TÜV ÖSTERREICH

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Testing Body for Communication Technology/ EMC

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Accredited Testing Laboratory,
Inspection Body,
Certification Body,
Calibration Body

Notified Body 0408
Canada: IC4413

TEST REPORT

of the accredited test laboratory

TÜV Nr.:M/EMV-04/120

about

the following EMC - test/- research

Applicant:	SKIDATA AG Untersbergstraße 40 A-5083 Gartenau - St. Leonhard
Product:	AS x70i DUO/KEY
Serial Number:	---
Standard:	47 CFR Ch. I Part 15 RSS-210 Issue 5

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Test laboratory for EMC

Deputy Supervisor of EMC-laboratory

Ing. Wilhelm Seier

Official seal

25.02. 2004

Checked by

Ing. Michael Emminger

Copy Nbr.: 01

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

DVR 0047 333
UID ATU 37086005

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Contents

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1. Applicant

Company	SKIDATA AG
Department	
Address	A-5083 Gartenau – St. Leonhard; Untersbergstraße 40
Contact person	Mr. Sonderegger

EUT received on	09.02.2004
Tests were performed on	09.02. – 11.02.2004

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2. Description of EUT

EUT	AS x70i DUO/KEY
Serial Number	---
Manufacturer	SKIDATA AG A-5083 Gartenau – St. Leonhard; Untersbergstraße 40
Description	SKIDATA AG provided the following configuration for the measurements: Serial production
Operating mode	The measurements were carried out at the following running states: normal use

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3. Standards / Final result

Name	Title	Deviation	Result
47 CFR Ch. I Part 15	Radio Frequency Devices	none	PASS
RSS-210 Issue 5	Low Power Licence-Exempt Radiocommunuication Devices (All Frequency Bands)	none	PASS
PASS EUT passed FAIL EUT failed			

4. Test results

4. 1. Conducted emission

Limits according to 15.109 and 6.6.

Frequeny range	Limit	
Detector	Quasi Peak	Average
0,150 - 0,5 MHz	66 - 56 dBµV decreasing with the logarithm of frequency	56 - 46 dBµV decreasing with the logarithm of frequency
0,5 - 5 MHz	56 dBµV	46 dBµV
5 - 30 MHz	60 dBµV	50 dBµV
Remark:	Quasi Peak and Average limits must be both met	

Measuring apparatus parameters:

Parameter	Preview measurement	Final measurement	Parameter	Preview measurement	Final measurement
Start frequency	150 kHz	150 kHz	Detector	MP/AV	QP/AV
Stop frequency	30 MHz	30 MHz	Measuring time	10 ms	1 s
Stepsize	5 kHz	5 kHz	RF-attenuation	0dB	0dB
IF- Bandwidth	9 kHz	9 kHz	Preamplifier	0 dB	0 dB

Operating mode	Measuring result
Normal use	Measurement diagram 1

Test result:

4. 1.1.) Measurement with QP-Detector

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed-Mark	Phase	PE
13,546	59,8	60	0,2		L	GND
13,574	59,7	60	0,3		N	GND
13,505	51,8	60	8,2		L	GND
13,595	49,1	60	10,9		L	GND
13,630	47,7	60	12,3		N	GND
13,715	42,0	60	18,0		L	GND

4. 1.2.) Measurement with AV-Detector

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed-Mark	Phase	PE
13,546	33,8	50	16,2		L	GND
13,574	36,7	50	13,3		L	GND

4. 2. Radiated emission

Limits according to 15.209 and 6.2.1.

	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
continuous and modulated carrier at 122,9 kHz,	Measurement diagram 2-4
continuous and modulated carrier at 13,56 MHz	Measurement diagram 5-7

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Test result:

4. 2.1.) Measurement in the frequency range 9 kHz to 30 MHz

continuous and modulated carrier at 122,9 kHz

Frequency kHz	Level dBµV/m	Limit dBµV/m	Margin dB	Exceed-Mark
122,9	103,7	105,8	2,1	

4. 2.2.) Measurement in the frequency range 30 MHz to 1000 MHz

continuous and modulated carrier at 122,9 kHz

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

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4. 2.3.) Measurement in the frequency range 9 kHz to 30 MHz

continuous and modulated carrier at 13,56 MHz

Frequency kHz	Level dBµV/m	Limit dBµV/m	Margin dB	Exceed-Mark
13560	101,8	69,5	32,3	This part of emission is coverd by 15.225 (a) and 6.2.2.(e) see page 11

4. 2.4.) Measurement in the frequency range 200 MHz to 1000 MHz

continuous and modulated carrier at 13,56 MHz

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

4.3. 15.225 Operation within the band 13,110 – 14,010 MHz RSS-210 6.2.2.(e) 13,553 – 13,567 MHz

15.225 (a):

The field strength of any emissions within this band shall not exceed 15.848 microvolts/meter (84 dBµV/m) at 30 meters.

Measurement results:

The field strength at 3m distance was measured as 101,8 dBµV/m. Extrapolated with 40 dB per decade to 30 meters distance it would be 61,8 dBµV/m.

