

TEST REPORT
of the accredited test laboratory

TÜV Nr.:M/FG-04/124

Geschäftsbereich
Medizintechnik,
Nachrichtentechnik
und EMV

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Applicant: Adcon Telemetry GmbH
Inkustr. 24
A-3400 Klosterneuburg

Tested Product: Telemetry GSM transceiver

Type: A733 GSM

Manufacturer: Adcon Telemetry GmbH
A-3400 Klosterneuburg; Inkustr. 24

Output power / 1 W max. **power supply:** 6,2 VDC
field strength:

Frequency range: 1850 - 1910 **Channel separation:** 200 kHz
MHz

Standard: FCC: 47 CFR 24

Akkreditierte Prüf-,
Überwachungs-,
Zertifizierungs- und
Kalibrierstelle

Notified Body 0408

TÜV Österreich
Test laboratory for EMC

Deputy supervisor of EMC-
laboratory:

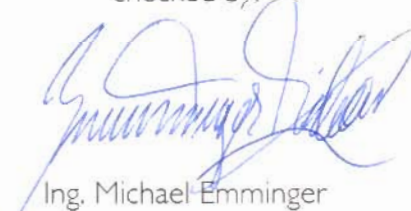

Ing. Wilhelm Seier



15. 9. 2004

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checked by:


Ing. Michael Emminger

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

LIST OF MEASUREMENTS

The complete list of measurements called for in 47 CFR 15.247 is given below.

SUBCLAUSE	PARAMETER TO BE MEASURED	PAGE
	Intentional Radiators	
	Test object data	3
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24.235	Frequency stability	6-7
24.238	Emissions Limits	8-9
15.209		
2.989	Occupied Bandwidth	10-15



TEST OBJECT DATA

General EUT Description

This telemetry equipment will be used to collect data from various sensors and write it into memory. Occasionally it is connecting through the GSM network to send the collected data to other stations like observers. This telemetry equipment will be situated in environment where normally no persons are situated and will work without user interaction.

The GSM Modem used is capable of operation in the bands 850 MHz and 1900 MHz, but the operation band is permanently locked to 1900 MHz. For this reason measurements were only made in this frequency band.



Power Output

§ 24.232

Conducted Measurement

Frequency (MHz)	Power Step	Peak Output Power (dBm)	Average Output Power (dBm)
1850,2	0	28,8	28,7
1880,0	0	28,5	28,3
1909,8	0	28,2	28,0
Measurement uncertainty	$\pm 0,75$ dB		

LIMIT

Power Step	Nominal Peak Output Power (dBm)	Tolerance (dB)
0	+ 30	± 2

Test Equipment used: NT-208



Power Output

§ 24.232

EIRP Measurement

Frequency (MHz)	Power Step	Burst Average (dBm)	Modulation Average (dBm)
1850,2	0	29,45	19,84
1880,0	0	27,90	18,27
1909,8	0	28,10	18,47
Measurement uncertainty	± 4 dB		

LIMIT

Power Step	Burst Average EIRP (dBm)
0	≤ 33

Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-207; NT-208

Frequency stability

§ 24.235

Frequency error vs. Supply voltage

The power supply voltage is nominal 6,2 VDC. The shut off voltage is 5,5 VDC. The GSM module power supply is regulated to 3,75 VDC. This voltage stays constant over the full supply voltage range from 5,5 VDC to 10 VDC. Because of this there were no change in frequency stability measureable over the full power supply range.

Frequency error vs. Temperature

Temperature °C	Frequency Error Hz	Frequency Error ppm
-30	+78	+0,0415
-20	+61	+0,0324
-10	+38	+0,0202
±0	+24	+0,0128
+10	+15	+0,0080
+20	+10	+0,0053
+30	+10	+0,0053
+40	+5	+0,0027
+50	+20	+0,0106
+60	+25	+0,0133

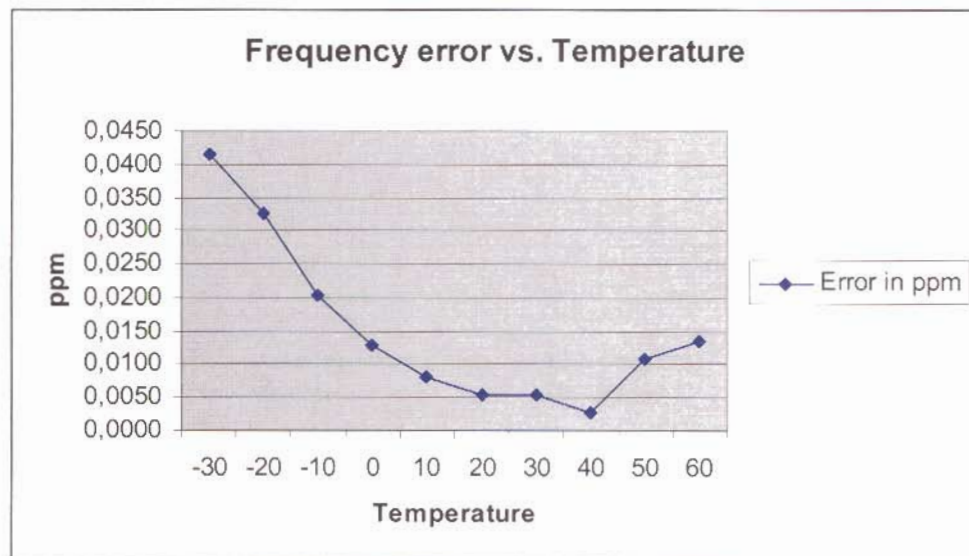
LIMIT

According to GSM standards the frequency stability of the carrier shall be accurate to within 0,1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.



Frequency stability

§ 24.235



Test Equipment used: NT-208, M-512

Emissions Limits

§ 24.238

§ 15.209

LIMIT

24.238:

On any frequency outside a licensee's frequency block within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in watts) by at least $43+10\log(P)$ dB. In the used power range this means a constant absolute limit of -13 dBm. Although the Limits of 15.209 are in field strength levels, the limits are far below that one of 24.238. So for all radiated measurements the 15.209 limit was taken to show compliance as digital device also.

