

TEST REPORT
of the accredited test laboratory

TÜV Nr.: M/EMV-02/268

about
the following EMC - test/- research

Applicant: AKG Acoustics USA
914 Airpark Center Drive
Nashville, TN 37217, USA

Product: RFT
transmitter for wireless headphone set

Serial Number: ---

Standard: 47 CFR Ch. I Part 15

Division Medical
Technology/
Communication
Technology/ EMC

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

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1. Applicant

Company	AKG Acoustics USA
Department	---
Address	914 Airpark Center Drive Nashville, TN 37217, USA
Contact person	Mr. Doug MacCallum
EUT received on	23 rd October 2002
Tests were performed on	23 rd October till 26 th October 2002

2. Description of EUT

EUT	RFT transmitter for wireless headphone set
Serial Number	---
Manufacturer	AKG Acoustics GmbH Lemböckgasse 21 - 25 A - 1230 Vienna
Description	AKG provided the following configuration for the measurements: RFT transmitter for wireless headphone set (vehicular use) Power supply: 12 VDC
Operating mode	The measurements were carried out at the following running states: transmit

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 according to 15.209 (15.249 (c))

Detector Quasi Peak (above 1 GHz --> Average and Peak Detector)				
Frequency range	Limit	Bandwith	Measurement distance	Remark
0,009 – 0,150 MHz	2400µV / f(kHz)	200 Hz	300 m	1
0,150 – 0,490 MHz	2400µV / f(kHz)	9 kHz	300 m	1
0,490 – 1,705 MHz	24000µV / f(kHz)	9 kHz	30 m	1
1,705 - 30 MHz	30 µV/m	9 kHz	30 m	1
30 – 88 MHz	100 µV/m	120 kHz	3 m	
88 – 216 MHz	150 µV/m	120 kHz	3 m	
216 – 960 MHz	200 µV/m	120 kHz	3 m	
960 MHz - 1000 MHz	500 µV/m	120 kHz	3 m	
Above 1000 MHz	500 µV/m	1 MHz	3 m	2
Remark: 1) The Limit was increased for a constant measurement distance of 3m with a factor of 20 dB per Decade. 2) The Limit was increased for a constant measurement distance of 1m with a factor of 20 dB per Decade.				

Operating mode	Measuring result
transmit	Measurement diagram 1-10

Test result:

**4. 1.1.) Measurement in the frequency range 9 kHz to 1000 MHz
Channel 1**

Due to the large margin of the pre-measurement results, no final measurement was performed.
(see measurement diagram 1-3)

**4. 1.2.) Measurement in the frequency range 9 kHz to 1000 MHz
Channel 2**

Due to the large margin of the pre-measurement results, no final measurement was performed.
(see measurement diagram 6-8)

**4. 1.3.) Measurement in the frequency range 1000 MHz to 18000 MHz
Channel 1**

Frequency MHz	Level dB μ V/m	Limit dB μ V/m	Margin dB
1830	54,7	63,5	8,8
2745	55,6	63,5	7,9
3660	58,1	63,5	5,4
all other	< 50	63,5	---
see measurement diagram 4-5 (The measuring diagrams only show the frequency range up to 7 GHz because no spurious emission was found in the frequency range 7 GHz to 18 GHz.)			

**4. 1.4.) Measurement in the frequency range 1000 MHz to 18000 MHz
Channel 2**

Frequency MHz	Level dB μ V/m	Limit dB μ V/m	Margin dB
1829	53,8	63,5	9,7
2743,5	52,4	63,5	11,1
3657,5	57,9	63,5	5,6
all other	< 50	63,5	---
see measurement diagram 9-10 (The measuring diagrams only show the frequency range up to 7 GHz because no spurious emission was found in the frequency range 7 GHz to 18 GHz.)			

4.2. Field strength in the frequency range 902 – 928 MHz

Limits according to 15.249 (a):

The field strength of any emissions within this band shall not exceed 50.000 microvolts/meter (94 dB μ V/m) at 3 meters.

Measurement results:

Channel 1: 80,5 dB μ V/m at 915 MHz

Channel 2: 81,5 dB μ V/m at 914,4 MHz

Appendix 1

Test equipment used

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

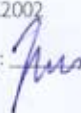
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Appendix 1 (continued) Test equipment used