6.2.2.(e)

The field strength of any emissions within this band shall not exceed 15.500 microvolts/meter (84 dBµV/m) at 30 meters.

Measurement results:

The field strength at 3m distance was measured as 101,8 dBµV/m. Extrapolated with 40 dB per decade to 30 meters distance it would be 61,8 dBµV/m.

15.225 (b) and 6.2.2.(e):

Frequency range MHz	Level dBµV/m	Limit dBµV/m
13,410 – 13,553	< 70	90,5
13,567 – 13,710	< 70	90,5
The Limit was increased for a constant measurement distance of 3m with a factor of 40 dB per Decade.		

15.225 (c) and 6.2.2.(e):

Frequency range MHz	Level dBµV/m	Limit dBµV/m
13,110 – 13,410	< 50	80,5
13,710 – 14,010	< 50	80,5
The Limit was increased for a constant measurement distance of 3m with a factor of 40 dB per Decade.		

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15.225 (d):

See measurement diagram.

15.225 (e) and 6.2.2.(e):

The frequency tolerance of the carrier signal shall be maintained within ± 0,01 % of the operating frequency over a temperature variation ov –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_{min} (93,5)V	13,56121
T_{nom} (20)°C	V_{nom} (126,5)V	13,56124
T_{min} (-20)°C	V_{nom} (110)V	13,56125
T_{max} (50)°C	V_{nom} (110)V	13,56123
Maximum deviation from nominal frequency under extreme test conditions (%)		0,00922
Measurement uncertainty		± 10 Hz

Appendix 1
Test equipment used

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☒	Anechoic Chamber with 3m measurement distance	NT-100
☒	MA 240 - Antenna mast 1 - 4 m height	NT-110
☒	DS 412 - Turntable 0 - 400 ° Azimuth	NT-111
☒	HD 100 Controller Mast+Turntable	NT-112
☐	HUF-Z2 - Bicon. Antennna 20 - 300 MHz	NT-120
☐	HUF-Z3 - Log. Per. Antenna 200 - 1000 MHz	NT-121
☒	HFH-Z2 - Loop Antenna. 9 kHz - 30 MHz	NT-122
☐	HFH-Z6 - Rod Antenna 9 kHz - 30 MHz	NT-123
☐	3121C - Dipole Antenna 28 - 1000 MHz	NT-124
☐	3115 - Horn Antenna 1 - 18 GHz	NT-125
☐	3116 - Horn Antenna 18 - 40 GHz	NT-126
☐	SAS-200/543 - Bicon. Ant. 20 MHz - 300 MHz	NT-127
☐	AT-1080 - Log. Per. Ant. 80 - 1000 MHz	NT-128
☒	HK-116 - bicon. Ant. 20 MHz - 300 MHz	NT-129
☐	HK-116 - bicon. Ant. 20 MHz - 300 MHz	NT-130
☒	3146 - Log. Per. Ant. 200 - 1000MHz	NT-131
☐	Loop Antenna H-Field	NT-132
☐	Horn Antenna 500 MHz - 2900 MHz	NT-133
☐	Log. per. Antenna 800 MHz - 2500 MHz	NT-134
☐	Log. per. Antenna 800 MHz - 2500 MHz	NT-135
☐	BiConiLog Antenna 26 MHz – 2000 MHz	NT-137
☐	Conical Dipol Antenna PCD8250	NT-138
☐	HZ-1 Antenna tripod	NT-150
☐	BN 1500 Antenna tripod	NT-151
☐	Ant. tripod for EN61000-4-3 Model TP1000A	NT-156
☐	ESVP - Test receiver 20 - 1000 MHz	NT-201
☐	ESPC - Test receiver 9 kHz - 2,5 GHz	NT-203
☒	ESI26 – Test receiver 20 Hz – 26,5 GHz	NT-207
☐	Digital Radio Tester CTS55	NT-208
☐	Noise-gen., ITU-R 559-2 20 Hz – 20 kHz	NT-209
☐	CMTA - Radiocommunication analyzer ; 0,1 - 1000 MHz	NT-210
☒	3271 - Spectrum analyzer 100 Hz - 26,5 GHz	NT-211
☐	Radiocommunicationanalyzer Marconi 2945A	NT-212
☐	2855S - Communication analyzer	NT-213
☐	Mixer M28HW 26,5 GHz - 40 GHz	NT-214
☐	Diode Detector 0,01 GHz - 26,5 GHz	NT-215
☐	3160-10 Horn Antenna 26,5 GHz - 40 GHz	NT-216
☐	Radiocommunicationanalyzer SWR 1180 MD	NT-217
☐	Mixer M19HWD 40 GHz – 60 GHz	NT-218
☐	Mixer M12HWD 60 GHz – 90 GHz	NT-219
☐	TDS - 540 DSO Digital scope	NT-220
☐	PM97 Scopemeter	NT-221
☐	B10 - Harmonics and flicker analyzer	NT-231
☐	EFA-3 H-field- / E-field probe	NT-243
☐	E-field measuring instrument EMR-200; 100 kHz – 3 GHz	NT-244
☐	E-field probe 100 kHz – 3 GHz	NT-245
☐	Magneticfield-Sensor 300 kHz – 30 MHz	NT-246
☐	E-field probe 10 MHz – 18 GHz	NT-247
☐	H-field probe 10 MHz – 1 GHz	NT-248
☐	ELT-400 1 Hz – 400 kHz	NT-249
☐	MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250