Conducted Emissions

CHANNEL					
512 (1850,2 MHz)		661 (1880 MHz)		810 (1909,8 MHz)	
Frequency (MHz)	Level (dBm)	Frequency (MHz)	Level (dBm)	Frequency (MHz)	Level (dBm)
3700,4	-37,03	3760	-42,94	3819,6	-39,58
5550,6	-43,05	5640	-43,15	5729,4	-42,11
7400,8	-45,65	7520	-58,39	All others	< -60
All others	< -60	All others	< -60		

Test Equipment used: NT-207; NT-208

Emissions Limits

§ 24.238
§ 15.209

Radiated Emissions

CHANNEL					
512 (1850,2 MHz)		661 (1880 MHz)		810 (1909,8 MHz)	
Frequency (MHz)	Level (dBµV/m)	Frequency (MHz)	Level (dBµV/m)	Frequency (MHz)	Level (dBµV/m)
≤ 500	< 50 QP	≤ 500	< 50 QP	≤ 500	< 50 QP
≤ 1000	< 40 QP	≤ 1000	< 40 QP	≤ 1000	< 40 QP
> 1000	< 45 AV	> 1000	< 45 AV	> 1000	< 45 AV

LIMIT 15.209

Frequency (MHz)	Limit (dBµV/m)	Measurement distance (m)
30 - 88	40	3
88 - 216	43,5	3
216 - 960	46	3
Above 960	54	3

Test Equipment used: NT-100; NT-110; NT-111; NT-112; NT-125; NT-207; NT-208

Measurement diagrams in Annex 2 are only for channel 661. Although the measurements were made up to the 10th harmonic, the diagrams only show the frequency range up to 18 GHz. This is because the measurements above 18 GHz are not yet automatized and we were not able to plot the Spectrum analyzer display.



OCCUPIED BANDWIDTH – 20 dB BANDWIDTH

§ 2.989



Delta 1 [T1]

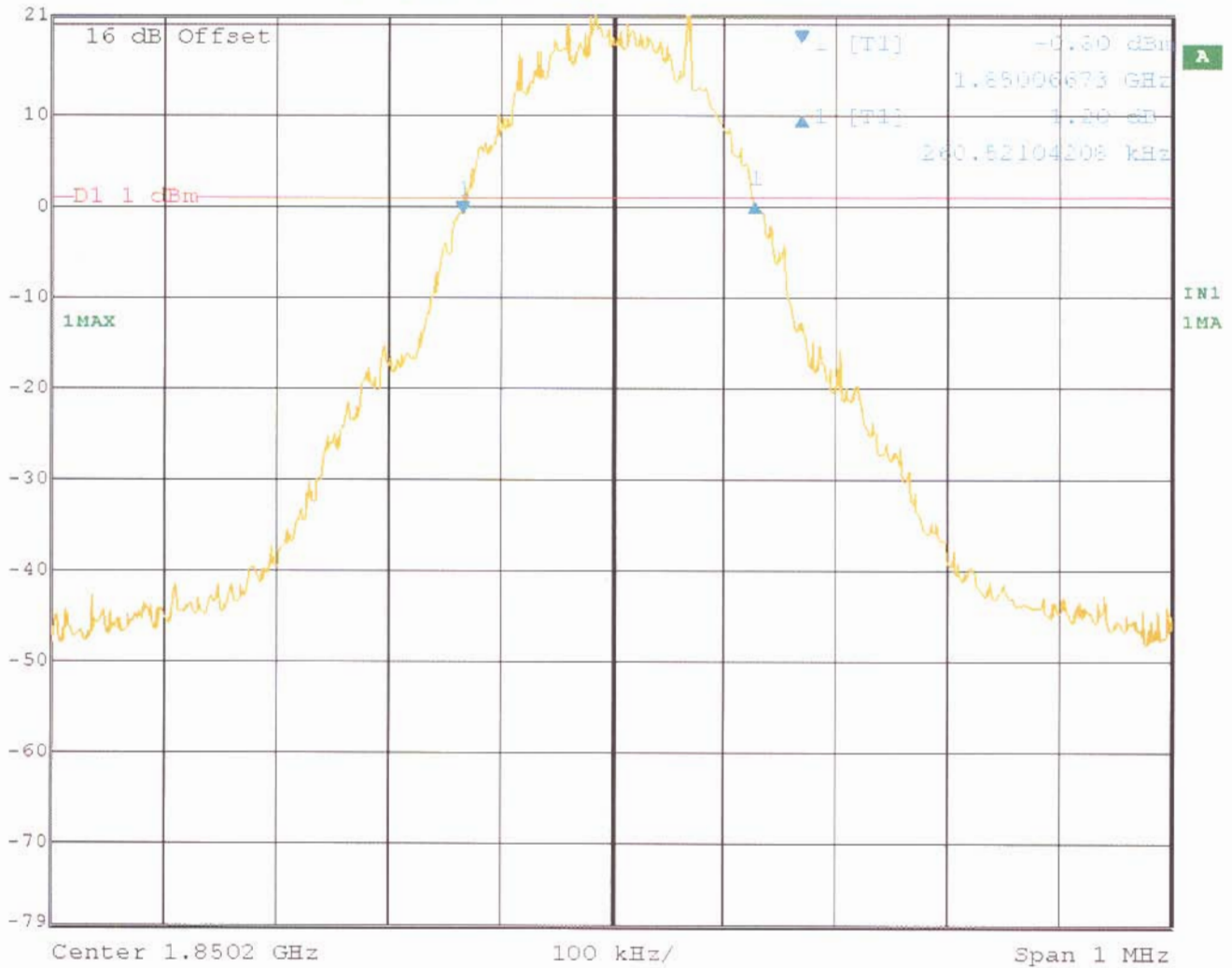
PBW 3 kHz RF Att 40 dB

Ref Lvl 1.29 dB

VBW 3 kHz

21 dBm 260.52104208 kHz

SWT 280 ms Unit dBm



Date: 1.SEP.2004 16:34:05

channel 512

Bandwidth: 260,52 kHz

TEST EQUIPMENT USED: NT-207; NT-208



OCCUPIED BANDWIDTH – 20 dB BANDWIDTH

§ 2.989



Ref Lvl

21 dBm

Delta 1 [T1]

