TEST REPORT

of the accredited test laboratory

TÜV Nr.:M/EMV-08/154

about

the following EMC - test/- research

Applicant:	KEBA AG Gewerbepark Urfahr A-4041 Linz
Product:	RFID Module; XE020
Serial Number:	---
FCC ID:	U870001
Standard:	47 CFR Ch. I Part 15 (September 20, 2007) RSS-210 Issue 7 (June 2007)

TÜV AUSTRIA SERVICES GMBH

Test laboratory for EMC

Supervisor of EMC-laboratory

Official seal

Checked by

Ing. Wilhelm Seier

30.04.2008

Ing. Michael Emminger

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Medical Technology/ Communication Technology/ EMC

Department:
Testing Body for Communication Technology/ EMC

TÜV ®

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Inspection Body,
Certification Body,
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Contents

1. Applicant

Company:	KEBA AG
Department:	Development center
Address:	Gewerbepark Urfahr A-4041 Linz
Contact person:	Mr. Dipl.-Ing. Markus Dobersberger

EUT received on:	02.11.2006
Tests were performed on:	02.11.2006 to 02.11.2006

2. Description of EUT

EUT:	RFID Module; XE020
Serial Number:	---
Manufacturer:	KEBA AG Gewerbepark Urfahr A-4041 Linz
Description:	Keba provided the following configuration for the measurements: Pre-production model
Operating mode:	The measurements were carried out at the following running states: normal operation

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3. Standards / Final result

Name	Title	Deviation	Result
47 CFR Ch. I Part 15 (September 20, 2007)	Radio Frequency Devices	none	PASS
RSS-210 Issue 7 (June 2007)	Low Power Licence-Exempt Radiocommunuication Devices (All Frequency Bands)	none	PASS
PASS EUT passed FAIL EUT failed			

4. Test results

4. 1. Conducted emission on the DC line

Because the module will only be used in Products of the manufacturer itself (limited modular approval) this measurement was exempted and the final product must meet this requirement on it AC mains power supply line.

4. 2. Radiated emission

Limits according to 15.209 and A2.7 (Table 2+3)

	Detector Quasi Peak	
Frequency range	Limit	Measurement distance
0,009 – 0,490 MHz	2400µV / f(kHz)	300 m
0,490 – 1,705 MHz	24000µV / 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
Normal operation	Measurement diagram 1-3

Test result:

4. 2.1.) Measurement in the frequency range 9 kHz to 1000 MHz

Frequency MHz	Level dBµV/m	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
216,95	33,3	46,0	12,7	100	169	VERTICAL

4.3. 15.225 Operation within the band 13,110 – 14,010 MHz RSS-210 A2.6 13,110 – 14,010 MHz

Limits:

15.225 (a) + A2. 6 (a):

The field strength of any emissions within the band 13,553 – 13,567 MHz shall not exceed 15.848 microvolts/meter (84 dBµV/m) at 30 meters.

15.225 (b) and A2.6 (b):

Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter (50,5 dBµV/m) at 30 meters.

15.225 (c) and A2.6 (c):

Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter (40,5 dBµV/m) at 30 meters.

15.225 (d) and A2.6 (d):

30 microvolts/m (29,5 dBµV/m) at 30 m, outside the band 13.110-14.010 MHz

Test result:

The field strength at 13,56 MHz in 3 m distance was measured as 52,3 dBµV/m.
Extrapolated with 40 dB per decade to 30 meters distance it would be 12,3 dBµV/m.

15.225 (e) and A2.6:

The frequency tolerance of the carrier signal shall be maintained within ± 0,01 % of the operating frequency over a temperature variation of –20 degrees to +50 degrees C at normal supply voltage, and for a variation of the primary supply voltage from 85 % to 115 % of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

Measurement results:

Test conditions		Transmitter frequency
		13,56 MHz
T_{nom} (20)°C	V_{nom} (12)VDC	13,560243 MHz
T_{nom} (20)°C	V_{min} (10,2)VDC	13,560293 MHz
T_{nom} (20)°C	V_{max} (13,8)VDC	13,560214 MHz
T_{min} (-20)°C	V_{nom} (12)VDC	13,560243 MHz
T_{max} (50)°C	V_{nom} (12)VDC	13,560157 MHz
Maximum deviation from nominal frequency under extreme test conditions (%)		0,00216 %
Measurement uncertainty		± 10 Hz

