

# TEST REPORT

of the accredited test laboratory

**TÜV Nr.:M/EMV-08/135**

about  
the following EMC - test/- research

**Applicant:** KEBA AG  
Gewerbepark Urfahr  
A-4041 Linz

**Product:** IE 160/ C-OEM  
IE 160/ D-OEM

**Serial Number:** ---

**FCC ID:** U870005

**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

Ing. Wilhelm Seier



11.04.2008

Checked by

Ing. Michael Emminger

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



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1015 Vienna/Austria

**Branch Office:**  
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DVR 3002476

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## 1. Applicant

**Company:** KEBA AG

**Department:** Development center

**Address:** Gewerbepark Urfahr  
A-4041 Linz

**Contact person:** Mr. Dipl.-Ing. (FH) Michael Höllerschmid

**EUT received on:** 17.03.2008

**Tests were performed on:** 18.03.2008 to 26.03.2008

## 2. Description of EUT

**EUT:** IE 160/ C-OEM  
IE 160/ D-OEM

**Serial Number:** ---

**Manufacturer:** KEBA AG  
Gewerbepark Urfahr  
A-4041 Linz

**Description:** Keba provided the following configuration for the measurements:  
  
Serial production

**Operating mode:** The measurements were carried out at the following running states:  
  
normal use

### 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 Radiocommunication Devices (All Frequency Bands)	none	PASS
PASS EUT passed FAIL EUT failed			

## 4. Test results

### 4. 1. Radiated emission

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

Frequency range	Detector Quasi Peak	
	Limit	Measurement distance
0,009 – 0,490 MHz	2400 $\mu$ V / f(kHz)	300 m
0,490 – 1,705 MHz	24000 $\mu$ 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
Normal operation	IE 160/ C-OEM → Measurement diagram 1-3 IE 160/ D-OEM → Measurement diagram 4-6

**Test result:**

**4. 1.1.) Measurement in the frequency range 9 kHz to 1000 MHz**  
IE 160/ C-OEM

Frequency MHz	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Exceed- Mark	Height cm	Azimuth deg	Polarization
36	25,1	40	14,9		175	225	Vertical
39,2	31,7	40	8,3		129	315	Vertical
43,6	32,7	40	7,3		138	178	Vertical
44,6	33,9	40	6,1		112	99	Vertical

**4. 1.2.) Measurement in the frequency range 9 kHz to 1000 MHz**  
IE 160/ D-OEM

Frequency MHz	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Exceed- Mark	Height cm	Azimuth deg	Polarization
36	28,5	40	11,5		174	328	Vertical
37,85	33,2	40	6,8		100	211	Vertical
44,5	24,4	40	15,6		146	203	Vertical
55,9	24,3	40	15,7		117	135	Vertical
57,1	22,9	40	17,1		107	208	Vertical
57,8	23,2	40	16,8		124	202	Vertical
58,5	20,9	40	19,1		167	225	Vertical
59,45	19,6	40	20,4		100	155	Vertical
60,9	21,4	40	18,6		100	140	Vertical
62,5	23	40	17		113	224	Vertical
431,65	21,2	46	24,8		100	316	Vertical
432,05	21,5	46	24,5		100	44	Vertical
443,65	21,3	46	24,7		100	45	Vertical
444,05	21,9	46	24,1		100	342	Vertical



**4.2. 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 dB $\mu$ V/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 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 at 30 meters.