☐ FCC-203I-DCN Ferrite decoupling network	NT-252	☐ 500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332
☐ PR50 Current Probe	NT-253	☐ AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
☐ Model 2000 Digital Multimeter	NT-261	☐ APA01 - RF-Amplifier 0,5 GHz - 2,5 GHz	NT-334
☐ Fluke 97 Digital Multimeter	NT-262	☐ Preamplifier 1 GHz - 4 GHz	NT-335
☐ Fluke 97 Digital Multimeter	NT-263	☐ 2-97201 Electronic load	NT-341
☐ ESH2-Z5 Artificial mains network 4x25A	NT-300	☐ TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-344
☐ ESH3-Z5 Artificial mains network 2x10A	NT-301	☐ TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-345
☐ ESH3-Z6 Artificial mains network 1x100A	NT-302	☐ VDS 200 Mobil-impuls-generator	NT-350
☐ ESH3-Z4 T-Artificial network	NT-303	☐ LD 200 Mobil-impuls-generator	NT-351
☐ PHE 4500/B Power amplifier	NT-304	☐ MPG 200 Mobil-Impuls-Generators	NT-352
☐ EZ10 T-Artificial network	NT-305	☐ EFT 200 Mobil-impuls-generator	NT-353
☐ MidiStar Telephone exchange	NT-306	☐ FP 16/3-1 3 ph. Coupling filter (Burst)	NT-400
☐ SMG - Signal generator 0,1 - 1000 MHz	NT-310	☐ PHE 4500 - Mains impedance network	NT-401
☐ PM 5518 TXVPS Video generator	NT-311	☐ FP-SURGE 32.1 3 ph. Coupling filter (Surge)	NT-402
☐ RefRad Reference generator	NT-312	☐ IP 6.2 Coupling filter for data lines (Surge)	NT-403
☐ SMP 02 Signal generator 10 MHz - 20 GHz	NT-313	☐ ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
☐ 40 MHz Arbitrary Generator T1241	NT-315	☐ IP 4 - Capacitive clamp (Burst)	NT-411
☐ PEFT - Burst generator up to 4 kV	NT-320	☐ HV-Attenuator 54,5 dB (Burst)	NT-420
☐ PSD - ESD generator up to 25 kV	NT-321	☐ RF-Attenuator 20 dB 0,1 - 1000 MHz / 25 W	NT-421
☐ ESD-Pistol	NT-322	☐ RF-Attenuator 10 dB 0,1 - 1000 MHz / 20 W	NT-422
☐ Vacuum-Relais up to 8 kV	NT-323	☐ RF-Attenuator 30 dB 0,1 - 1000 MHz / 1 W	NT-423
☐ PSURGE 4.1 Surge generator	NT-324	☐ RF-Attenuator 30 dB	NT-424
☐ TRANSIENT 1000 Immunity test system	NT-325	☐ RF-Attenuator 6 dB 0,1 - 1000 MHz / 1 W	NT-425
☐ VCS 500-M6 Surge-Generator	NT-326	☐ RF-Attenuator 6 dB 0,1 - 1000 MHz / 1 W	NT-426
☐ BTA-250 - RF-Amplifier 9 kHz - 220 MHz / 250 W	NT-330	☐ Voltage-divider 1:100	NT-427

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Appendix 1 (continued)

Test equipment used

☐ RF-Attenuator 6 dB	NT-428	☐ BSR-V1 - Video transmission system (optical fiber link)	NT-512
☐ RF-Attenuator 0 dB - 81 dB	NT-429	☒ ES-K1 Test software	NT-520
☐ WRU 27 - Band blocking 27 MHz	NT-430	☐ ESPC-K1 Test software	NT-521
☐ WHJ450C9 AA - High pass 450 MHz	NT-431	☐ SPS_PHE - Test software voltage fluctuations/harmonics	NT-525
☐ WHJ250C9 AA - High pass 250 MHz	NT-432	☐ SPS_EM - Test software for PHE 4500/B	NT-527
☐ RF-Load 150 W	NT-433	☐ Noise power test apparatus according to EN 55014	NT-530
☐ Impedance transducer 50 Ohm – 800 Ohm	NT-435	☐ Vertical coupling plane (ESD)	NT-531
☐ I+P 7780 Directional coupler 100 - 2000 MHz	NT-440	☐ Equipment for ESD-pulse verification.	NT-532
☐ ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441	☐ TEM-Zelle	NT-533
☐ Power Divider 6 dB/1 W/50 Ohm	NT-443	☐ ESV-24	NT-540
☐ Directional coupler 0,1 MHz – 70 MHz	NT-444	☒ Plotter adapter	NT-550
☐ Directional coupler 0,1 MHz – 70 MHz	NT-445	☒ Test cables	NT-550
☐ Tube imitations according to EN 55015	NT-450	☐ Test cable #4 for EN 61000-4-6	NT-553
☐ FCC-801-M5-25 Coupling decoupling network	NT-460	☐ Test cable #3 for conducted emission	NT-554
☐ FCC-801-AF10 Coupling decoupling network	NT-461	☐ Test cable #5 ESD-cable (2x470k)	NT-555
☐ FCC-801-S25 Coupling decoupling network	NT-462	☐ Test cable #6 ESD-cable (2x470k)	NT-556
☐ FCC-801-T4 Coupling decoupling network	NT-463	☐ Serial data - fiber optic link	NT-557
☐ FCC-801-C1 Coupling decoupling network	NT-464	☒ Test cable #8 Sucoflex 104EA	NT-559
☐ F-16A - Current probe 1kHz - 70MHz	NT-465	☐ Test cable #9 (for outdoor measurements)	NT-580
☒ PC P450 - Test computer	NT-500	☐ Test cable #10 (for outdoor measurements)	NT-581
☐ SE 284 GPIB - Plotter	NT 502	☐ Test cable #13 PBA-33PBC-10	NT-584
☐ PC P133 Test computer #2	NT-504	☐ Shield chamber	NT-600
☐ PC P200 MMX Notebook	NT-505	☐ Climatic chamber -55°C to +180°C	M-512
☐ PC PIII 933 MHz Notebook	NT-506	☐ Control and simulation equipment for EUT	---
☐ 7110 - Controlling device for E-Field probe	NT-510		
☐ Monitoring camera with Monitor	NT-511		