Appendix 1
Test equipment used

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☒	Anechoic Chamber with 3m measurement distance	NT-100	☐	Spectrumanalyzer – FSP7 9 kHz – 7 GHz	NT-200
☐	Stripline according to ISO 11452-5	NT-108	☐	ESVP - Test receiver 20 - 1000 MHz	NT-201
☒	MA 240 - Antenna mast 1 - 4 m height	NT-110	☐	ESPC - Test receiver 9 kHz - 2,5 GHz	NT-203
☒	DS 412 - Turntable 0 - 400 ° Azimuth	NT-111	☒	ESI26 – Test receiver 20 Hz – 26,5 GHz	NT-207
☒	HD 100 Controller Mast+Turntable	NT-112	☐	Digital Radio Tester CTS55	NT-208
☐	HUF-Z2 - Bicon. Antennna 20 - 300 MHz	NT-120	☐	Noise-gen., ITU-R 559-2 20 Hz – 20 kHz	NT-209
☐	HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz	NT-121	☐	CMTA - Radiocommunication analyzer ; 0,1 - 1000 MHz	NT-210
☒	HFH-Z2 - Loop Antenna 9 kHz - 30 MHz	NT-122	☐	3271 - Spectrum analyzer 100 Hz - 26,5 GHz	NT-211
☐	HFH-Z6 - Rod Antenna 9 kHz - 30 MHz	NT-123	☐	Radiocommunicationanalyzer Marconi 2945A	NT-212
☐	3121C - Dipole Antenna 28 - 1000 MHz	NT-124	☐	2855S - Communication analyzer	NT-213
☐	3115 - Horn Antenna 1 - 18 GHz (immunity)	NT-125	☐	Mixer M28HW 26,5 GHz - 40 GHz	NT-214
☐	3116 - Horn Antenna 18 - 40 GHz	NT-126	☐	Diode Detector 0,01 GHz - 26,5 GHz	NT-215
☐	SAS-200/543 - Bicon. Antenna 20 MHz - 300 MHz	NT-127	☐	RubiSource T&M Timing reference	NT-216
☐	AT-1080 - Log. Per. Antenna 80 - 1000 MHz	NT-128	☐	Radiocommunicationanalyzer SWR 1180 MD	NT-217
☒	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-129	☐	Mixer M19HWD 40 GHz – 60 GHz	NT-218
☐	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-130	☐	Mixer M12HWD 60 GHz – 90 GHz	NT-219
☒	3146 - Log. Per. Antenna 200 – 1000 MHz	NT-131	☐	TDS - 540 DSO Digital scope	NT-220
☐	Loop Antenna H-Field	NT-132	☐	TPS 2014 Digital scope	NT-222
☐	Horn Antenna 500 MHz - 2900 MHz	NT-133	☐	Artificial Ear according to IEC 60318	NT-224
☐	Horn Antenna 500 MHz - 6000 MHz	NT-133/1	☐	1 kHz Sound calibrator	NT-225
☐	Log. per. Antenna 800 MHz - 2500 MHz	NT-134	☐	B10 - Harmonics and flicker analyzer	NT-232
☐	Log. per. Antenna 800 MHz - 2500 MHz	NT-135	☐	SRM-3000 Spectrumanalyzer	NT-233
☐	BiConiLog Antenna 26 MHz – 2000 MHz	NT-137	☐	E-field probe SRM 75 MHz – 3 GHz	NT-234
☐	Conical Dipol Antenna PCD8250	NT-138	☐	Hall-Teslameter ETM-1	NT-241
☐	HF 906 - Horn Antenna 1 - 18 GHz (emission)	NT-139	☐	EFA-3 H-field- / E-field probe	NT-243
☐	HZ-1 Antenna tripod	NT-150	☐	E-field measuring instrument EMR-200; 100 kHz – 3 GHz	NT-244
☐	BN 1500 Antenna tripod	NT-151	☐	E-field probe 100 kHz – 3 GHz	NT-245
☐	Ant. tripod for EN61000-4-3 Model TP1000A	NT-156	☐	Magneticfield-Sensor 300 kHz – 30 MHz	NT-246
☐	Power quality analyzer Fluke 1760 (complete set)	NT-160 - NT-172	☐	E-field probe 3 MHz – 18 GHz	NT-247