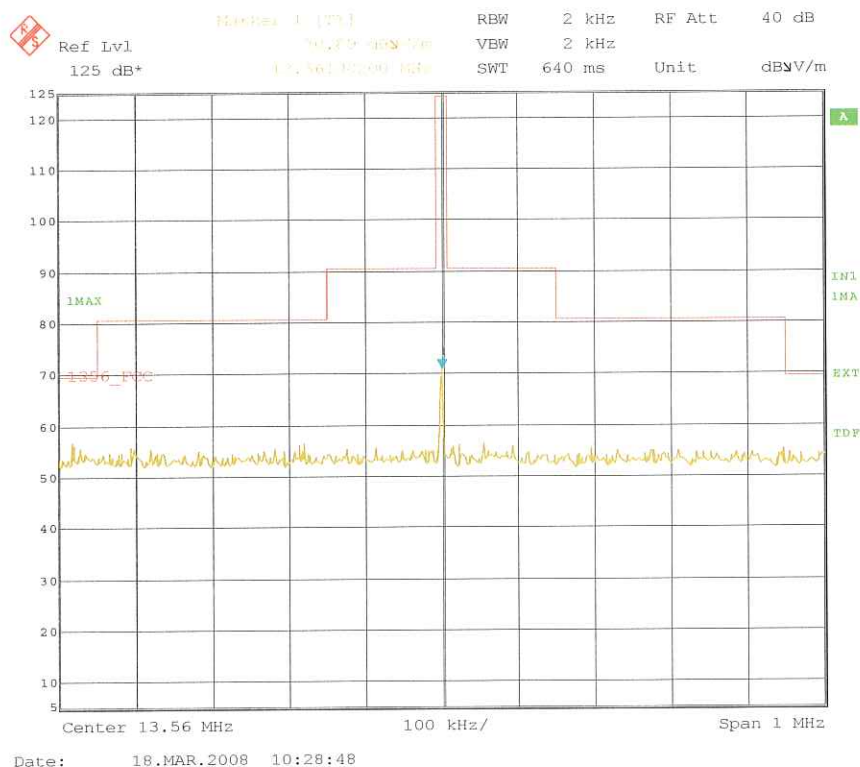
**15.225 (d) and A2.6 (d):**

30 microvolts/m at 30 m, outside the band 13.110-14.010 MHz

**Test result:**

**IE 160/ C-OEM**

The field strength at 13,56 MHz in 3 m distance was measured as 71,1 dB $\mu$ V/m.  
Extrapolated with 40 dB per decade to 30 meters distance it would be 31,1 dB $\mu$ V/m.

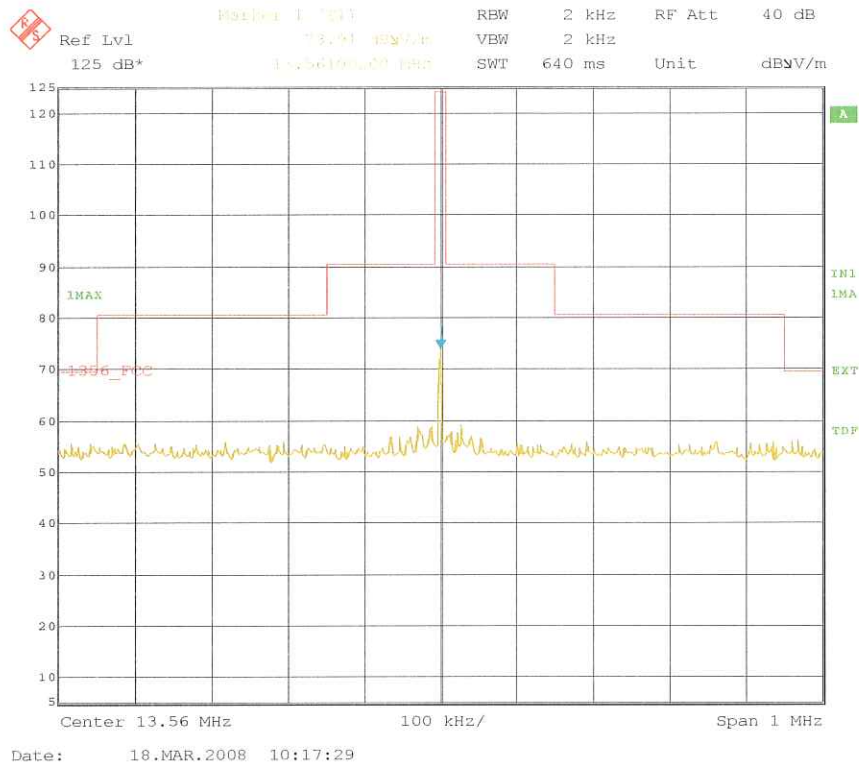




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### IE 160/ D-OEM

The field strength at 13,56 MHz in 3 m distance was measured as 74,7 dB $\mu$ V/m.  
Extrapolated with 40 dB per decade to 30 meters distance it would be 34,7 dB $\mu$ V/m.



### 15.225 (e) and A2.6:

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0,01$  % 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	$V_{nom}$ ( USB powered )	13,560284 MHz
$T_{min}$ ( -20 )°C	$V_{nom}$ ( USB powered )	13,560320 MHz
$T_{max}$ ( 50 )°C	$V_{nom}$ ( USB powered )	13,560256 MHz
Maximum deviation from nominal frequency under extreme test conditions (%)		0,000320 MHz
Measurement uncertainty		$\pm 10$ Hz

# Appendix 1

## Test equipment used

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


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# Appendix 1 (continued)

## Test equipment used

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


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# Appendix 1 (continued)