-0.00 dB

272.54809018 kHz

RBW

3 kHz

RF Att

40 dB

VBW

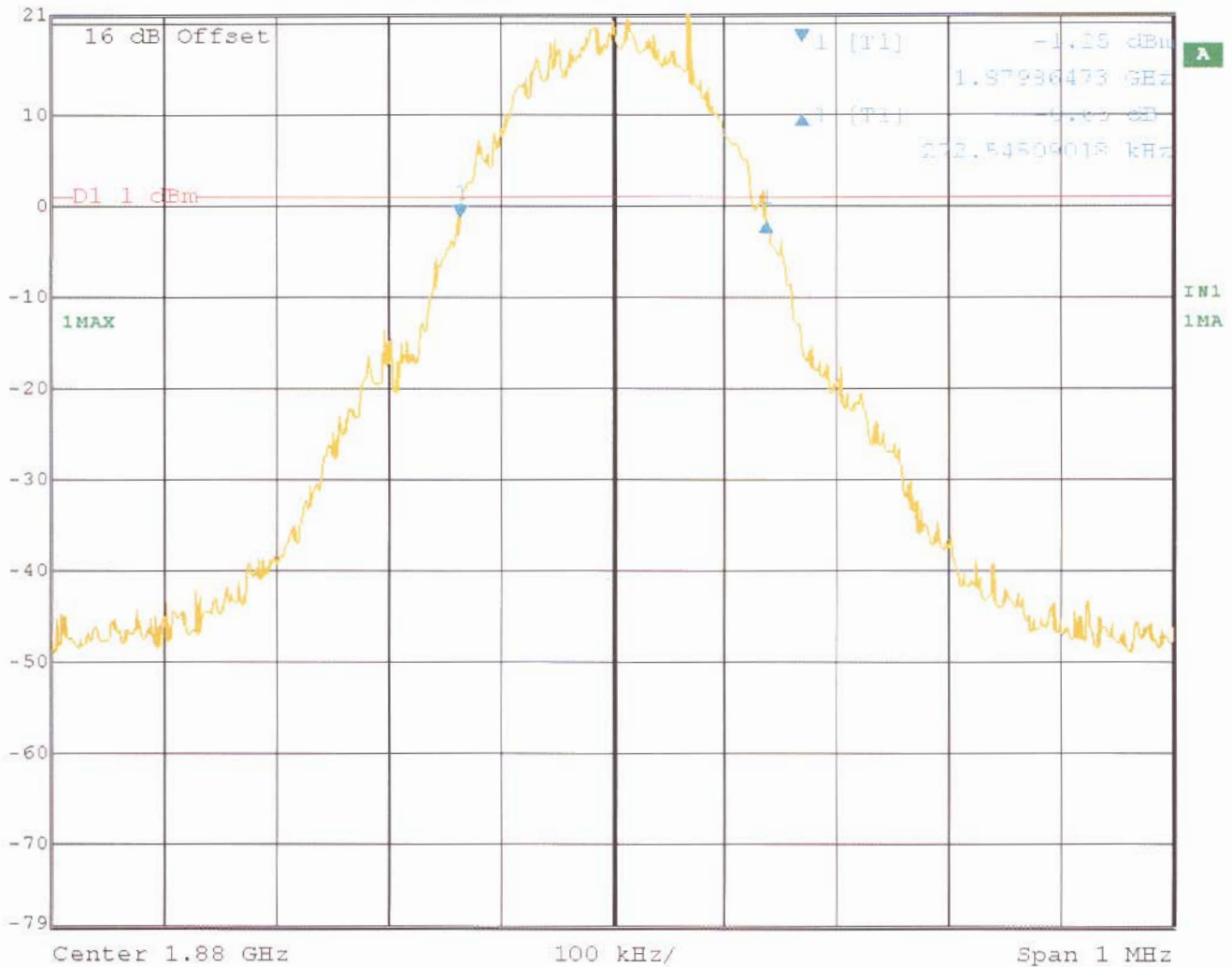
3 kHz

SWT

280 ms

Unit

dBm



Date: 1.SEP.2004 16:35:09

channel 661

Bandwidth: 272,54 kHz

TEST EQUIPMENT USED: NT-207; NT-208

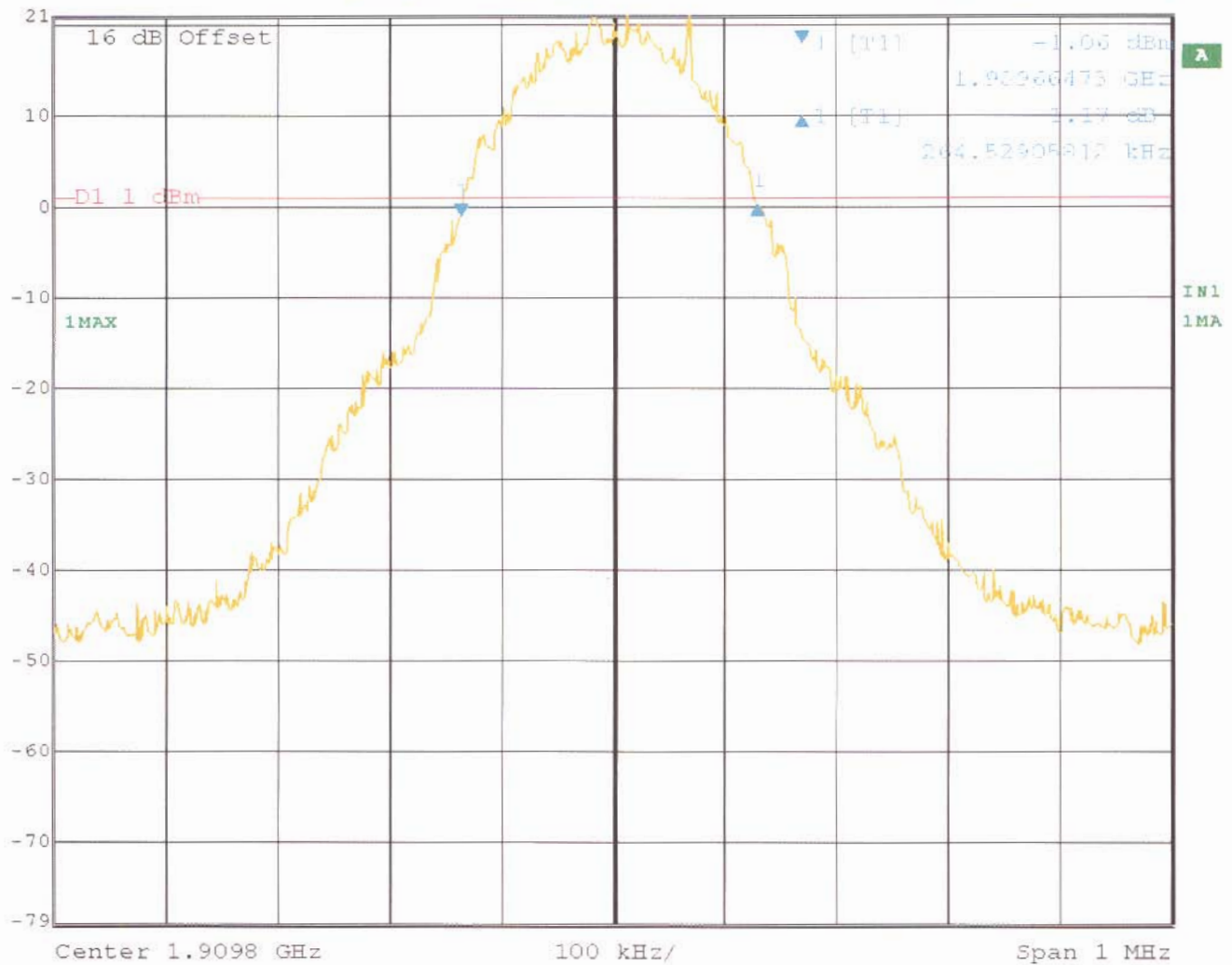


OCCUPIED BANDWIDTH – 20 dB BANDWIDTH

§ 2.989



Delta 1 (T1) RBW 3 kHz RF Att 40 dB
Ref Lvl 21 dBm 1.17 dB VBW 3 kHz
264.52905812 kHz SWT 280 ms Unit dBm