Medizintechnik/
Nachrichtentechnik/EMV

Department: EMV

Test report number:
M/EMV-04/120

Date: 25.02.2004

Checked by:

Appendix 1 (continued)
Test equipment used

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☐	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
☐	Model 2000 Digital Multimeter	NT-261
☐	Fluke 97 Digital Multimeter	NT-262
☐	Fluke 97 Digital Multimeter	NT-263
☒	ESH2-Z5 Artificial mains network 4x25A	NT-300
☐	ESH3-Z5 Artificial mains network 2x10A	NT-301
☐	ESH3-Z6 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
☐	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 T1241	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
☐	FP 16/3-1 3 ph. Coupling filter (Burst)	NT-400
☐	PHE 4500 - Mains impedance network	NT-401
☐	IP 6.2 Coupling filter for data lines (Surge)	NT-403
☐	ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
☐	IP 4 - Capacitive clamp (Burst)	NT-411
☐	Highpass-Filter 100 MHz – 4 GHz	NT-412
☐	Highpass-Filter 600 MHz – 4 GHz	NT-413
☐	Highpass-Filter 1250 MHz – 4 GHz	NT-414
☐	Highpass-Filter 1800 MHz – 18 GHz	NT-415
☐	Highpass-Filter 3500 MHz – 18 GHz	NT-416
☐	HV-Attenuator 54,5 dB (Burst)	NT-420
☐	RF-Attenuator 20 dB 0,1 - 1000 MHz / 25 W	NT-421
☐	RF-Attenuator 10 dB 0,1 - 1000 MHz / 20 W	NT-422

Appendix 1 (continued)
Test equipment used

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Medizintechnik/
Nachrichtentechnik/EMV

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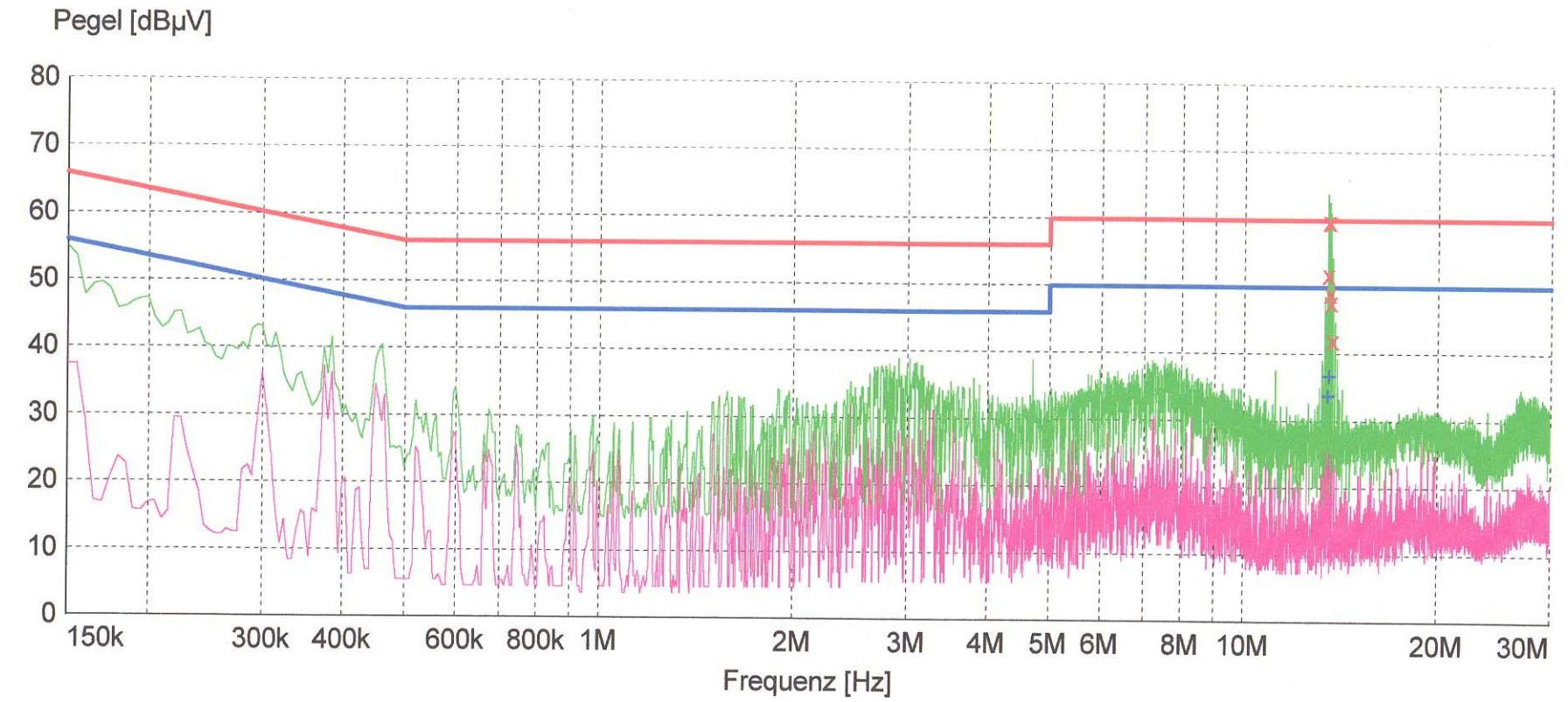
☐	RF-Attenuator 30 dB 0,1 - 1000 MHz / 1 W	NT-423
☐	RF-Attenuator 30 dB	NT-424
☐	RF-Attenuator 6 dB 0,1 - 1000 MHz / 1 W	NT-425
☐	RF-Attenuator 6 dB 0,1 - 1000 MHz / 1 W	NT-426
☐	Voltage-divider 1:100	NT-427
☐	RF-Attenuator 6 dB	NT-428
☐	RF-Attenuator 0 dB - 81 dB	NT-429
☐	WRU 27 - Band blocking 27 MHz	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 50 Ohm – 800 Ohm	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
☒	PC P450 - Test computer	NT-500
☐	PC P4 1700 MHz Notebook	NT-505
☐	PC PIII 933 MHz Notebook	NT-506
☐	Monitoring camera with Monitor	NT-511
☒	ES-K1 Test software	NT-520
☐	SPS_PHE - Test software voltage fluctuations/harmonics	NT-525
☐	SPS_EM - Test software for PHE 4500/B	NT-527
☐	Noise power test apparatus according to EN 55014	NT-530
☐	Vertical coupling plane (ESD)	NT-531
☐	TEM-Zelle	NT-533
☐	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
☐	Shield chamber	NT-600
☒	Climatic chamber -55°C to +180°C	M-512
☐	Control and simulation equipment for EUT	---