## Test equipment used

<input type="checkbox"/>	RF-Attenuator 3 dB DC – 18 GHz / 50 W	NT-419	<input type="checkbox"/>	95242-1 – Current probe 10 MHz – 400 MHz	NT-468
<input type="checkbox"/>	RF-Attenuator 20 dB DC - 1000 MHz / 25 W	NT-421	<input type="checkbox"/>	94106-1L-1 – Current probe 20 Hz – 450 MHz	NT-471
<input type="checkbox"/>	RF-Attenuator 30 dB DC - 1000 MHz / 1 W	NT-423	<input checked="" type="checkbox"/>	PC P4 3 GHz Test computer	NT-500
<input type="checkbox"/>	RF-Attenuator 30 dB	NT-424	<input type="checkbox"/>	PC P4 1700 MHz Notebook	NT-505
<input type="checkbox"/>	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-425	<input type="checkbox"/>	PC Intel Centrino 1600 MHz Notebook	NT-506
<input type="checkbox"/>	RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-426	<input type="checkbox"/>	Monitoring camera with Monitor	NT-511
<input type="checkbox"/>	RF-Attenuator 6 dB	NT-428	<input checked="" type="checkbox"/>	ES-K1 Version 1.71 SP2 Test software	NT-520
<input type="checkbox"/>	RF-Attenuator 0 dB - 81 dB	NT-429	<input type="checkbox"/>	SRM-TS Version 1.3 software for SRM-3000	NT-522
<input type="checkbox"/>	WRU 27 - Band blocking 27 MHz	NT-430	<input type="checkbox"/>	SPS-PHE Test software V2.32 voltage fluctuations/harmonics	NT-525
<input type="checkbox"/>	WHJ450C9 AA - High pass 450 MHz	NT-431	<input type="checkbox"/>	SPS-EM Test software V2.32 for PHE 4500/B	NT-527
<input type="checkbox"/>	WHJ250C9 AA - High pass 250 MHz	NT-432	<input type="checkbox"/>	Noise power test apparatus according to EN 55014	NT-530
<input type="checkbox"/>	RF-Load 150 W	NT-433	<input type="checkbox"/>	Vertical coupling plane (ESD)	NT-531
<input type="checkbox"/>	Impedance transducer 1:4 ; 1:9 ; 1:16	NT-435	<input type="checkbox"/>	Test cable #4 for EN 61000-4-6	NT-553
<input type="checkbox"/>	RF-Attenuator DC – 18 GHz 6 dB	NT-436	<input type="checkbox"/>	Test cable #3 for conducted emission	NT-554
<input type="checkbox"/>	RF-Attenuator DC – 18 GHz 6 dB	NT-437	<input type="checkbox"/>	Test cable #5 ESD-cable (2x470k)	NT-555
<input type="checkbox"/>	RF-Attenuator DC – 18 GHz 10 dB	NT-438	<input type="checkbox"/>	Test cable #6 ESD-cable (2x470k)	NT-556
<input type="checkbox"/>	RF-Attenuator DC – 18 GHz 20 dB	NT-439	<input type="checkbox"/>	Test cable #8 Sucoflex 104EA	NT-559
<input type="checkbox"/>	I+P 7780 Directional coupler 100 - 2000 MHz	NT-440	<input type="checkbox"/>	Test cable #9 (for outdoor measurements)	NT-580
<input type="checkbox"/>	ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441	<input type="checkbox"/>	Test cable #10 (for outdoor measurements)	NT-581
<input type="checkbox"/>	Power Divider 6 dB/1 W/50 Ohm	NT-443	<input type="checkbox"/>	Test cable #13 Sucoflex 104PE	NT-584
<input type="checkbox"/>	Directional coupler 0,1 MHz – 70 MHz	NT-444	<input type="checkbox"/>	Test cable #21 for SRM-3000	NT-592
<input type="checkbox"/>	Directional coupler 0,1 MHz – 70 MHz	NT-445	<input type="checkbox"/>	Shield chamber	NT-600
<input type="checkbox"/>	Tube imitations according to EN 55015	NT-450	<input type="checkbox"/>	Climatic chamber	M-1200
<input type="checkbox"/>	FCC-801-M2-50A Coupling decoupling network	NT-459	<input type="checkbox"/>	Control and simulation equipment --- for EUT	
<input type="checkbox"/>	FCC-801-M5-25 Coupling decoupling network	NT-460			
<input type="checkbox"/>	FCC-801-AF10 Coupling decoupling network	NT-461			
<input type="checkbox"/>	FCC-801-S25 Coupling decoupling network	NT-462			
<input type="checkbox"/>	FCC-801-T4 Coupling decoupling network	NT-463			
<input type="checkbox"/>	FCC-801-C1 Coupling decoupling network	NT-464			
<input type="checkbox"/>	F-16A - Current probe 1kHz - 70MHz	NT-465			