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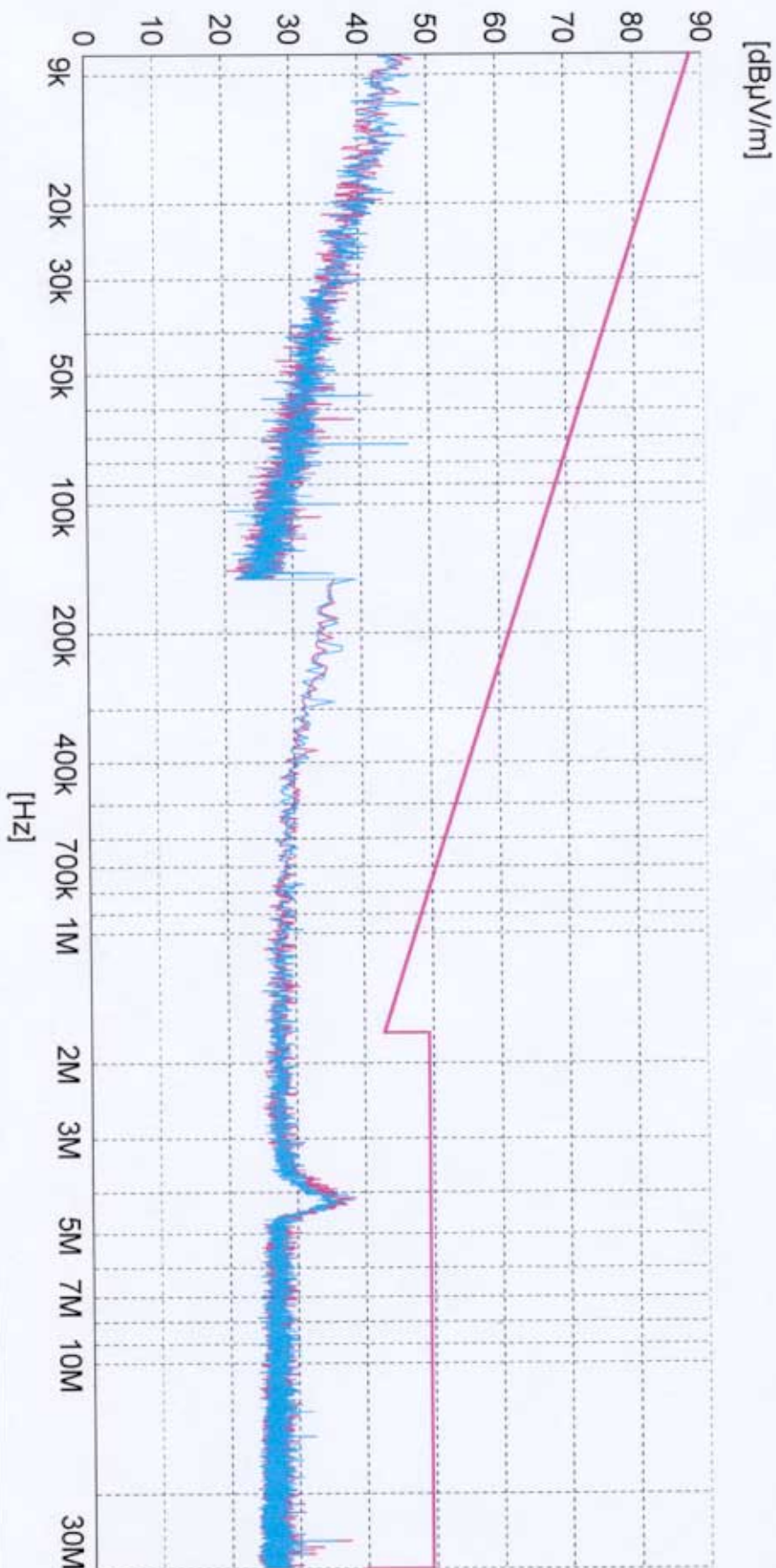
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