Date: 1.SEP.2004 16:28:52

channel 810

Bandwidth: 264,53 kHz

TEST EQUIPMENT USED: NT-207; NT-208

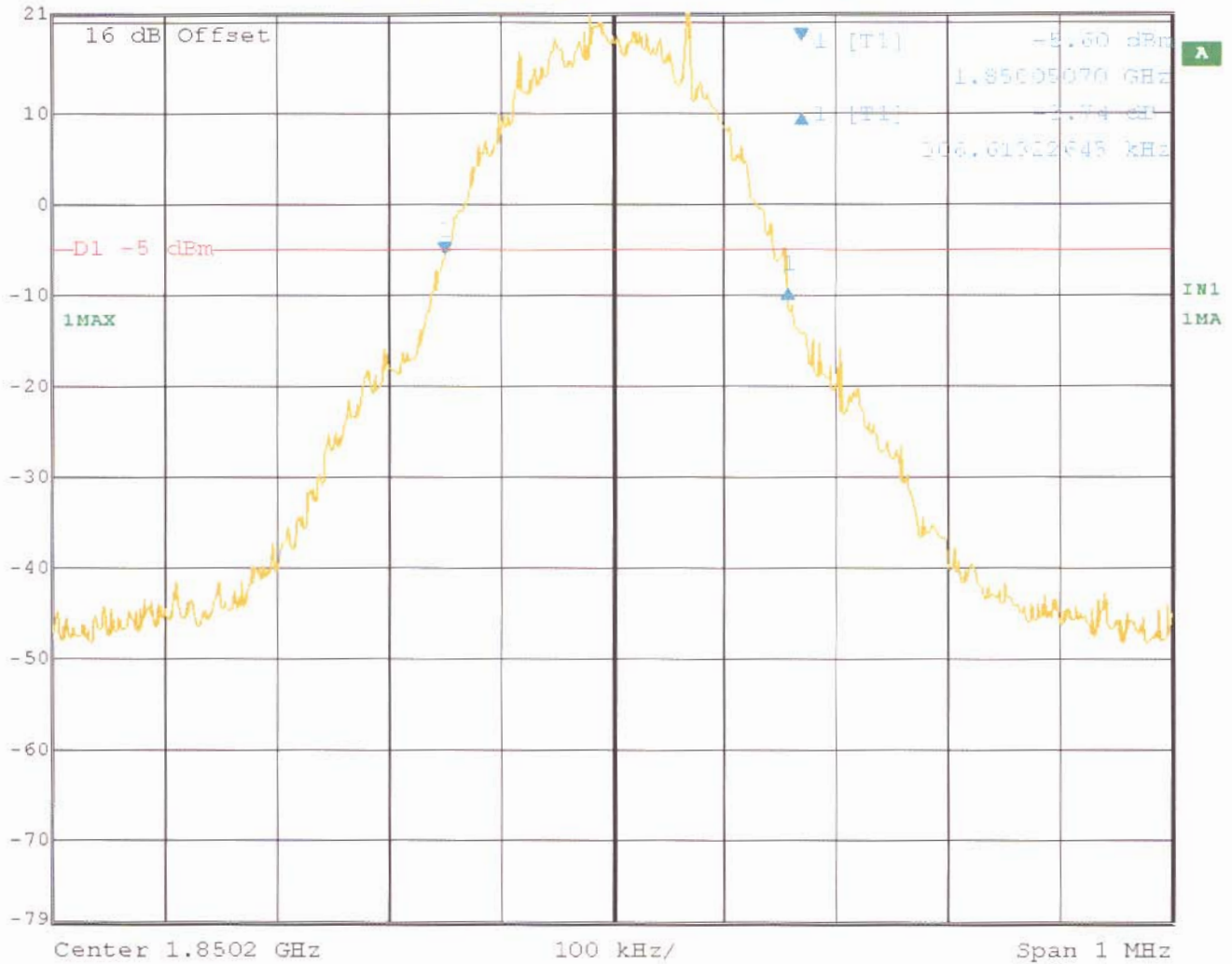


OCCUPIED BANDWIDTH – 26 dB BANDWIDTH

§ 2.989



Delta 1 (P1) = 0.94 dB
Ref Lvl 21 dBm
RBW 3 kHz RF Att 40 dB
VBW 3 kHz
SWT 280 ms Unit dBm