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——	MES	Key_AS_VAC_pre AV	
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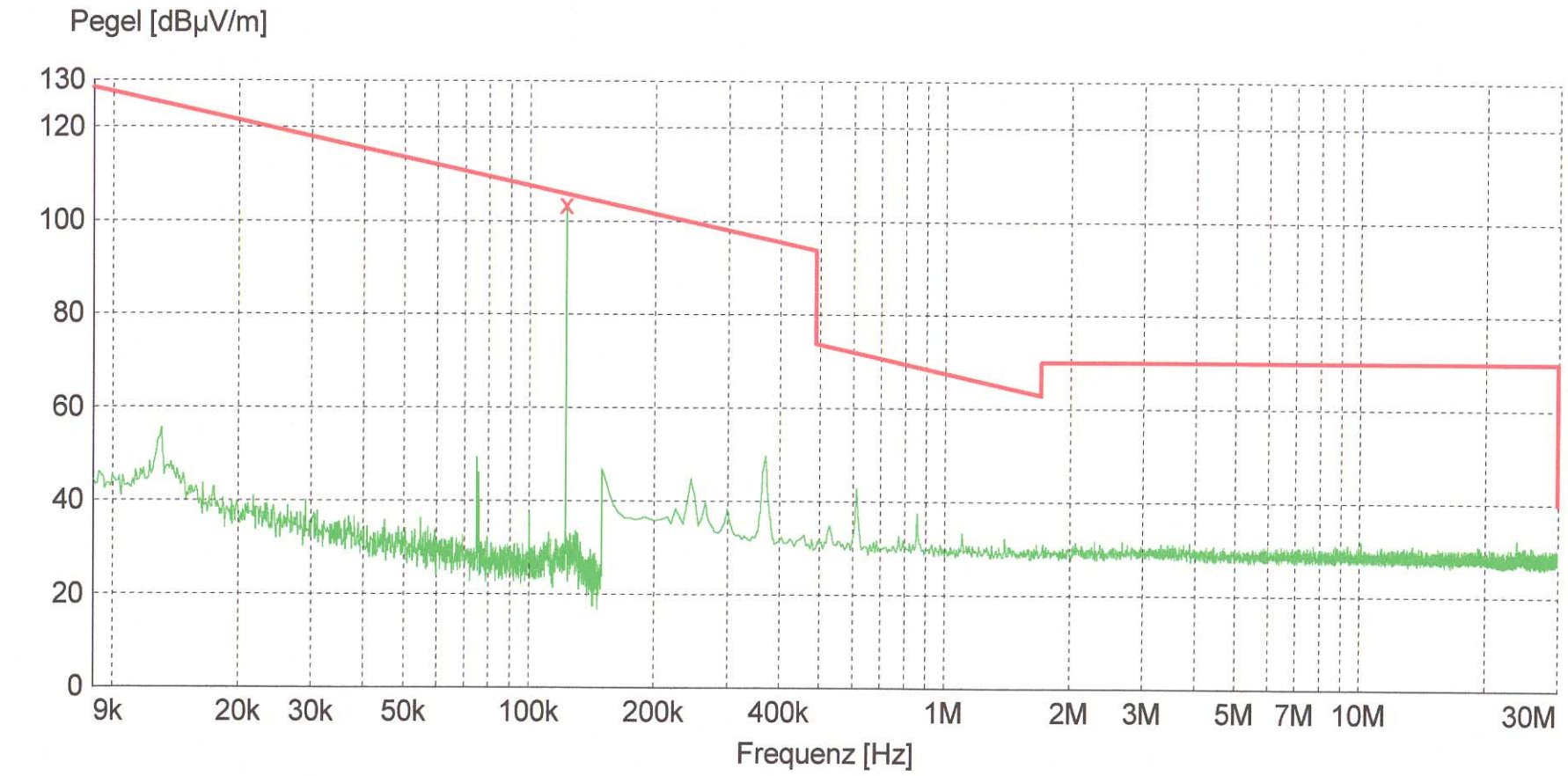
——	LIM	EN 55022 V AV	EN 55022 V AV