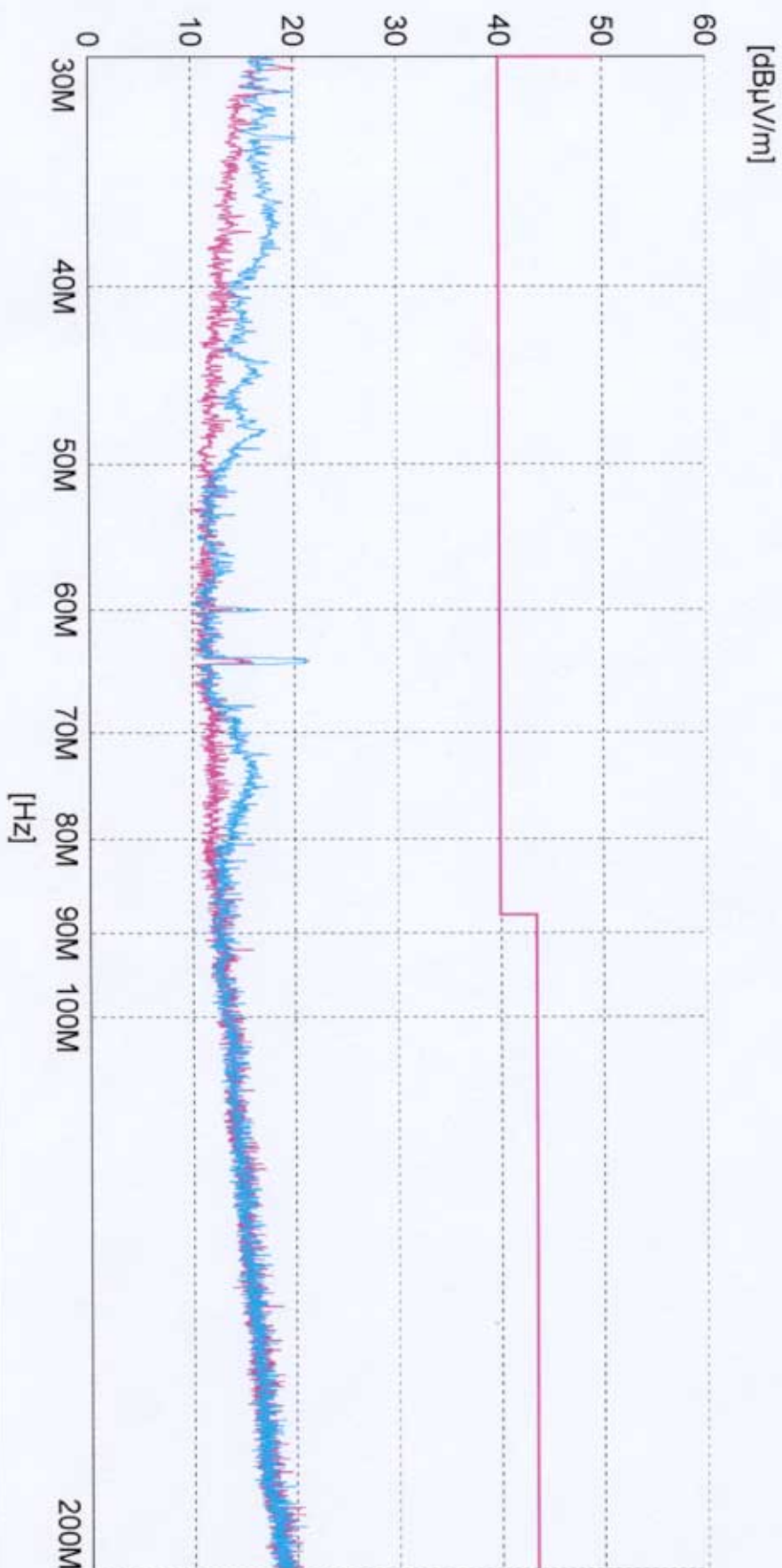
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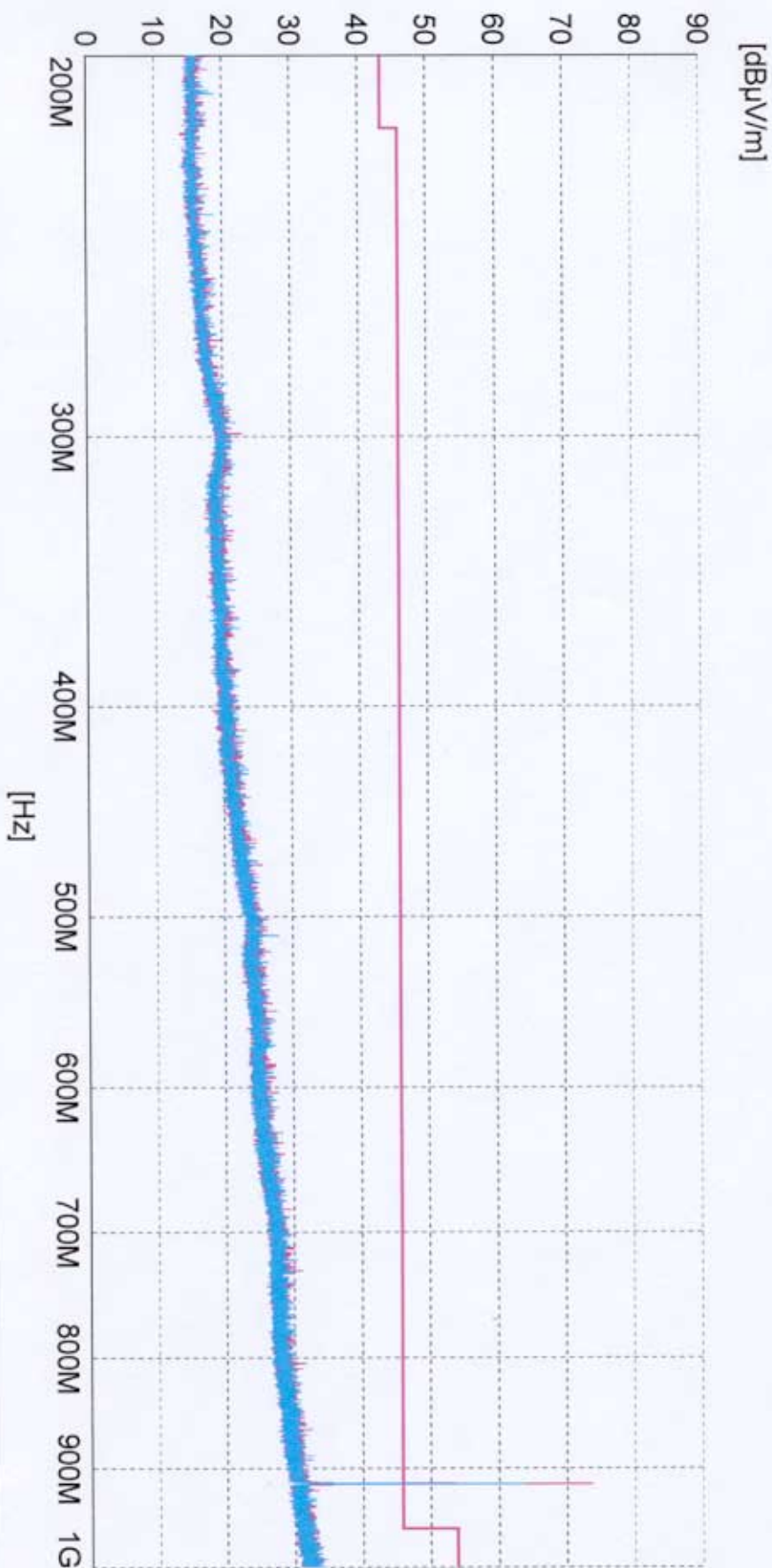