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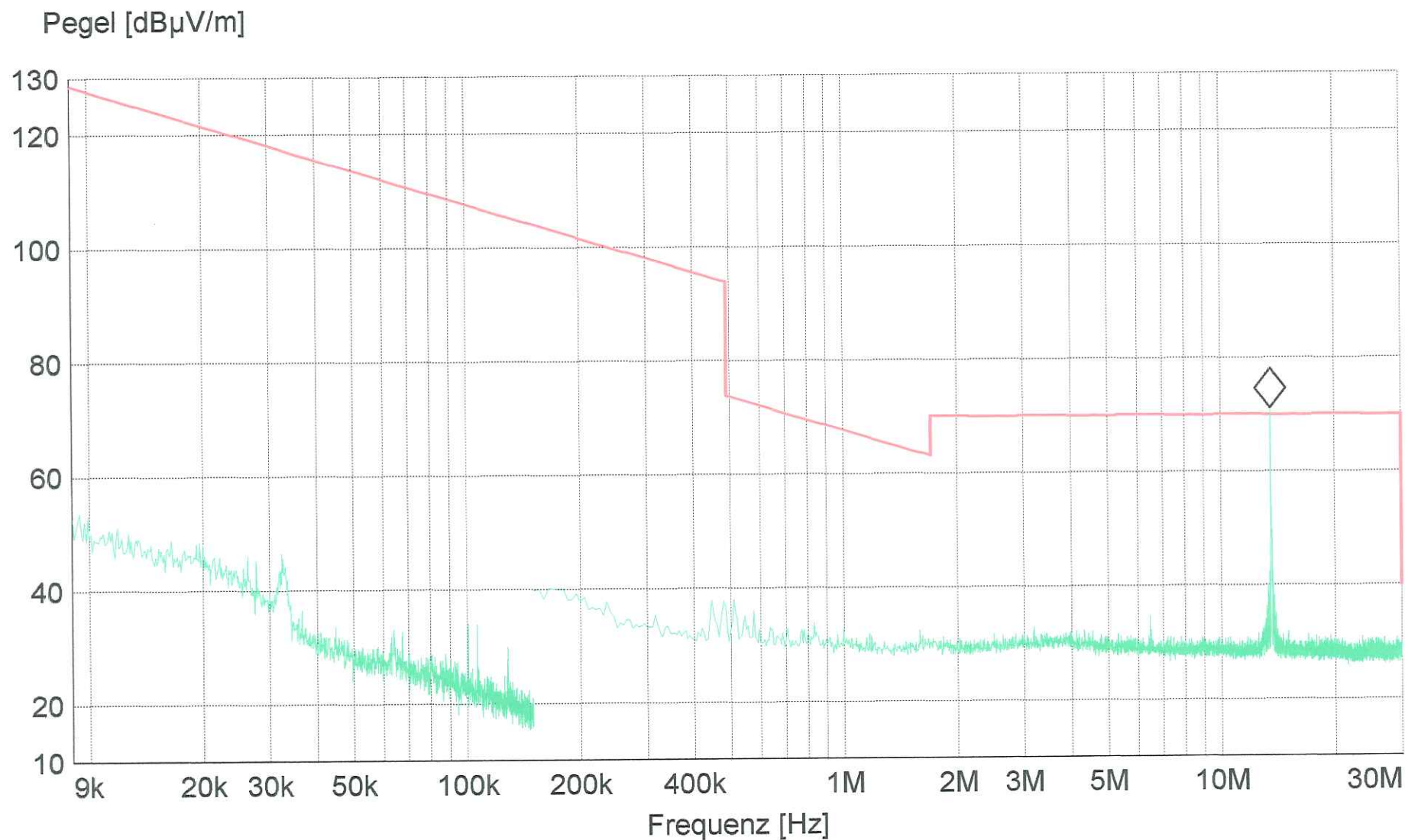
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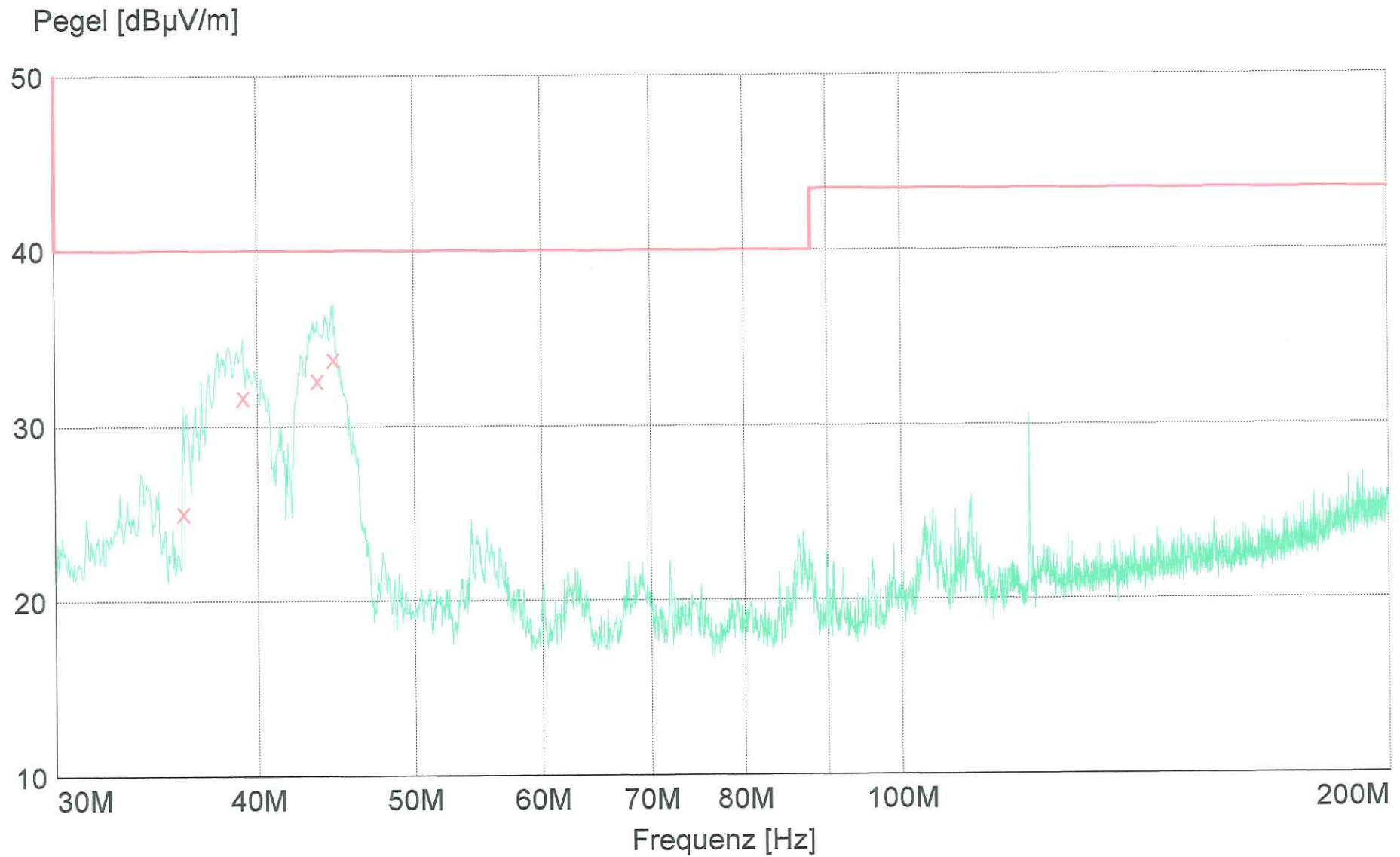
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Marker: 13.56 MHz 71.08 dBμV/m