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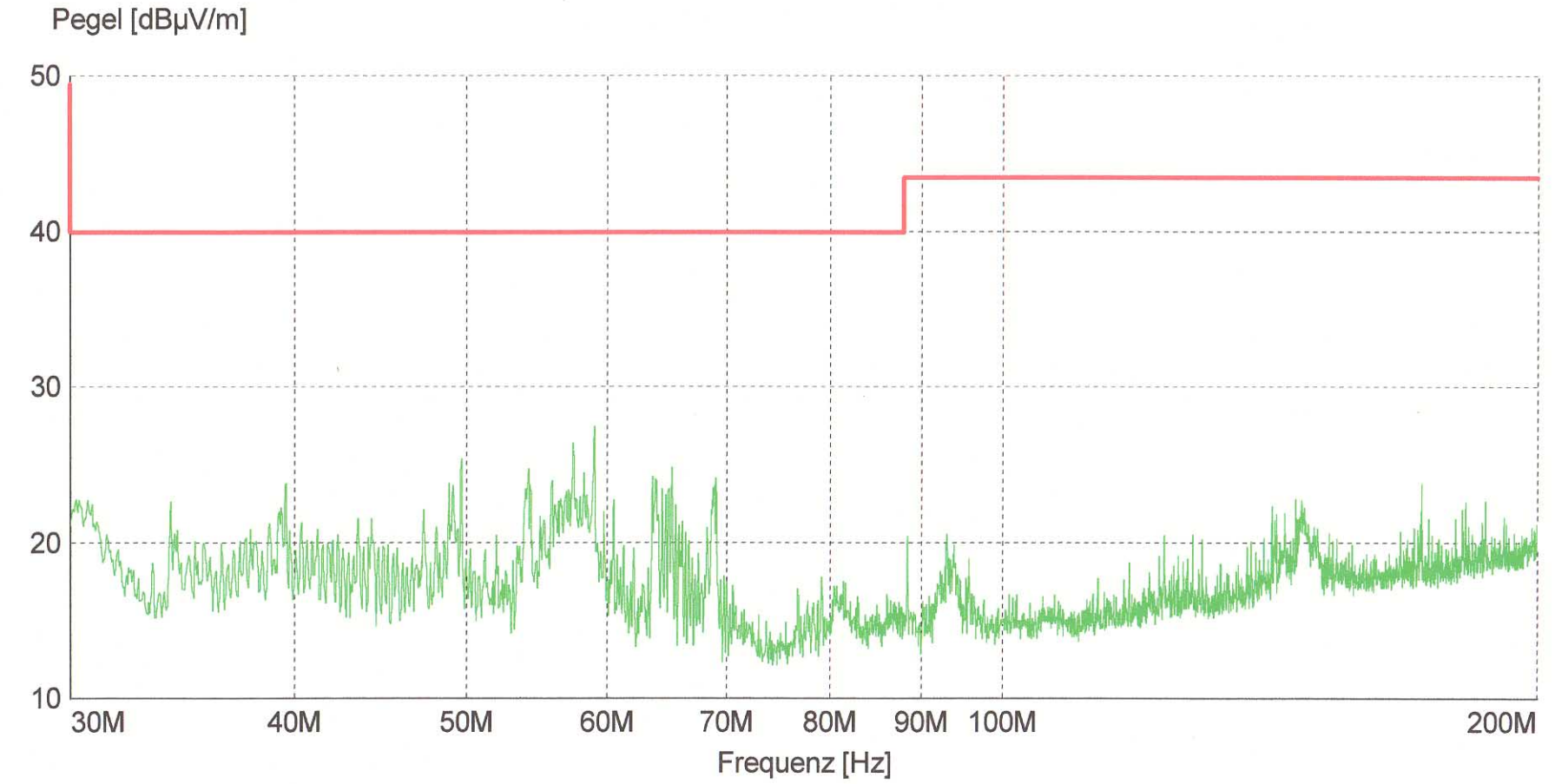