Date: 1.SEP.2004 16:33:18

channel 512

Bandwidth: 306,61 kHz

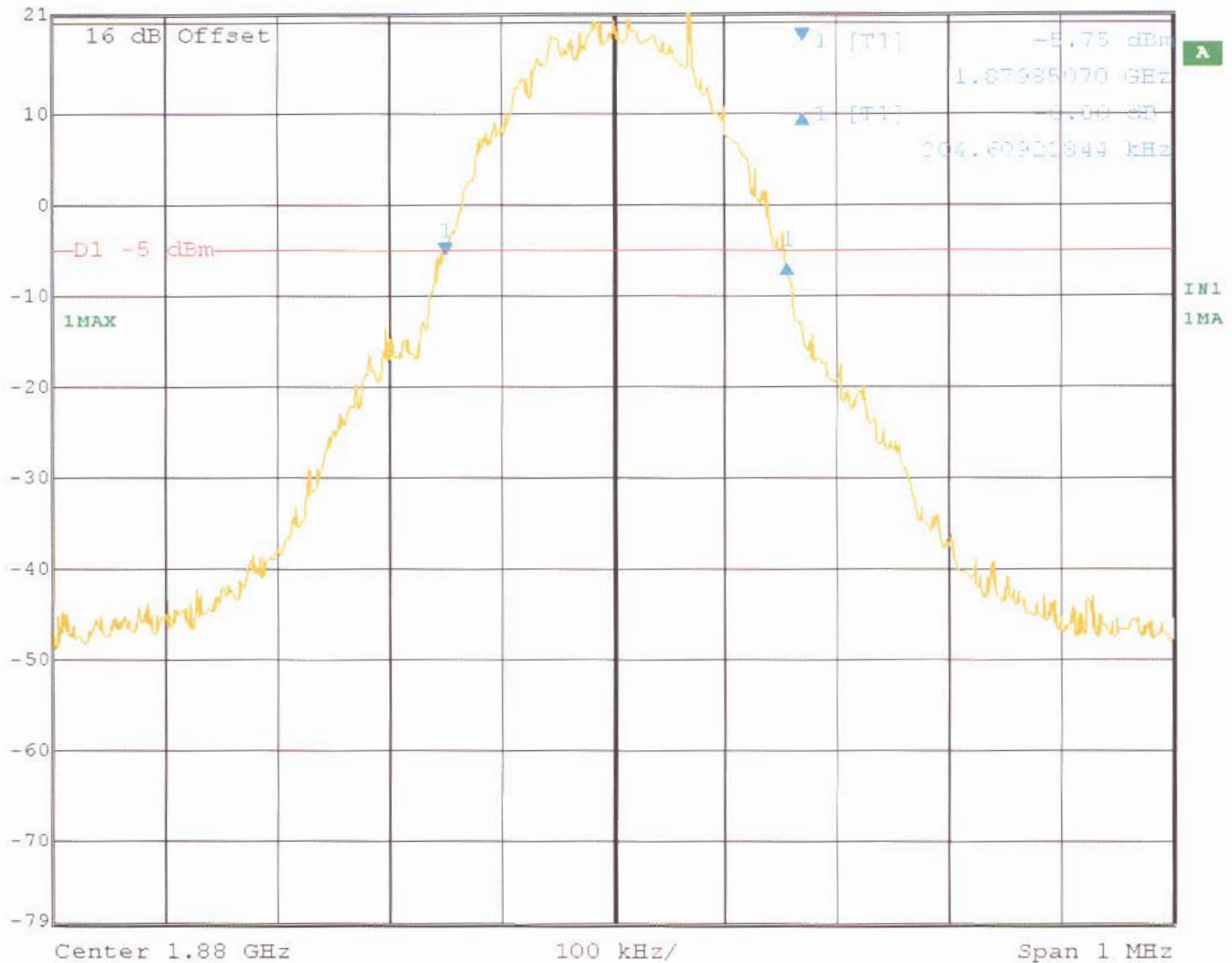
TEST EQUIPMENT USED: NT-207; NT-208



OCCUPIED BANDWIDTH – 26 dB BANDWIDTH

§ 2.989

Ref Lvl 21 dBm
RBW 3 kHz
RF Att 40 dB
VBW 3 kHz
SWT 280 ms
Unit dBm



Date: 1.SEP.2004 16:35:54

channel 661

Bandwidth: 304,61 kHz

TEST EQUIPMENT USED: NT-207; NT-208

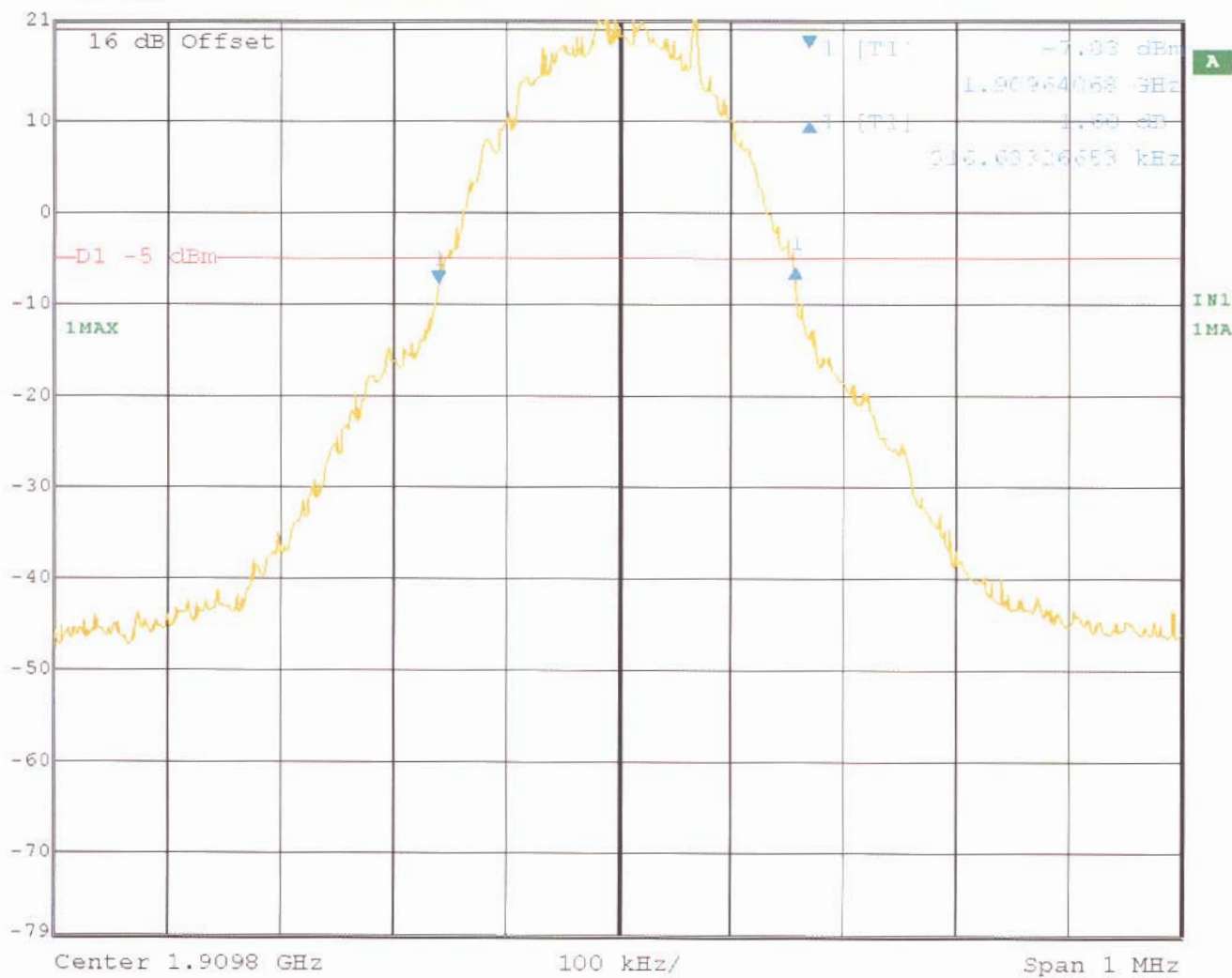


OCCUPIED BANDWIDTH – 26 dB BANDWIDTH

§ 2.989



Ref Lvl	Delta 1 (T1)	RBW	3 kHz	RF Att	40 dB
21 dBm	1.00 dB	VBW	3 kHz		
	316.63326653 kHz	SWT	280 ms	Unit	dBm



Date: 1.SEP.2004 16:31:31

channel 810

Bandwidth: 316.63 kHz

TEST EQUIPMENT USED: NT-207; NT-208



Appendix 1

Test equipment used

☐	Anechoic Chamber with 3m measurement distance	NT-100	☐	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	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. Ant. 20 MHz - 300 MHz	NT-127	☐	3160-10 Horn Antenna 26,5 GHz - 40 GHz	NT-216
☐	AT-1080 - Log. Per. Ant. 80 - 1000 MHz	NT-128	☐	Radiocommunicationanalyzer SWR 1180 MD	NT-217
☐	HK-116 - bicon. Ant. 20 MHz - 300 MHz	NT-129	☐	Mixer M19HWD 40 GHz - 60 GHz	NT-218
☐	HK-116 - bicon. Ant. 20 MHz - 300 MHz	NT-130	☐	Mixer M12HWD 60 GHz - 90 GHz	NT-219
☐	3146 - Log. Per. Ant. 200 - 1000MHz	NT-131	☐	TDS - 540 DSO Digital scope	NT-220
☐	Loop Antenna H-Field	NT-132	☐	PM97 Scopemeter	NT-221
☐	Horn Antenna 500 MHz - 2900 MHz	NT-133	☐	B10 - Harmonics and flicker 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
☐	Ant. tripod for EN61000-4-3 Model TP1000A	NT-156	☐	ELT-400 1 Hz - 400 kHz	NT-249
☐	Spectrumanalyzer - FSP7 9 kHz - 7 GHz	NT-200	☐	MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250

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Appendix 1 (continued)

