"/>	Test cable #3 for conducted emission	NT-554
<input type="checkbox"/>	FCC-801-M5-25 Coupling decoupling network	NT-460	<input type="checkbox"/>	Test cable #5 ESD-cable (2x470k)	NT-555
<input type="checkbox"/>	FCC-801-AF10 Coupling decoupling network	NT-461	<input type="checkbox"/>	Test cable #6 ESD-cable (2x470k)	NT-556
<input type="checkbox"/>	FCC-801-S25 Coupling decoupling network	NT-462	<input type="checkbox"/>	Serial data - fiber optic link	NT-557
<input type="checkbox"/>	FCC-801-T4 Coupling decoupling network	NT-463	<input type="checkbox"/>	Test cable #8 Sucoflex 104EA	NT-559
<input type="checkbox"/>	FCC-801-C1 Coupling decoupling network	NT-464	<input type="checkbox"/>	Test cable #9 (for outdoor measurements)	NT-580
<input type="checkbox"/>	F-16A - Current probe 1kHz - 70MHz	NT-465	<input type="checkbox"/>	Test cable #10 (for outdoor measurements)	NT-581
<input checked="" type="checkbox"/>	PC P450 - Test computer	NT-500	<input type="checkbox"/>	Test cable #13 PBA-33PBC-10	NT-584
<input type="checkbox"/>	SE 284 GPIB - Plotter	NT 502	<input type="checkbox"/>	Shield chamber	NT-600
<input type="checkbox"/>	PC P133 Test computer #2	NT-504	<input type="checkbox"/>	Climatic chamber -55°C to +180°C	M-512
<input type="checkbox"/>	PC P200 MMX Notebook	NT-505	<input type="checkbox"/>	Control and simulation equipment for EUT	---
<input type="checkbox"/>	PC PIII 933 MHz Notebook	NT-506			
<input type="checkbox"/>	7110 - Controlling device for E-Field probe	NT-510			
<input type="checkbox"/>	Monitoring camera with Monitor	NT-511			
<input type="checkbox"/>	BSR-V1 - Video transmission system (optical fiber link)	NT-512			

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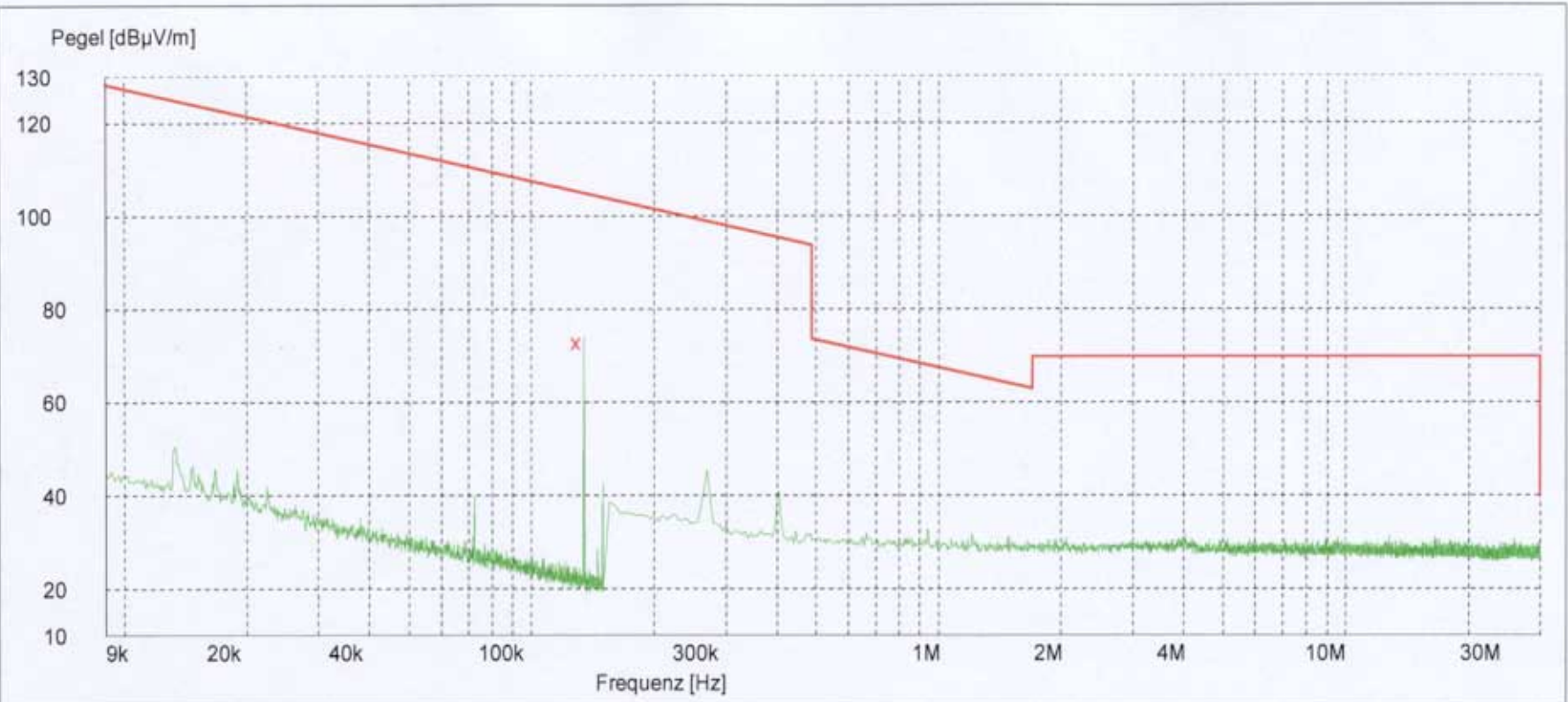
Department: EMV