Division Medical Technology/ Communication Technology/ EMC

Department: EMC

Test report number: M/EMV-08/154

Date: 30.04.2008

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Appendix 1 (continued)
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TÜV AUSTRIA

☐	H-field probe 27 MHz – 1 GHz	NT-248
☐	ELT-400 1 Hz – 400 kHz	NT-249
☐	MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250
☐	FCC-203I EM Injection clamp	NT-251
☐	FCC-203I-DCN Ferrite decoupling network	NT-252
☐	PR50 Current Probe	NT-253
☐	PR630 Current Probe	NT-254
☐	Fluke 87 V True RMS Multimeter	NT-260
☐	Model 2000 Digital Multimeter	NT-261
☐	Fluke 87 V Digital Multimeter	NT-262/1
☐	ESH2-Z5-U1 Artificial mains network 4x25A	NT-300
☐	ESH3-Z5-U1 Artificial mains network 2x10A	NT-301
☐	ESH3-Z6-U1 Artificial mains network 1x100A	NT-302
☐	ESH3-Z4 T-Artificial network	NT-303
☐	PHE 4500/B Power amplifier	NT-304
☐	EZ10 T-Artificial Network	NT-305
☐	ENY22 Artificial Network	NT-308
☐	ENY41 Artificial Network	NT-309
☐	SMG - Signal generator 0,1 - 1000 MHz	NT-310
☐	PM 5518 TXVPS Video generator	NT-311
☐	RefRad Reference generator	NT-312
☐	SMP 02 Signal generator 10 MHz - 20 GHz	NT-313
☐	40 MHz Arbitrary Generator TGA1241	NT-315
☐	PEFT - Burst generator up to 4 kV	NT-320
☐	ESD 30 System up to 25 kV	NT-321
☐	PSURGE 4.1 Surge generator	NT-324
☐	TRANSIENT 1000 Immunity test system	NT-325
☐	VCS 500-M6 Surge-Generator	NT-326
☐	BTA-250 - RF-Amplifier 9 kHz - 220 MHz / 250 W	NT-330
☐	T82-50 RF-Amplifier 2 GHz – 8 GHz	NT-331
☐	500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332
☐	AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
☐	APA01 – RF-Amplifier 0,5 GHz – 2,5 GHz	NT-334
☐	Preamplifier 1 GHz - 4 GHz	NT-335
☐	Preamplifier for GPS MKU 152 A	NT-336
☐	Preamplifier 100 MHz – 23 GHz	NT-337
☐	DC Block 10 MHz – 18 GHz Model 8048	NT-338
☐	2-97201 Electronic load	NT-341
☒	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-344
☐	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-345
☐	VDS 200 Mobil-impuls-generator	NT-350
☐	LD 200 Mobil-impuls-generator	NT-351
☐	MPG 200 Mobil-Impuls-Generators	NT-352
☐	EFT 200 Mobil-impuls-generator	NT-353
☐	AN 200 S1 Artificial Network	NT-354
☐	FP-EFT 32M 3 ph. Coupling filter (Burst)	NT-400/1
☐	PHE 4500 - Mains impedance network	NT-401
☐	IP 6.2 Coupling filter for data lines (Surge)	NT-403
☐	TK 9421 High Power Volt. Probe 150 kHz - 30 MHz	NT-409
☐	ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
☐	IP 4 - Capacitive clamp (Burst)	NT-411
☐	Highpass-Filter 100 MHz – 3 GHz	NT-412
☐	Highpass-Filter 600 MHz – 4 GHz	NT-413
☐	Highpass-Filter 1250 MHz – 4 GHz	NT-414
☐	Highpass-Filter 1800 MHz – 16 GHz	NT-415
☐	Highpass-Filter 3500 MHz – 18 GHz	NT-416
☐	RF-Attenuator 10 dB DC – 18 GHz / 50 W	NT-417
☐	RF-Attenuator 6 dB DC – 18 GHz / 50 W	NT-418