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 MES FCC 1_h
 LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

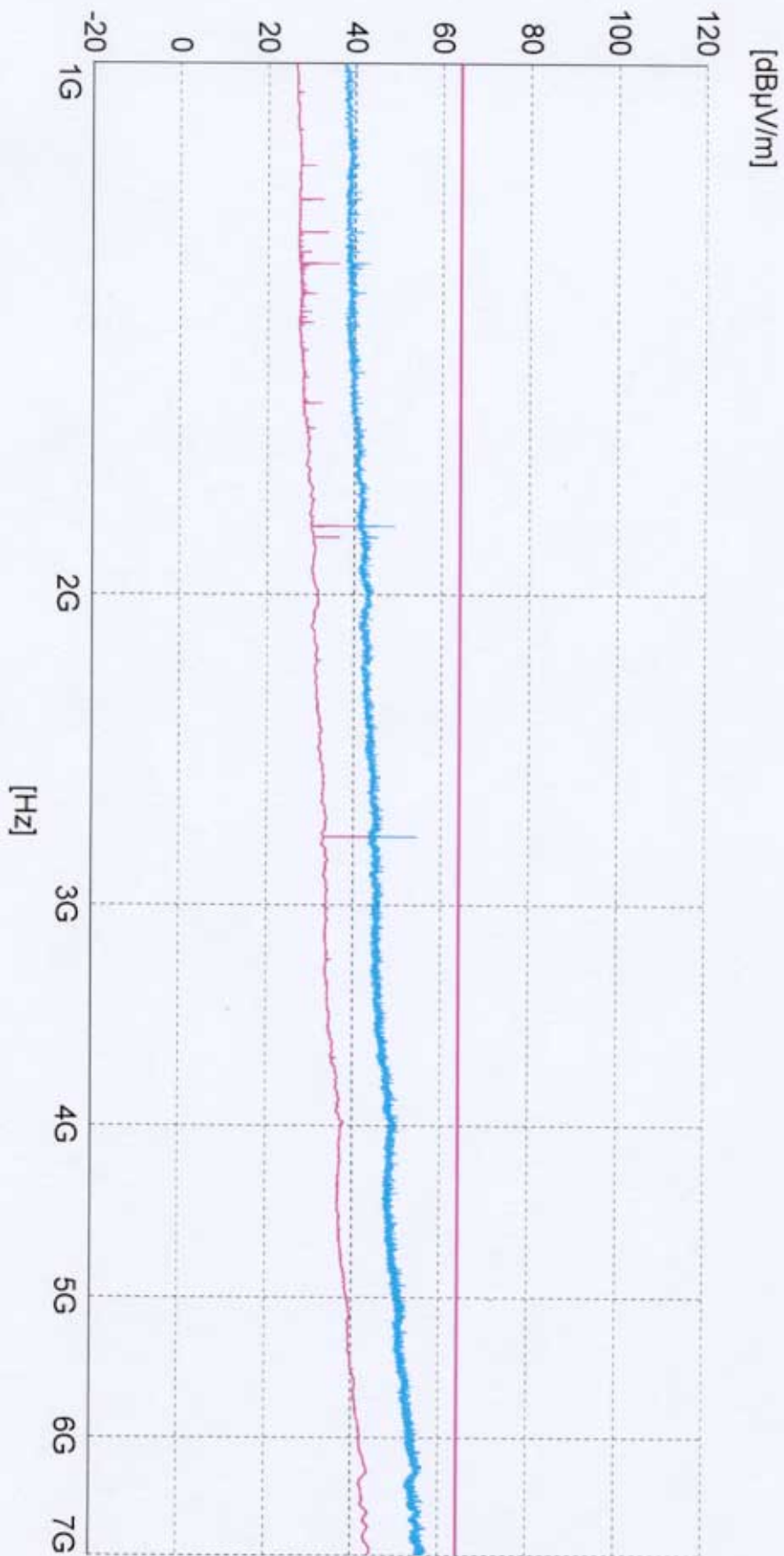


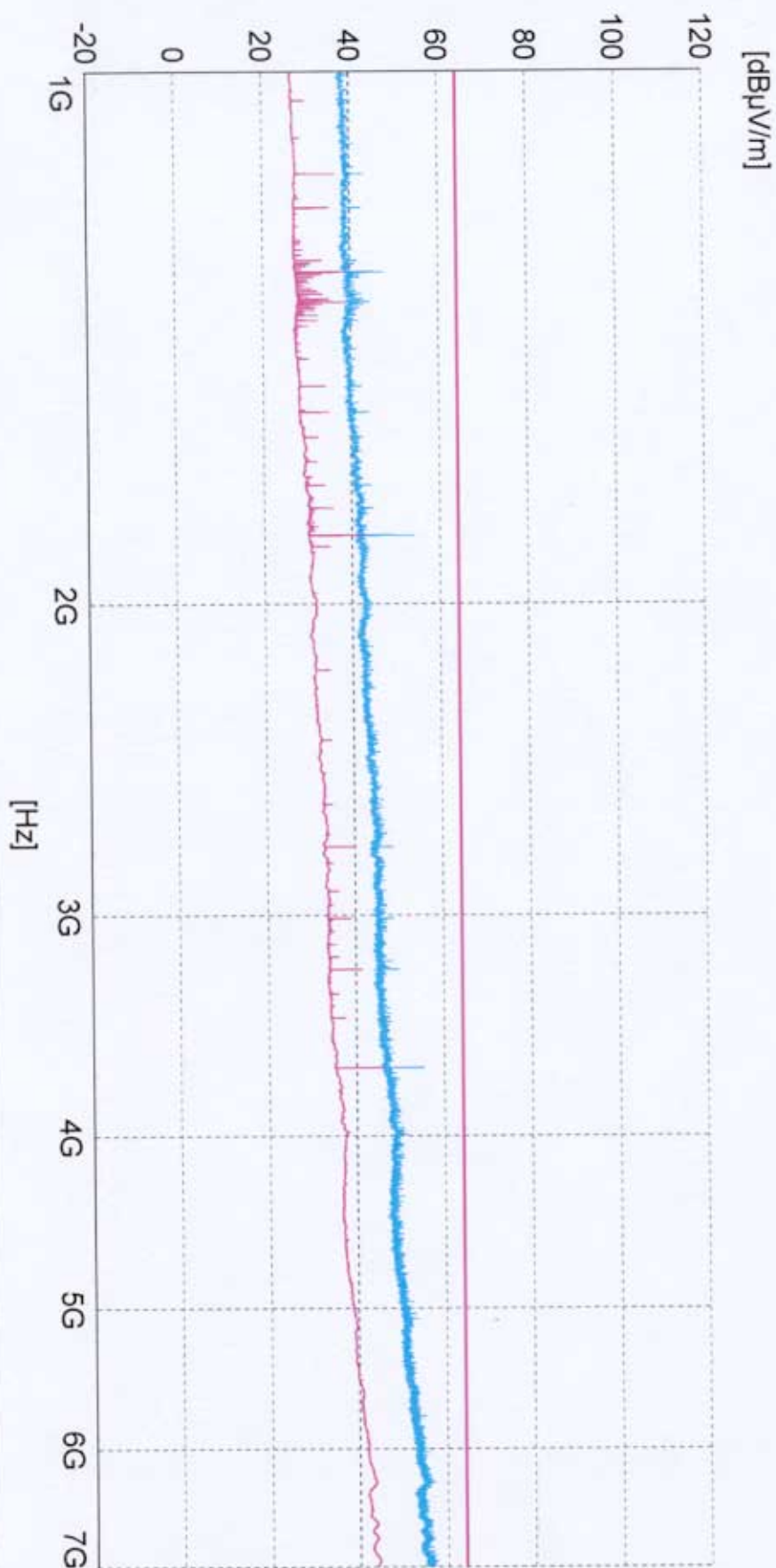
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 — LIM FCC ClassB F QP/AV