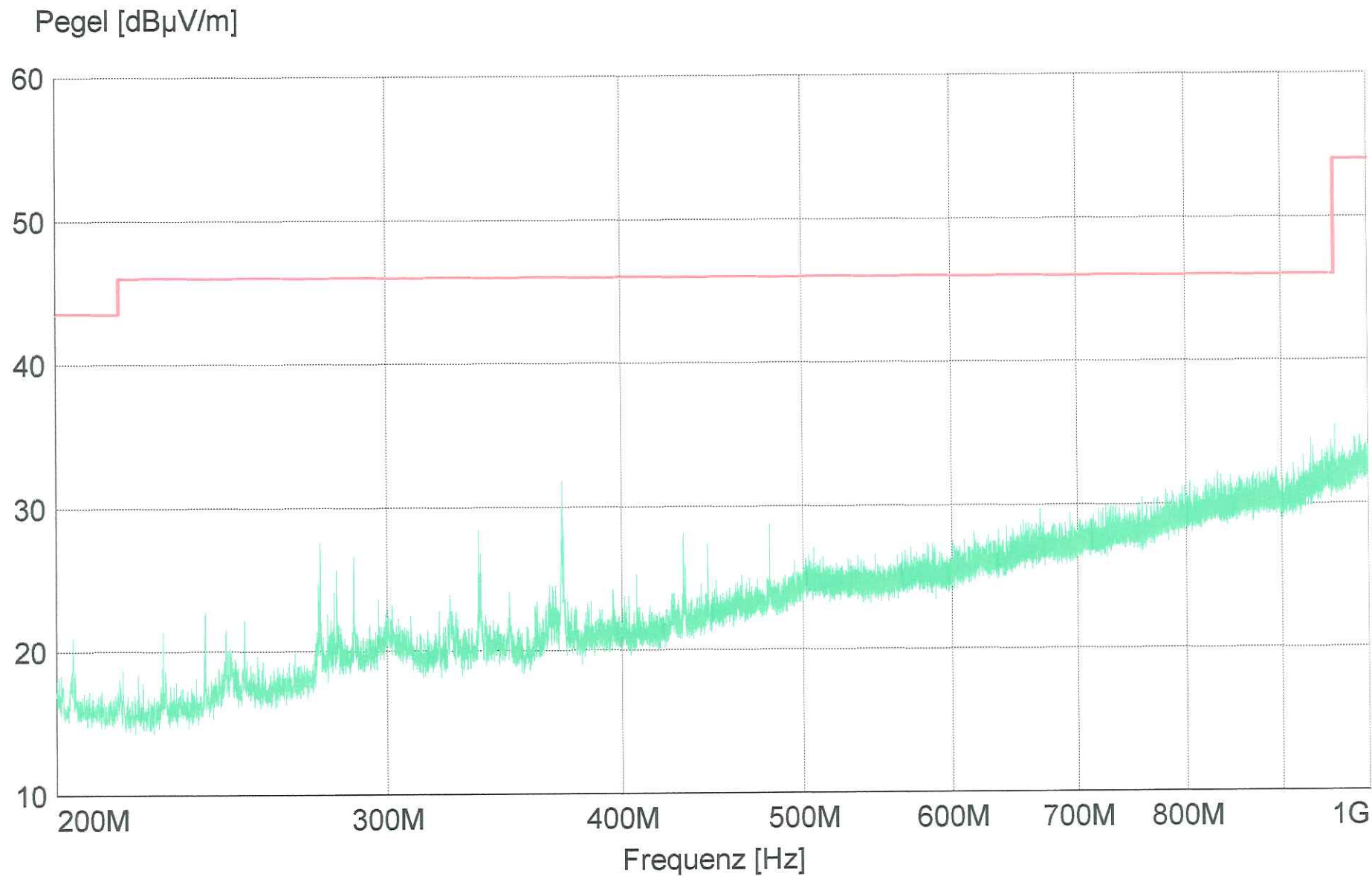
MES 160Coem\_kf0\_pre  
LIM FCC ClassB F QP 40dB FCC ClassB, field strength 3m