Division Medical Technology/ Communication Technology/ EMC

Department: EMC

Test report number: M/EMV-08/154

Date: 30.04.2008

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Appendix 1 (continued)
Test equipment used

TÜV AUSTRIA

Division Medical Technology/ Communication Technology/ EMC

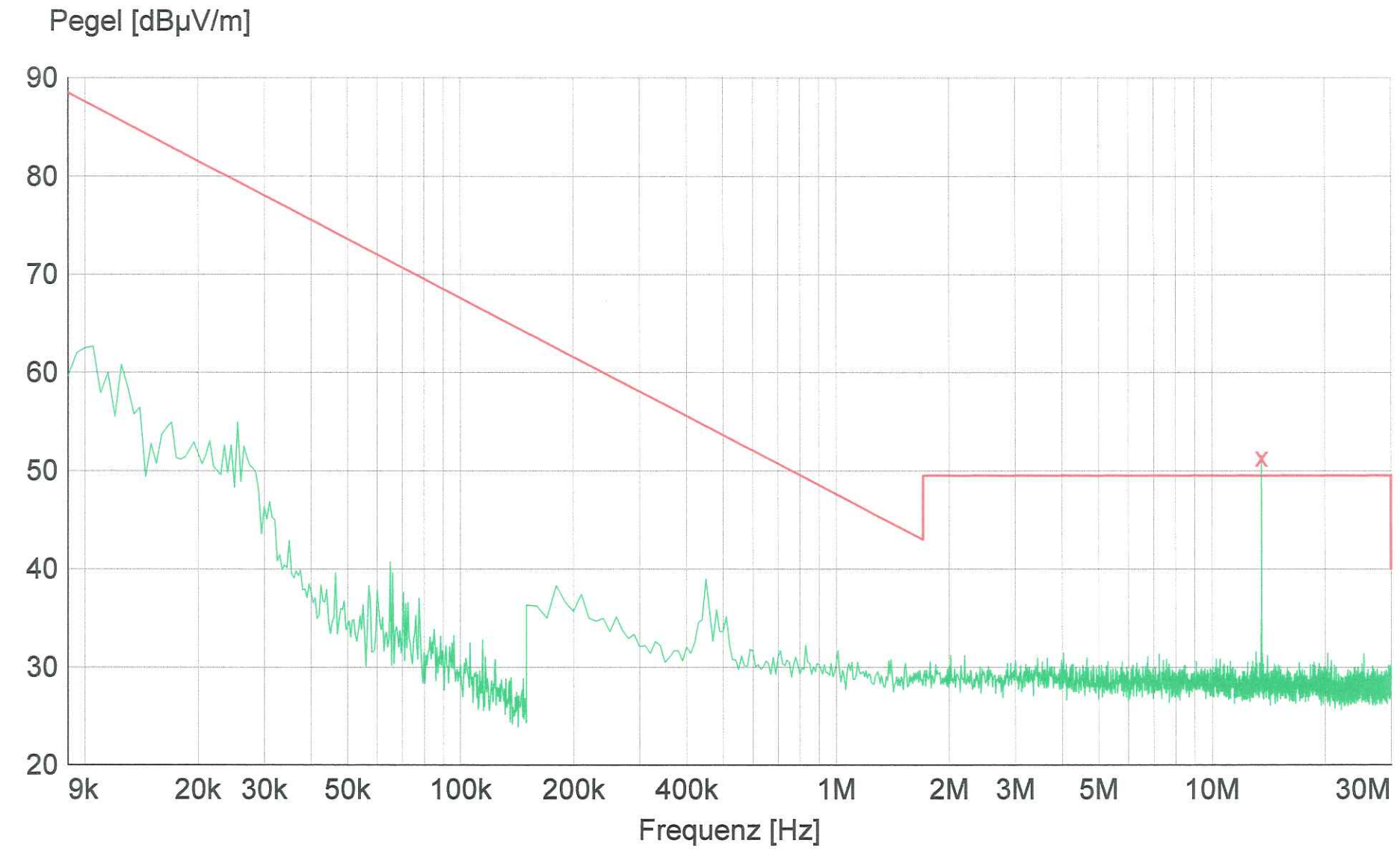
Department: EMC

Test report number: M/EMV-08/154

Date: 30.04.2008

Checked by: M

☐	RF-Attenuator 3 dB DC – 18 GHz / 50 W	NT-419
☐	RF-Attenuator 20 dB DC - 1000 MHz / 25 W	NT-421
☐	RF-Attenuator 30 dB DC - 1000 MHz / 1 W	NT-423
☐	RF-Attenuator 30 dB	NT-424
☐	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-425
☐	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-426
☐	RF-Attenuator 6 dB	NT-428
☐	RF-Attenuator 0 dB - 81 dB	NT-429
☐	WRU 27 - Band blocking 27 MHz	NT-430
☐	WHJ450C9 AA - High pass 450 MHz	NT-431
☐	WHJ250C9 AA - High pass 250 MHz	NT-432
☐	RF-Load 150 W	NT-433
☐	Impedance transducer 1:4 ; 1:9 ; 1:16	NT-435
☐	RF-Attenuator DC – 18 GHz 6 dB	NT-436
☐	RF-Attenuator DC – 18 GHz 6 dB	NT-437
☐	RF-Attenuator DC – 18 GHz 10 dB	NT-438
☐	RF-Attenuator DC – 18 GHz 20 dB	NT-439
☐	I+P 7780 Directional coupler 100 - 2000 MHz	NT-440
☐	ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441
☐	Power Divider 6 dB/1 W/50 Ohm	NT-443
☐	Directional coupler 0,1 MHz – 70 MHz	NT-444
☐	Directional coupler 0,1 MHz – 70 MHz	NT-445
☐	Tube imitations according to EN 55015	NT-450
☐	FCC-801-M2-50A Coupling decoupling network	NT-459