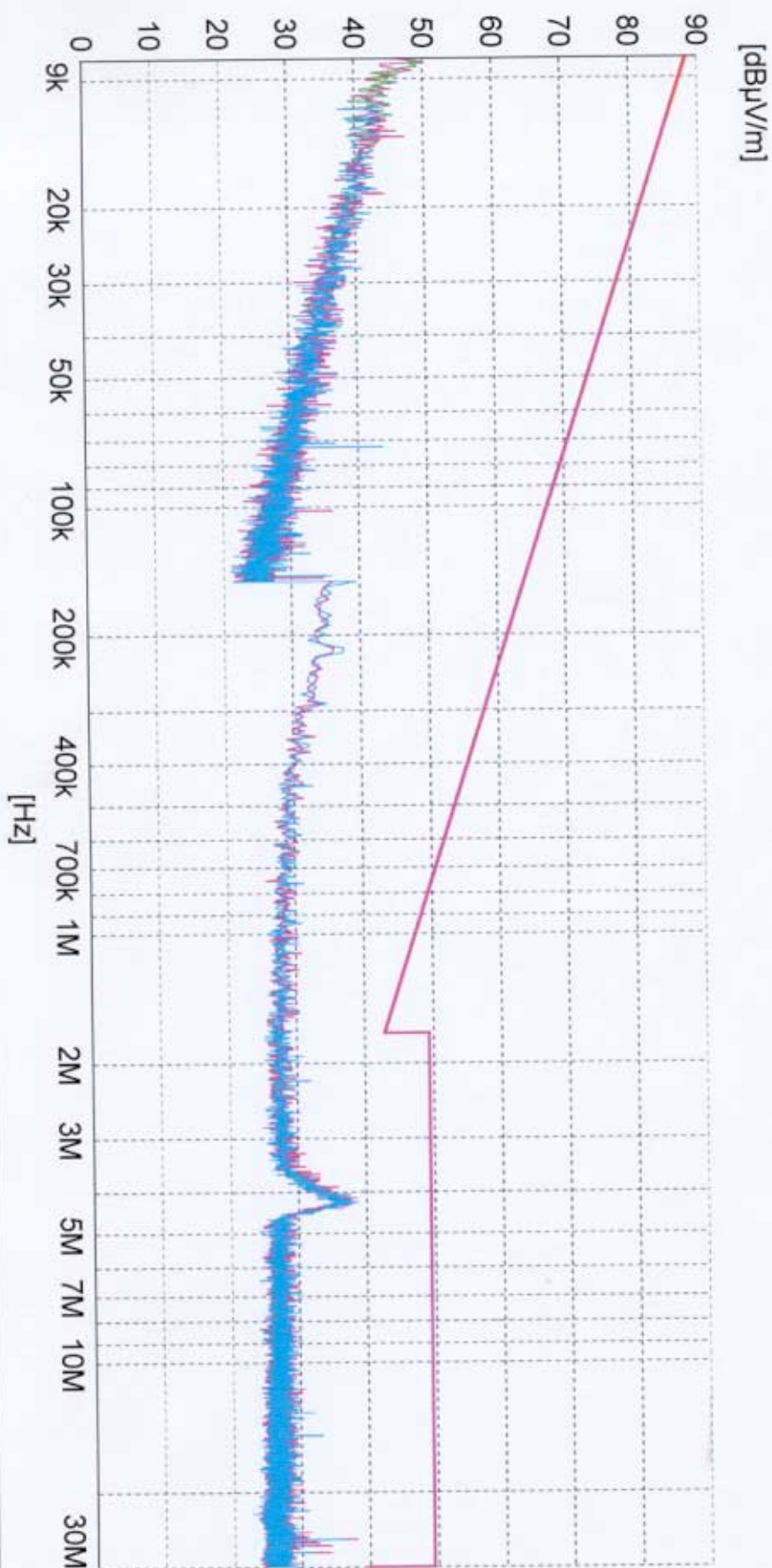
FCC ClassB, field strength 3m

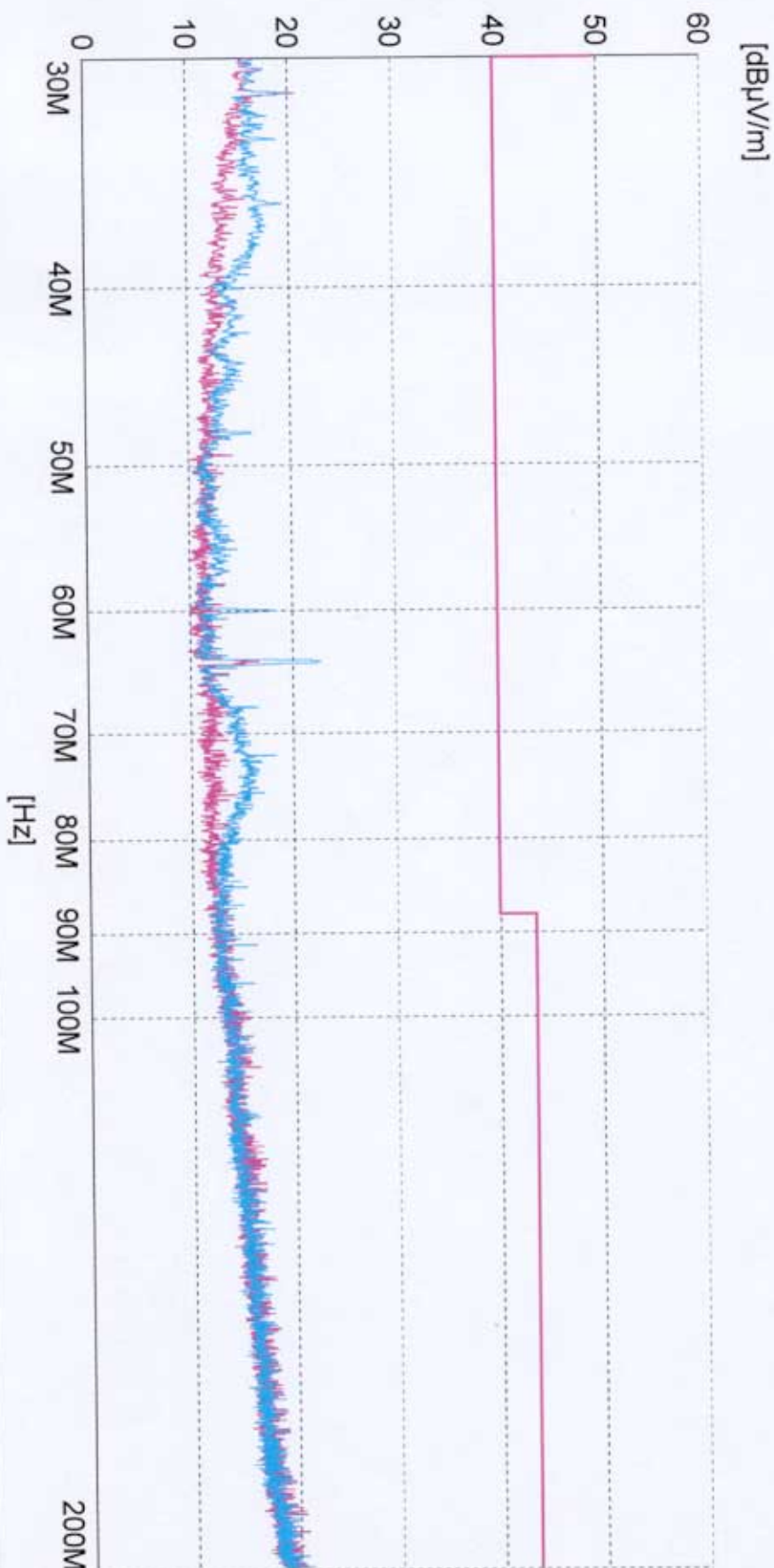