x x : MES 160C\_kf1\_fin  
 — MES 160C\_kf1\_pre  
 — LIM FCC ClassB F QP 40dB FCC ClassB, field strength 3m

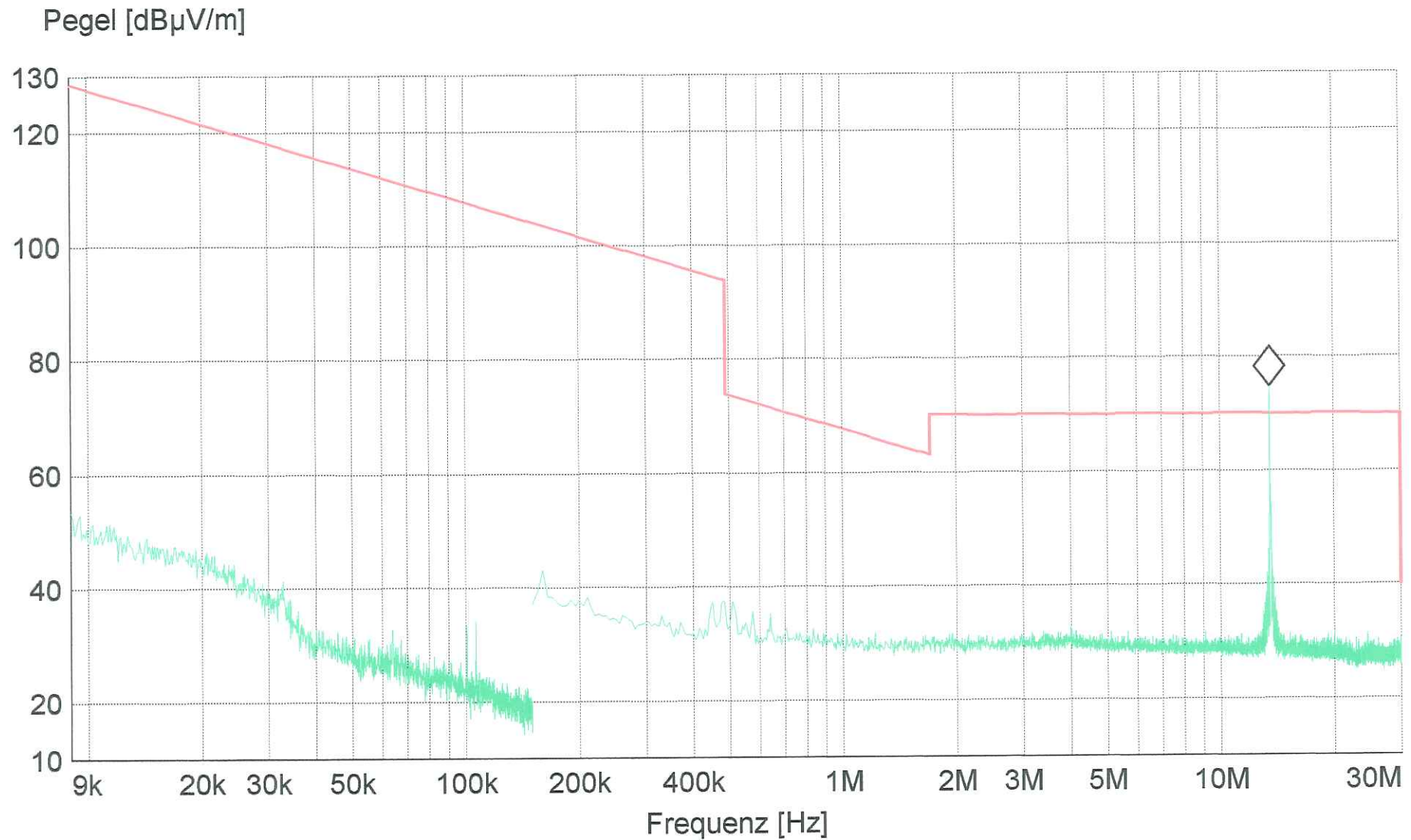
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 Measurement diagram:  
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MES 160C\_kf2\_pre  
 LIM FCC ClassB F QP 40dB FCC ClassB, field strength 3m