Test report number:
MEMV-02/225

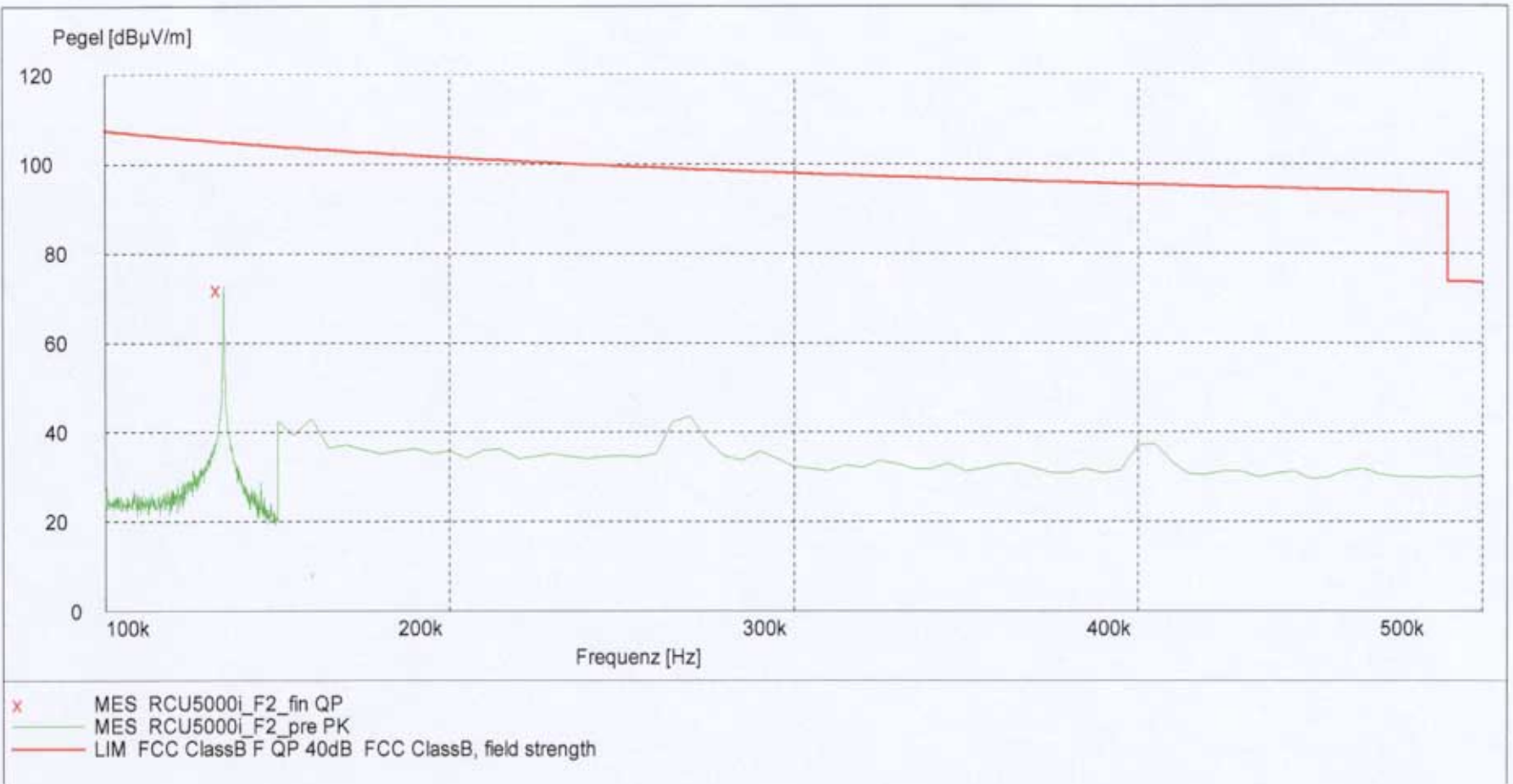
Page: 3 of 3

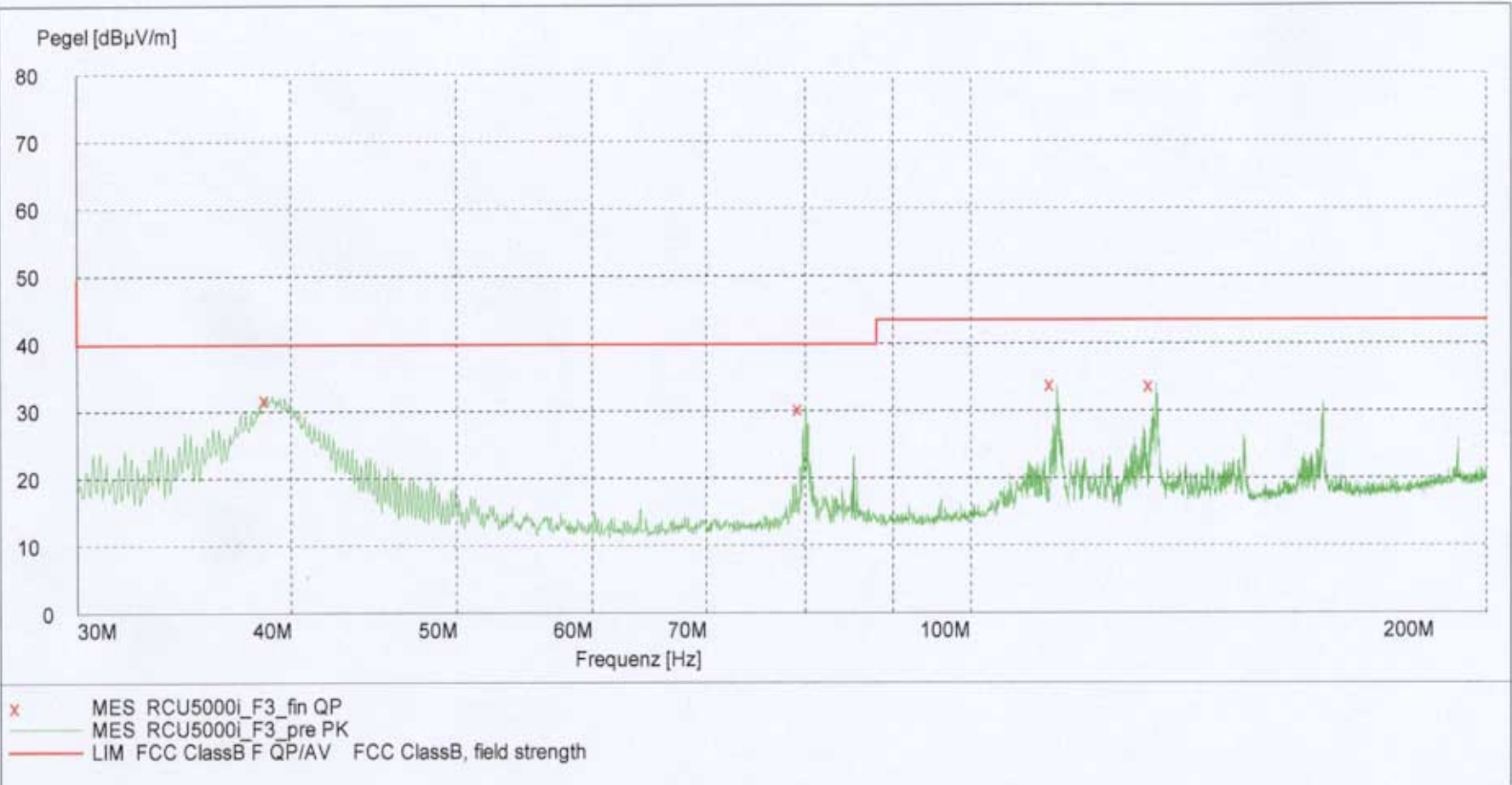
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x MES RCU5000i_F1_fin QP
 — MES RCU5000i_F1_pre PK
 — LIM FCC ClassB F QP 40dB FCC ClassB, field strength





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Department EMC

Test report number:
M/EMV-02/225

Diagram nr.:
4 of 4

Date: 14. 10. 2002

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