☐	FCC-801-M5-25 Coupling decoupling network	NT-460
☐	FCC-801-AF10 Coupling decoupling network	NT-461
☐	FCC-801-S25 Coupling decoupling network	NT-462
☐	FCC-801-T4 Coupling decoupling network	NT-463
☐	FCC-801-C1 Coupling decoupling network	NT-464
☐	F-16A - Current probe 1kHz - 70MHz	NT-465
☐	95242-1 – Current probe 10 MHz – 400 MHz	NT-468
☐	94106-1L-1 – Current probe 20 Hz – 450 MHz	NT-471
☒	PC P4 3 GHz Test computer	NT-500
☐	PC P4 1700 MHz Notebook	NT-505
☐	PC Intel Centrino 1600 MHz Notebook	NT-506
☐	Monitoring camera with Monitor	NT-511
☒	ES-K1 Version 1.71 SP2 Test software	NT-520
☐	SRM-TS Version 1.3 software for SRM-3000	NT-522
☐	SPS-PHE Test software V2.4c voltage fluctuations/harmonics	NT-525
☐	SPS-EM Test software V2.4c EN61000-4-11	NT-527
☐	Noise power test apparatus according to EN 55014	NT-530
☐	Vertical coupling plane (ESD)	NT-531
☐	Test cable #4 for EN 61000-4-6	NT-553
☐	Test cable #3 for conducted emission	NT-554
☐	Test cable #5 ESD-cable (2x470k)	NT-555
☐	Test cable #6 ESD-cable (2x470k)	NT-556
☐	Test cable #8 Sucoflex 104EA	NT-559
☐	Test cable #9 (for outdoor measurements)	NT-580
☐	Test cable #10 (for outdoor measurements)	NT-581
☐	Test cable #13 Sucoflex 104PE	NT-584
☐	Test cable #21 for SRM-3000	NT-592
☐	Shield chamber	NT-600
☒	Climatic chamber	M-1200
☐	Control and simulation equipment for EUT	---



x x : MES Keba_F1_finFCC
MES Keba_F1_preFCC
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