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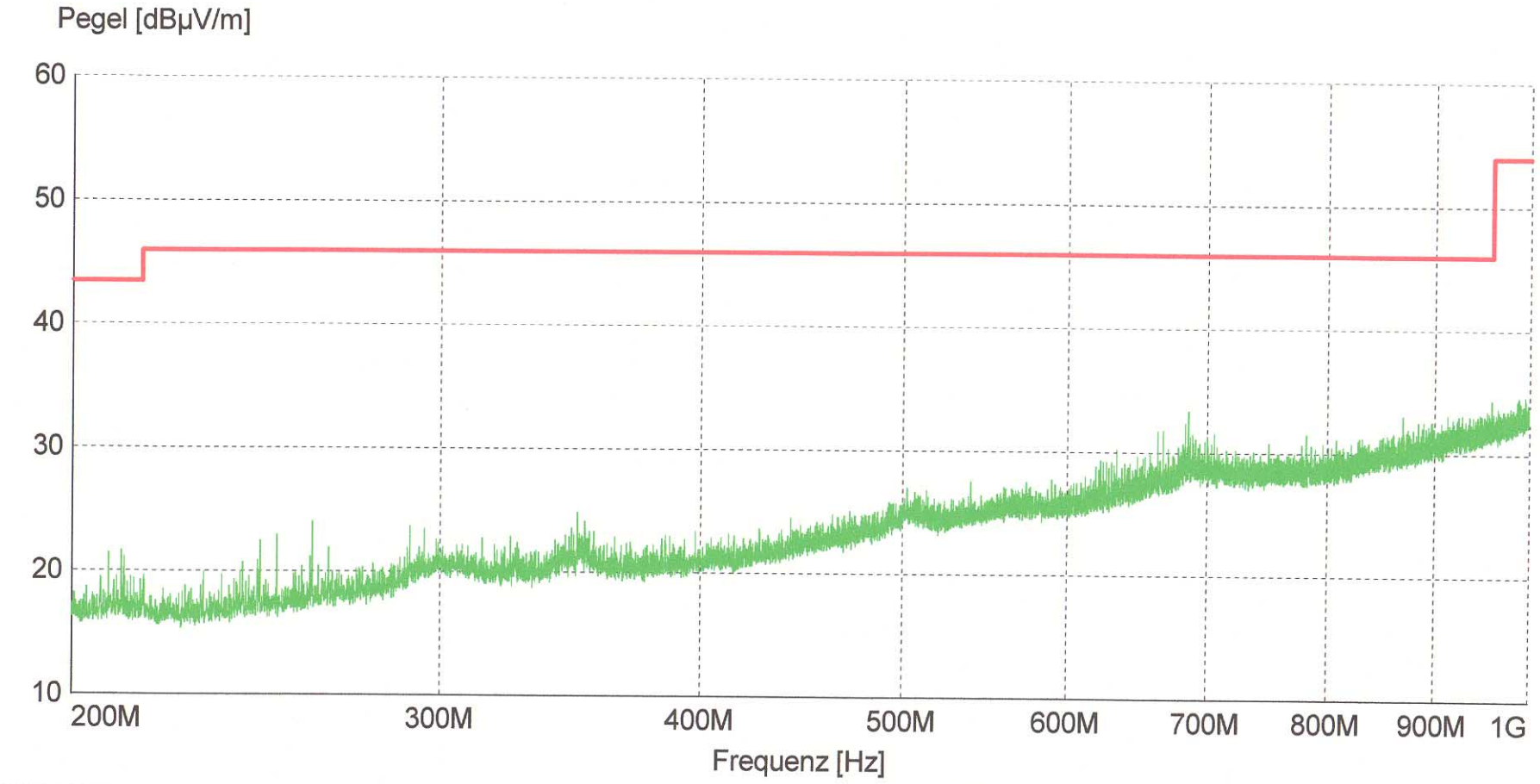