Test equipment used

☐ FCC-203I EM Injection clamp	NT-251	☐ AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
☐ FCC-203I-DCN Femite decoupling network	NT-252	☐ APA01 - RF-Amplifier 0,5 GHz - 2,5 GHz	NT-334
☐ PR50 Current Probe	NT-253	☐ Preamplifier 1 GHz - 4 GHz	NT-335
☐ PR630 Current Probe	NT-254	☐ Preamplifier for GPS MKU 152 A	NT-336
☐ Model 2000 Digital Multimeter	NT-261	☐ Preamplifier 100 MHz - 23 GHz	NT-337
☐ Fluke 97 Digital Multimeter	NT-262	☐ DC Block 10 MHz - 18 GHz Model 8048	NT-338
☐ 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
☐ SMG - Signal generator 0,1 - 1000 MHz	NT-310	☐ FP 16/3-1 3 ph. Coupling filter (Burst)	NT-400
☐ PM 5518 TXVPS Video generator	NT-311	☐ PHE 4500 - Mains impedance network	NT-401
☐ 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	☐ Highpass-Filter 100 MHz - 4 GHz	NT-412
☐ ESD 30 System up to 25 kV	NT-321	☐ Highpass-Filter 600 MHz - 4 GHz	NT-413
☐ PSURGE 4.1 Surge generator	NT-324	☐ Highpass-Filter 1250 MHz - 4 GHz	NT-414
☐ TRANSIENT 1000 Immunity test system	NT-325	☐ Highpass-Filter 1800 MHz - 18 GHz	NT-415
☐ VCS 500-M6 Surge-Generator	NT-326	☐ Highpass-Filter 3500 MHz - 18 GHz	NT-416
☐ BTA-250 - RF-Amplifier 9 kHz - 220 MHz / 250 W	NT-330	☐ HV-Attenuator 54,5 dB (Burst)	NT-420
☐ T82-50 RF-Amplifier 2 GHz - 8 GHz	NT-331	☐ RF-Attenuator 20 dB 0,1 - 1000 MHz / 25 W	NT-421
☐ 500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332	☐ RF-Attenuator 10 dB 0,1 - 1000 MHz / 20 W	NT-422

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Appendix 1 (continued)

Test equipment used

☐ RF-Attenuator 30 dB 0,1 - 1000 MHz / 1 W	NT-423	☐ FCC-801-C1 Coupling decoupling network	NT-464
☐ RF-Attenuator 30 dB	NT-424	☐ F-16A - Current probe 1kHz - 70MHz	NT-465
☐ RF-Attenuator 6 dB 0,1 - 1000 MHz / 1 W	NT-425	☐ PC P4 3 GHz Test computer	NT-500
☐ RF-Attenuator 6 dB 0,1 - 1000 MHz / 1 W	NT-426	☐ PC P4 1700 MHz Notebook	NT-505
☐ Voltage-divider 1:100	NT-427	☐ PC Intel Centrino 1600 MHz Notebook	NT-506
☐ RF-Attenuator 6 dB	NT-428	☐ Monitoring camera with Monitor	NT-511
☐ RF-Attenuator 0 dB - 81 dB	NT-429	☐ ES-K1 Version 1.71 Test software	NT-520
☐ WRU 27 - Band blocking 27 MHz	NT-430	☐ SPS_PHE - Test software voltage fluctuations/harmonics	NT-525
☐ WHJ450C9 AA - High pass 450 MHz	NT-431	☐ SPS_EM - Test software for PHE 4500/B	NT-527
☐ WHJ250C9 AA - High pass 250 MHz	NT-432	☐ Noise power test apparatus according to EN 55014	NT-530
☐ RF-Load 150 W	NT-433	☐ Vertical coupling plane (ESD)	NT-531
☐ Impedance transducer 50 Ohm - 800 Ohm	NT-435	☐ TEM-Zelle	NT-533
☐ RF-Attenuator DC - 18 GHz 6 dB	NT-436	☐ Test cable #4 for EN 61000-4-6	NT-553
☐ RF-Attenuator DC - 18 GHz 6 dB	NT-437	☐ Test cable #3 for conducted emission	NT-554
☐ RF-Attenuator DC - 18 GHz 10 dB	NT-438	☐ Test cable #5 ESD-cable (2x470k)	NT-555
☐ RF-Attenuator DC - 18 GHz 20 dB	NT-439	☐ Test cable #6 ESD-cable (2x470k)	NT-556
☐ I+P 7780 Directional coupler 100 - 2000 MHz	NT-440	☐ Test cable #8 Sucoflex 104EA	NT-559
☐ ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441	☐ Test cable #9 (for outdoor measurements)	NT-580
☐ Power Divider 6 dB/1 W/50 Ohm	NT-443	☐ Test cable #10 (for outdoor measurements)	NT-581
☐ Directional coupler 0,1 MHz - 70 MHz	NT-444	☐ Test cable #13 Sucoflex 104PE	NT-584
☐ Directional coupler 0,1 MHz - 70 MHz	NT-445	☐ Shield chamber	NT-600
☐ Tube imitations according to EN 55015	NT-450	☐ Climatic chamber -55°C to +180°C	NT-512
☐ FCC-801-M2-50A Coupling decoupling network	NT-459	☐ Control and simulation equipment for EUT	
☐ 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		