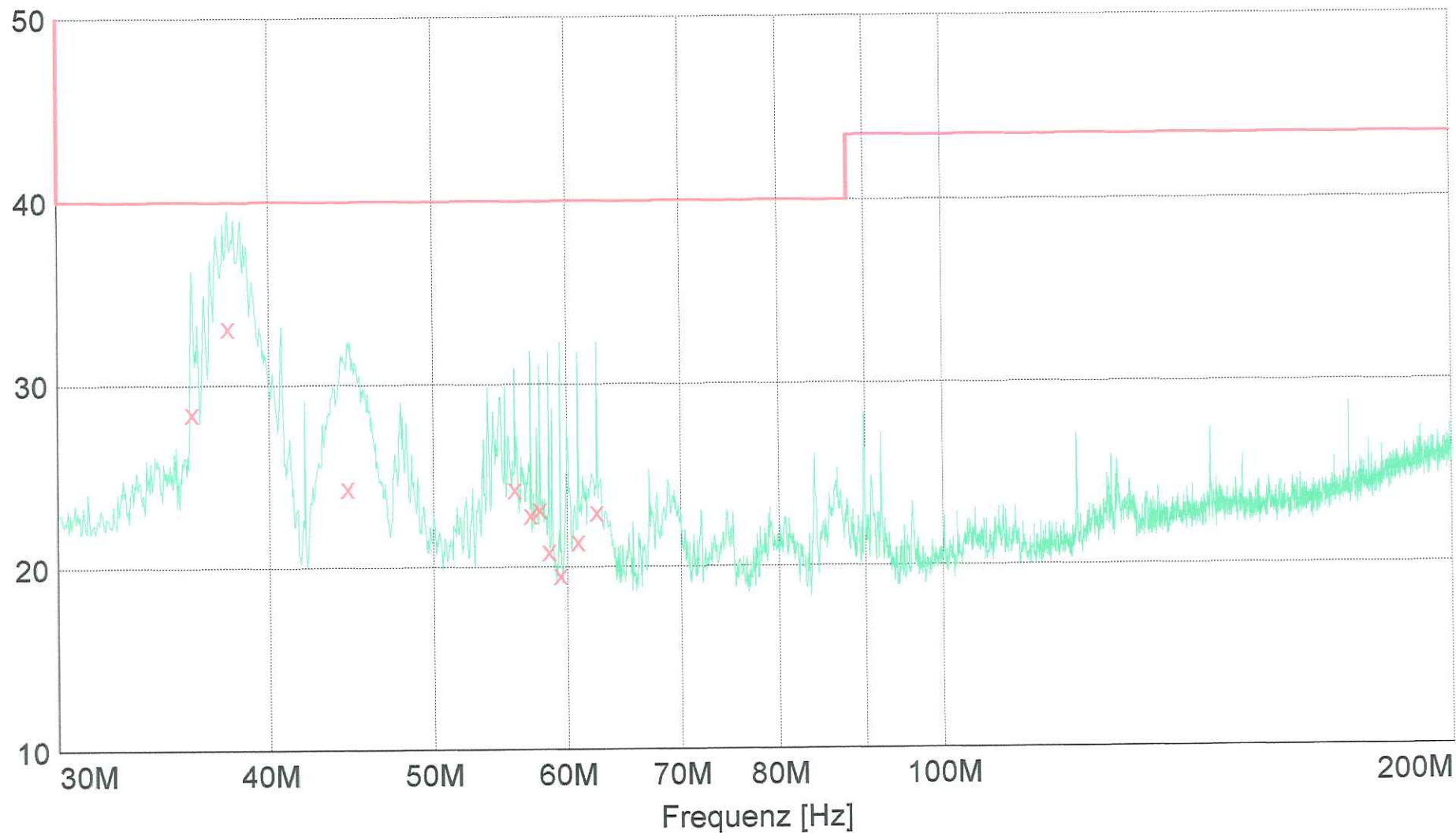
Marker: 13.56 MHz 74.74 dB $\mu$ V/m



MES 160Doem\_gf0\_pre  
LIM FCC ClassB F QP 40dB FCC ClassB, field strength 3m

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Pegel [dB $\mu$ V/m]