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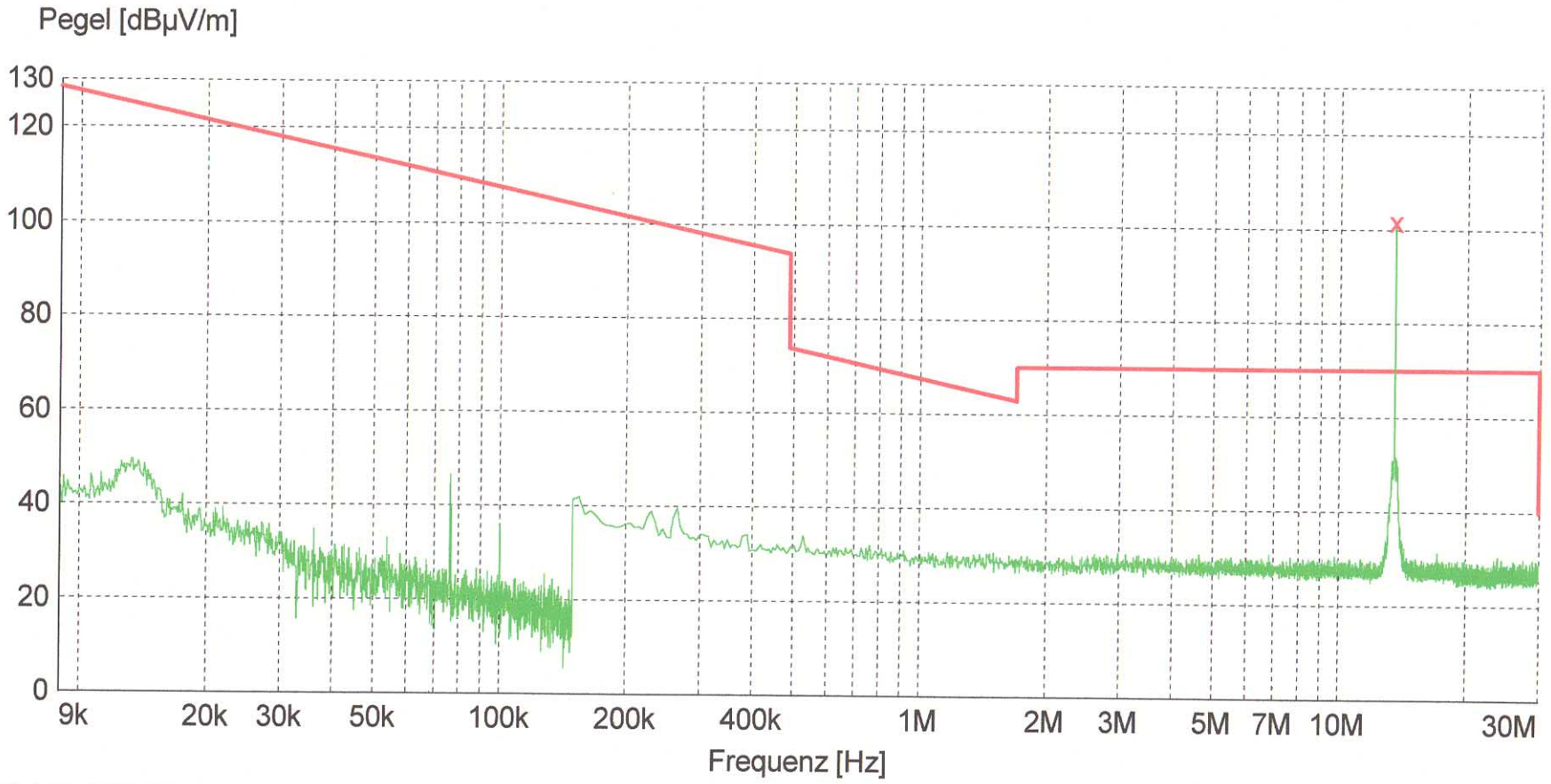

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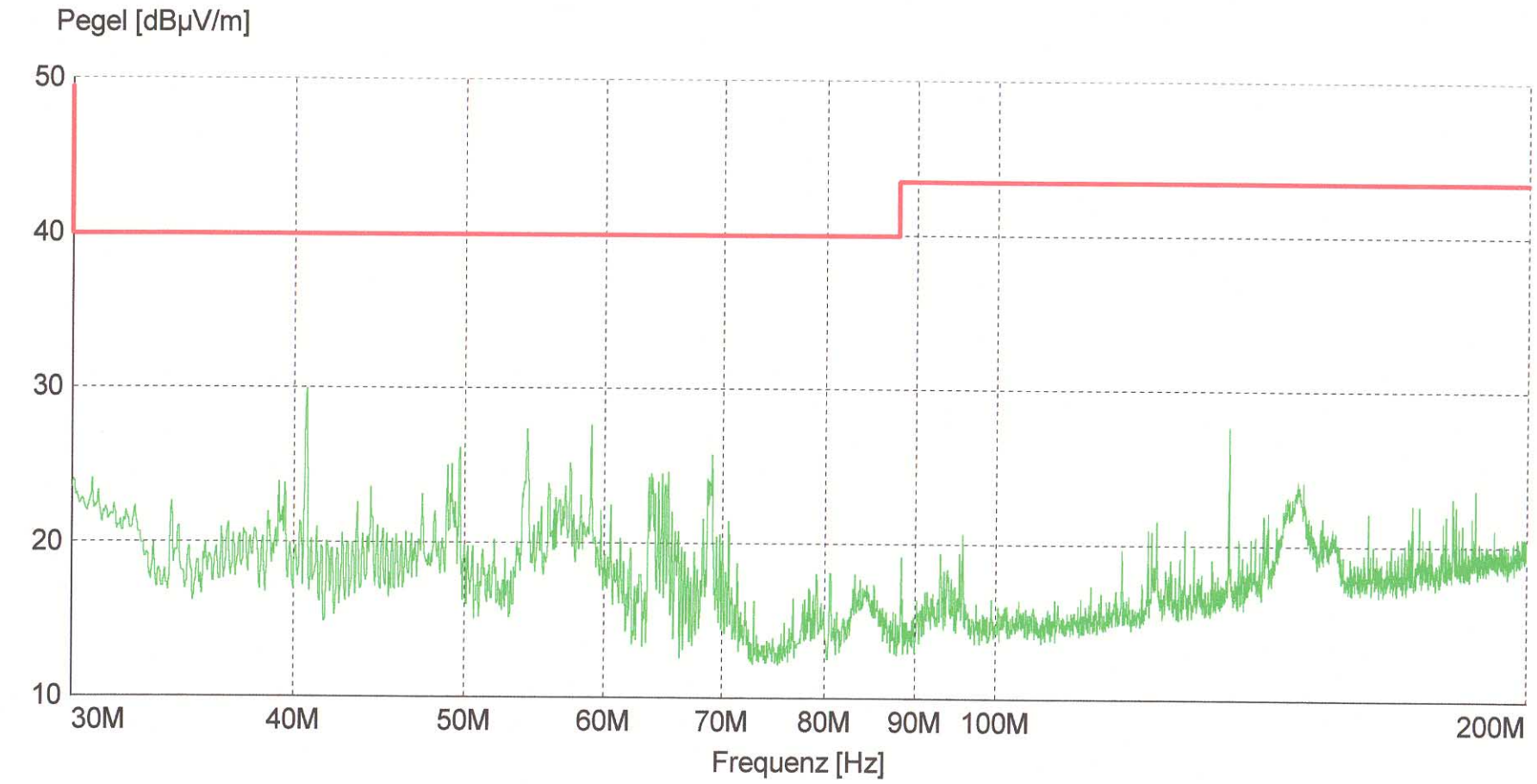