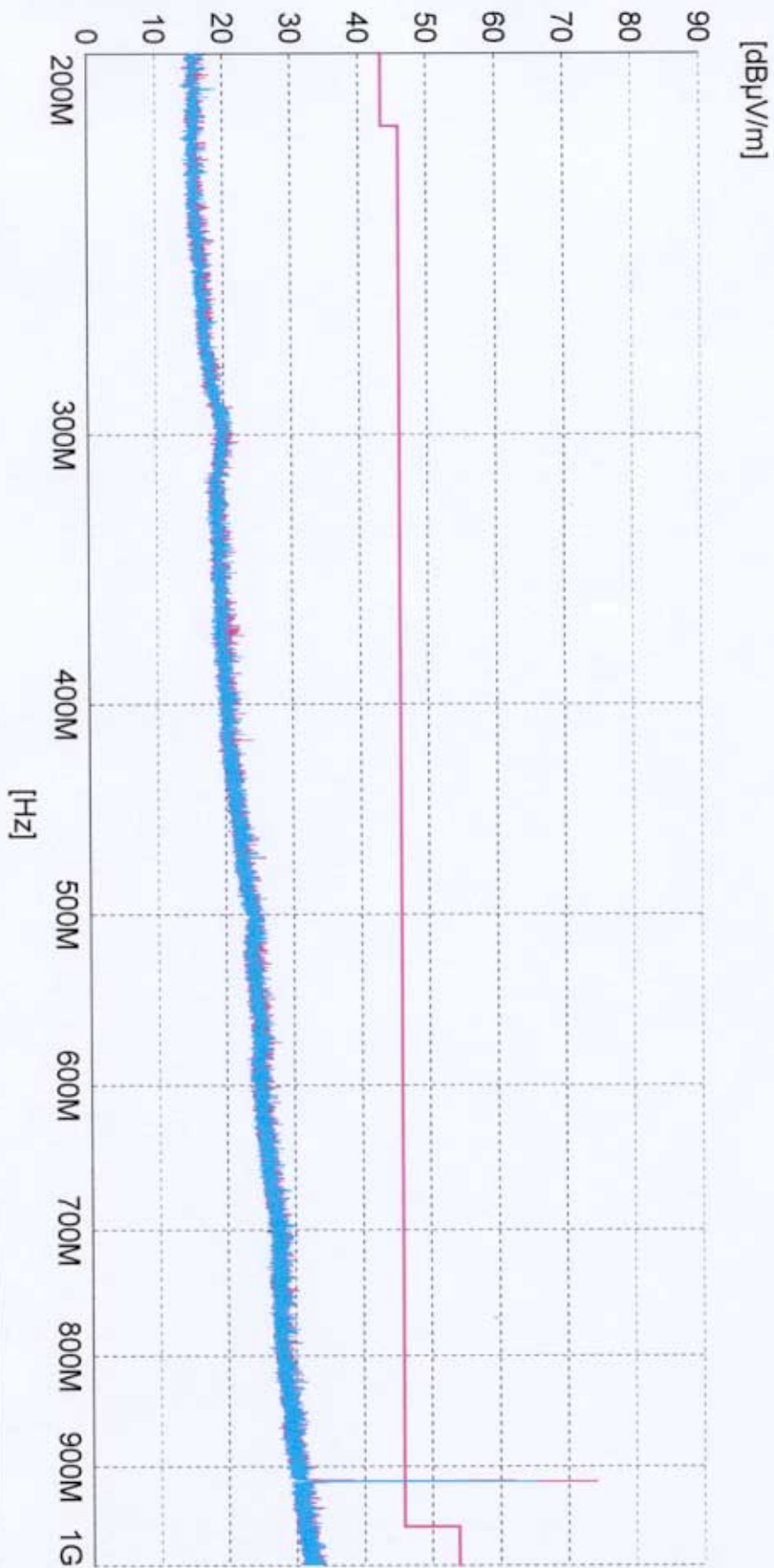
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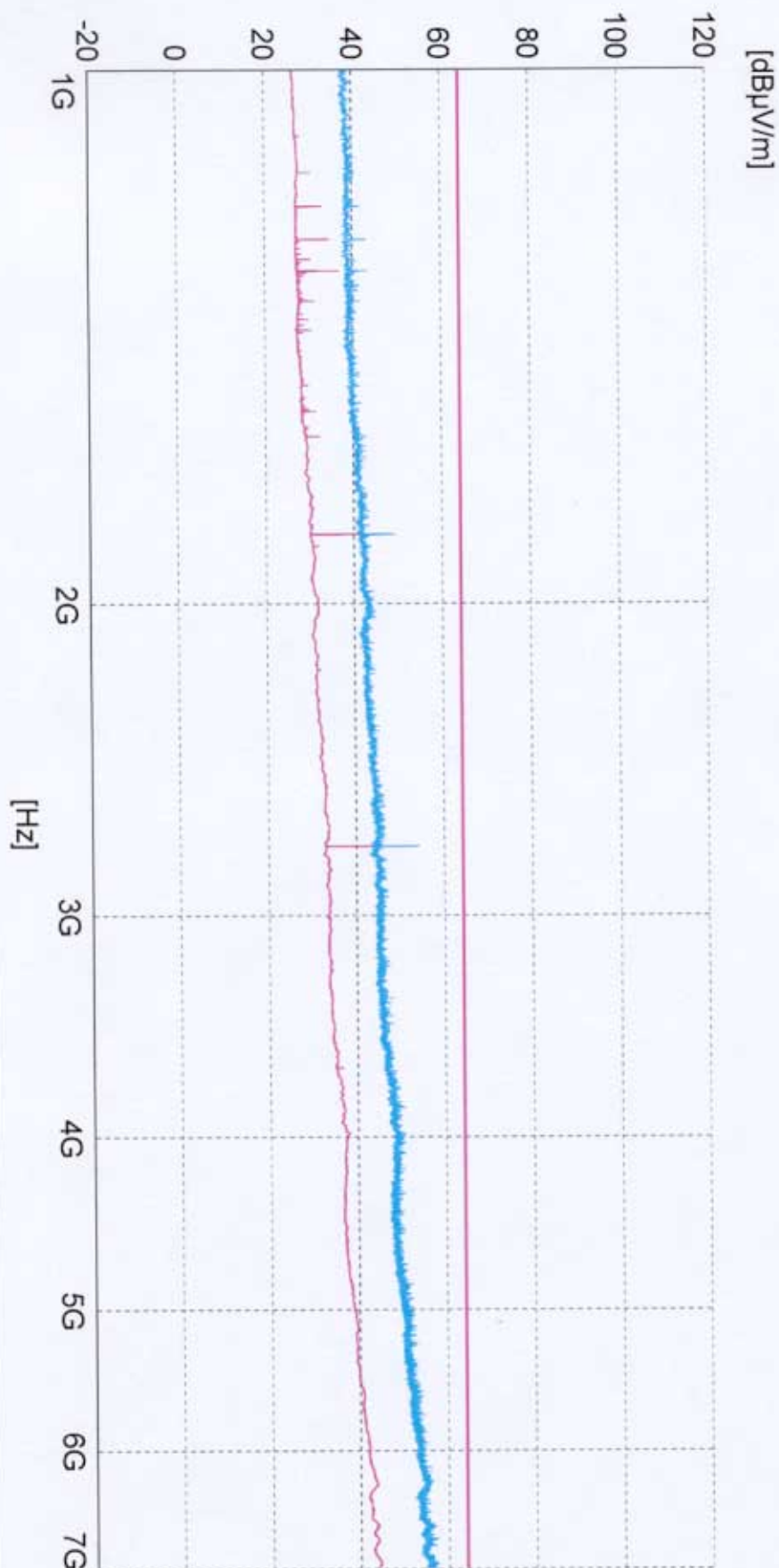






MES FCC_2_v01
 MES FCC_2_h01
 LIM FCC ClassB F QP/AV

FCC ClassB, field strength 3m



MES FCC_2 hPK
 MES FCC_2 hAV
 LIM FCC ClassB F AV 1m