x x : MES 160Doem\_gf1\_fin  
 — MES 160Doem\_gf1\_pre  
 — LIM FCC ClassB F QP 40dB FCC ClassB, field strength 3m

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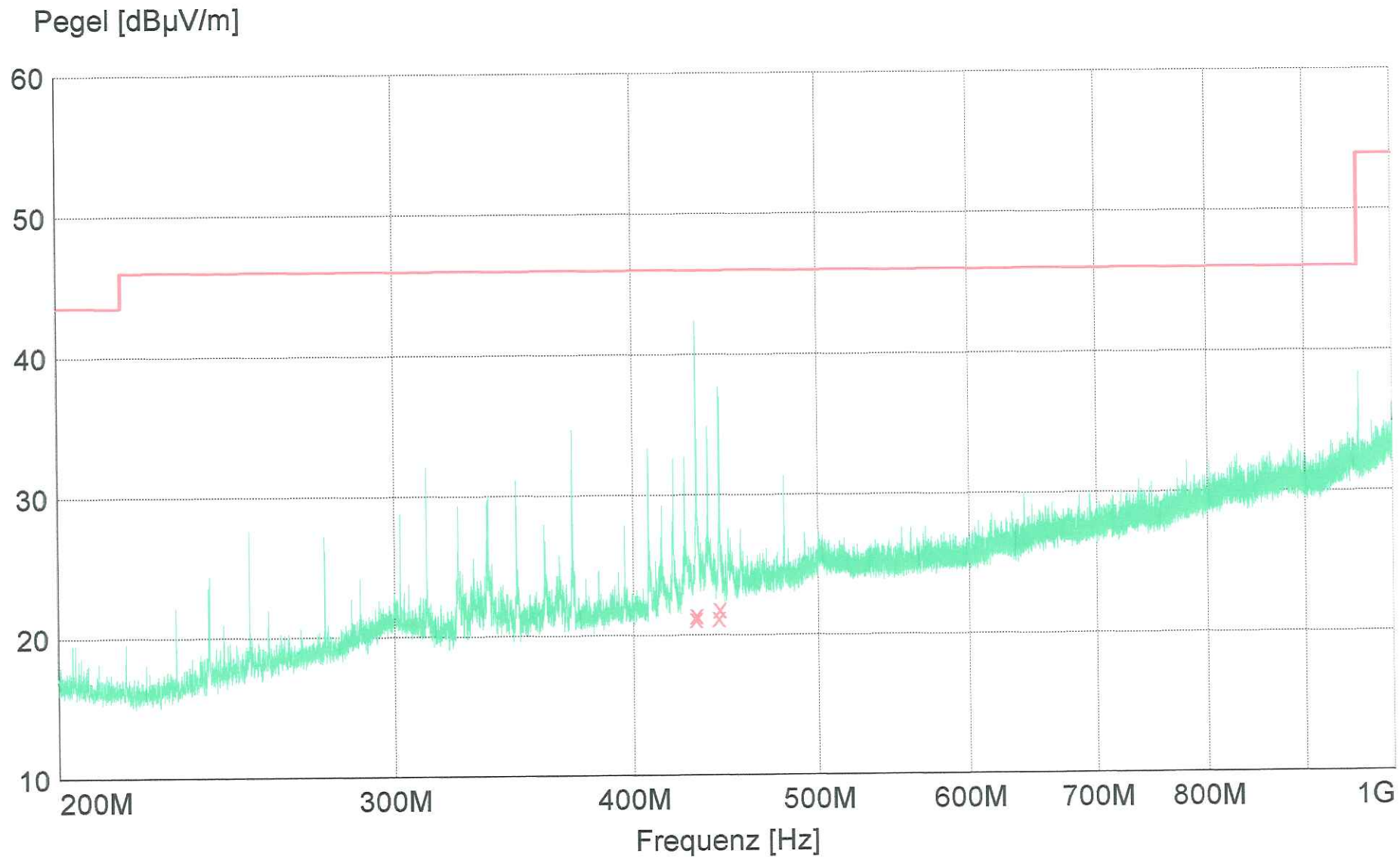
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x x : MES 160Doem\_gf2\_fin  
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