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Department: EMC

Test report reference: M/EMV-08/154

Measurement diagram: 4 of 3

Date: 30.04.2008

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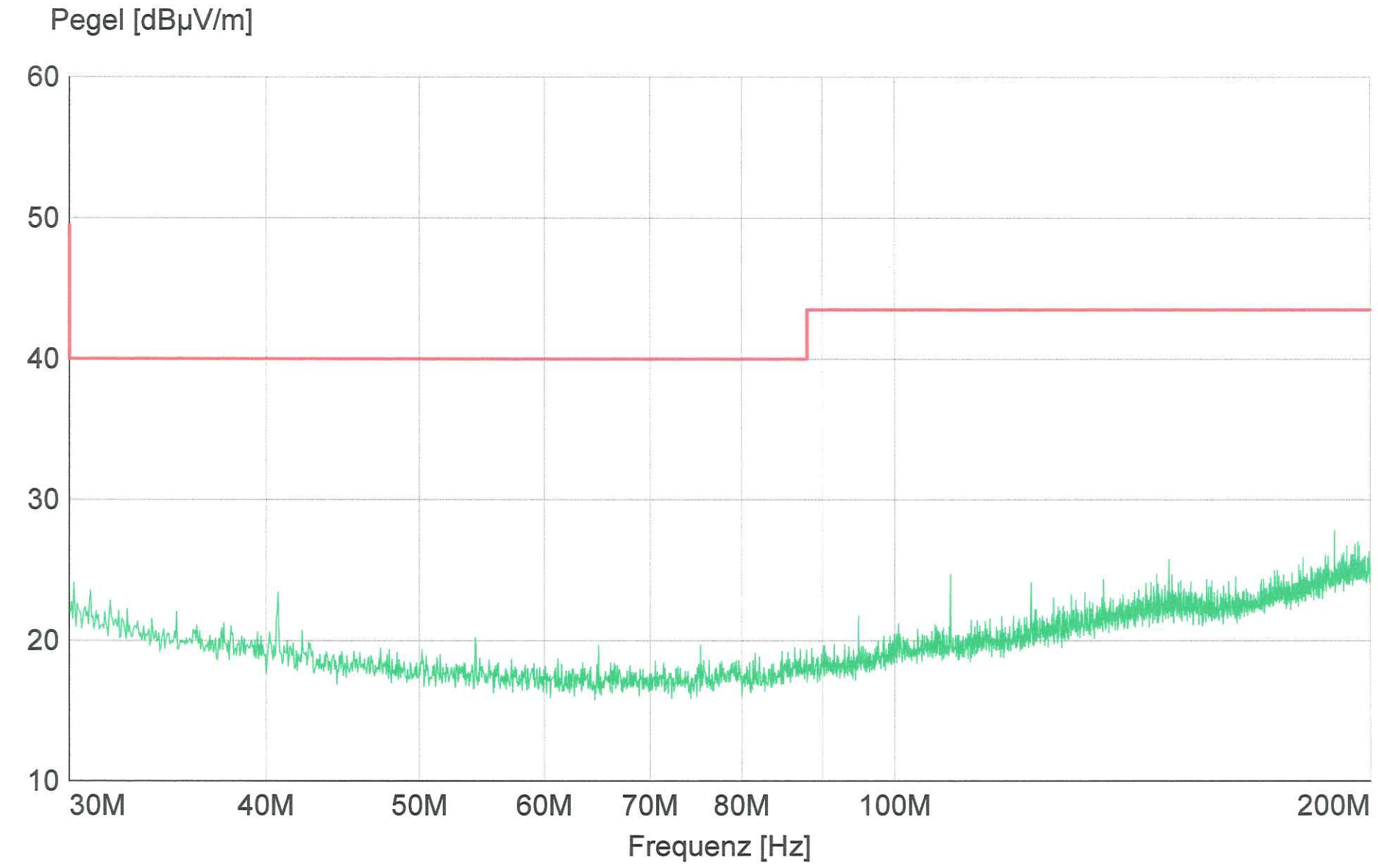