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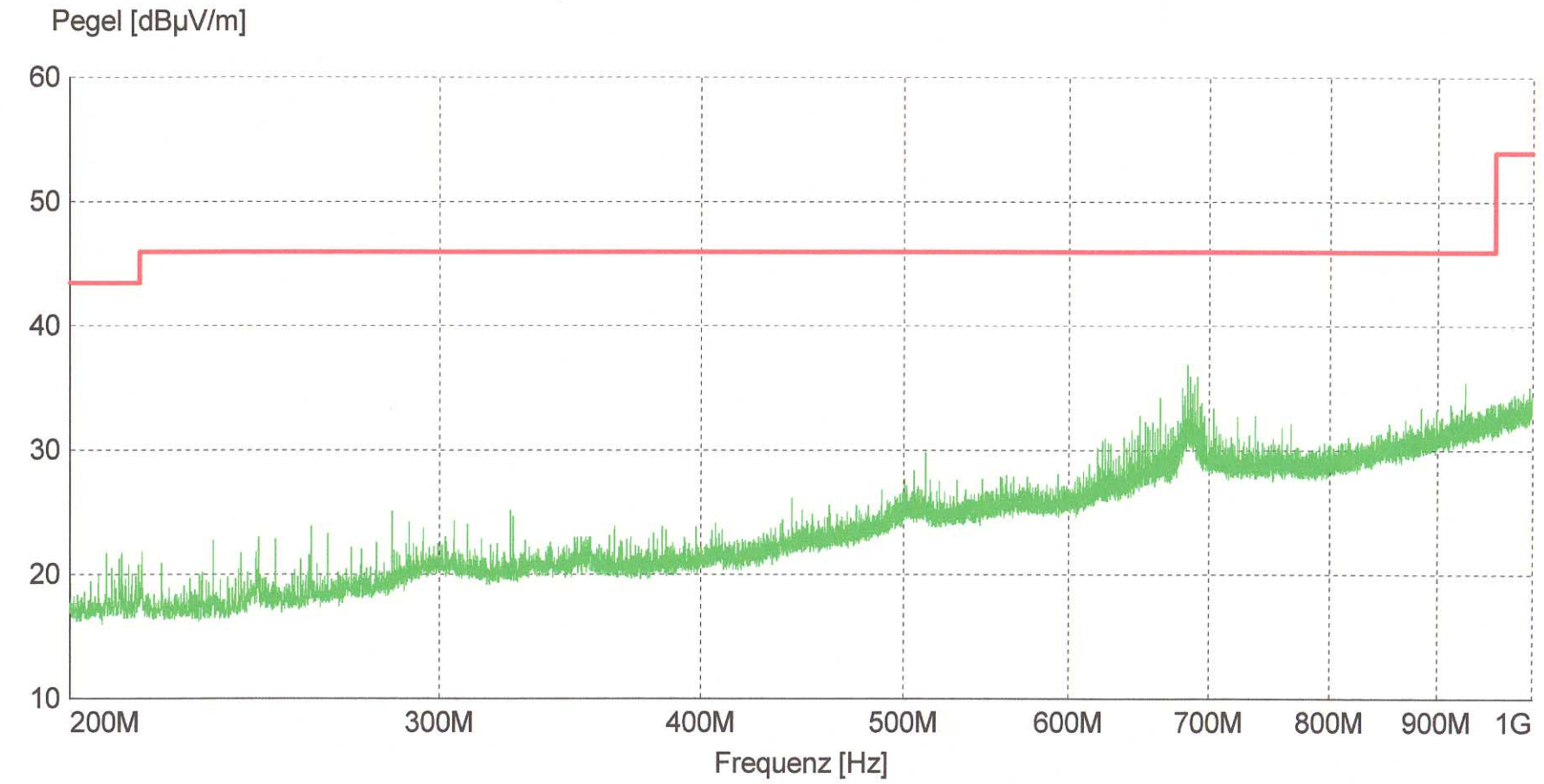

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