MES Keba_F2_pre
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

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Date: 30.04.2008

Measurement diagram: 8 of 3

Test report reference: M/EMV-08/154

Department: EMC

Division Medical Technology/ Communication Technology/ EMC

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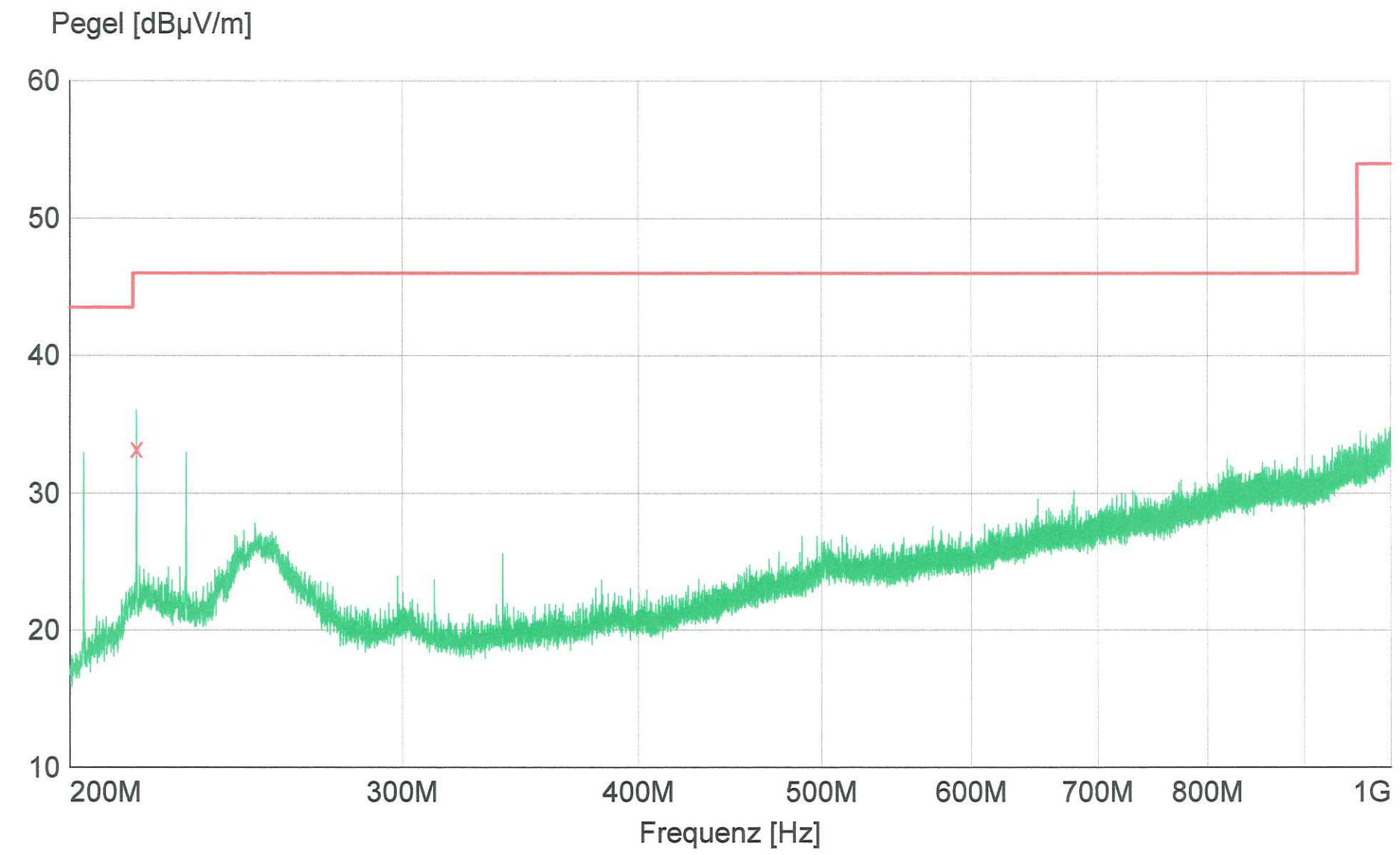

x x :MES Keba_F3_fin
MES Keba_F3_pre
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

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Test report reference: M/EMV-08/154

Measurement diagram: 3 of 3

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