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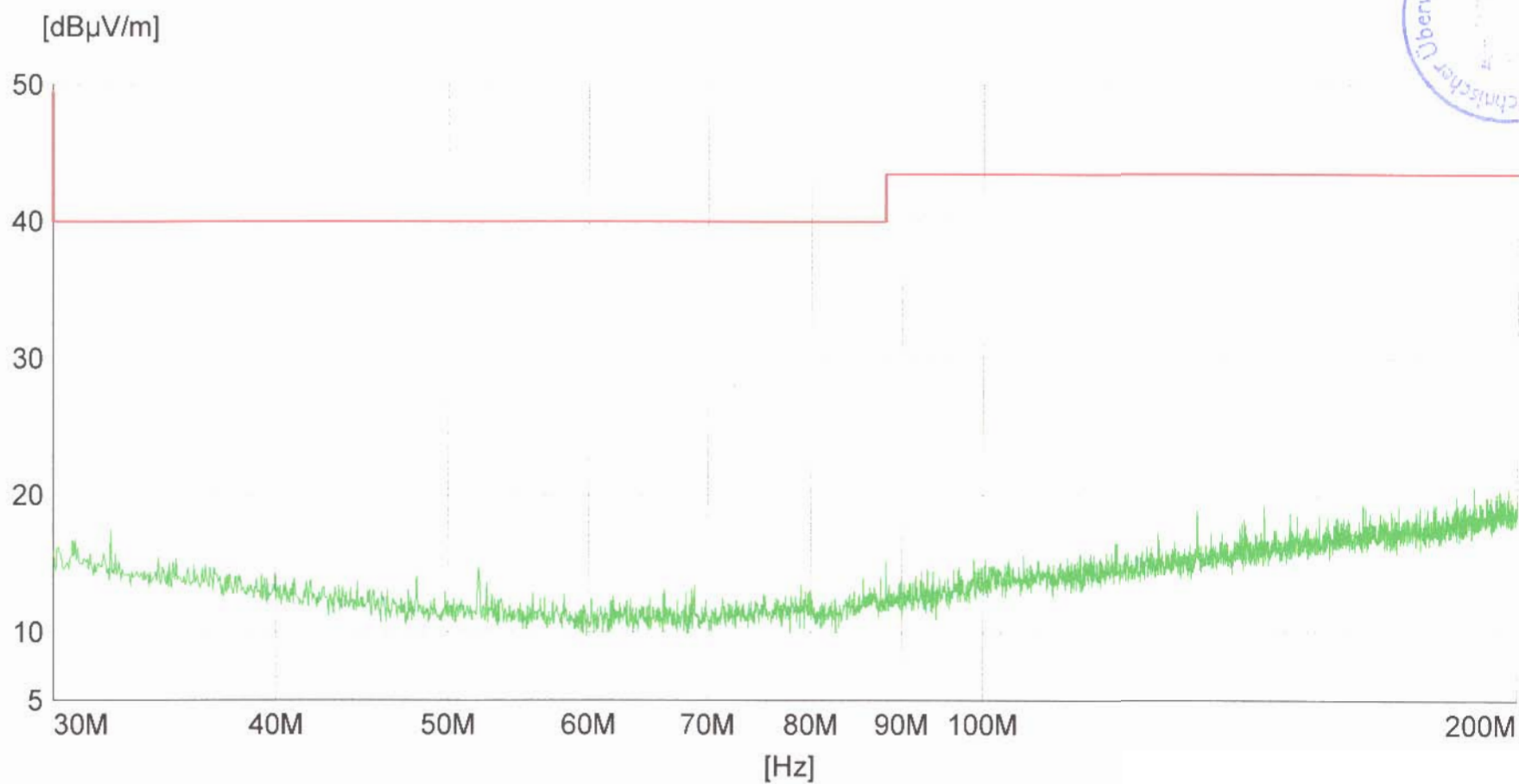
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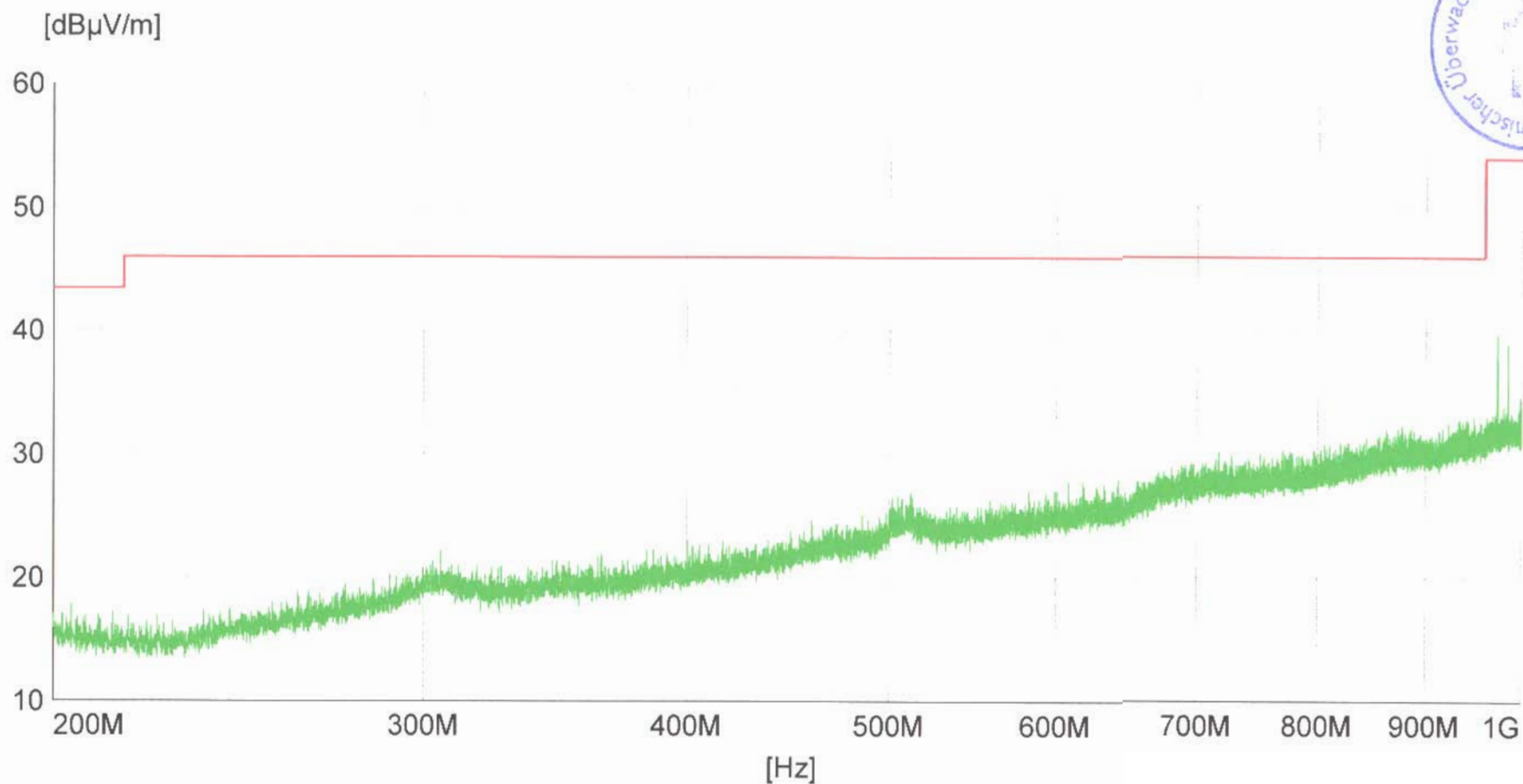
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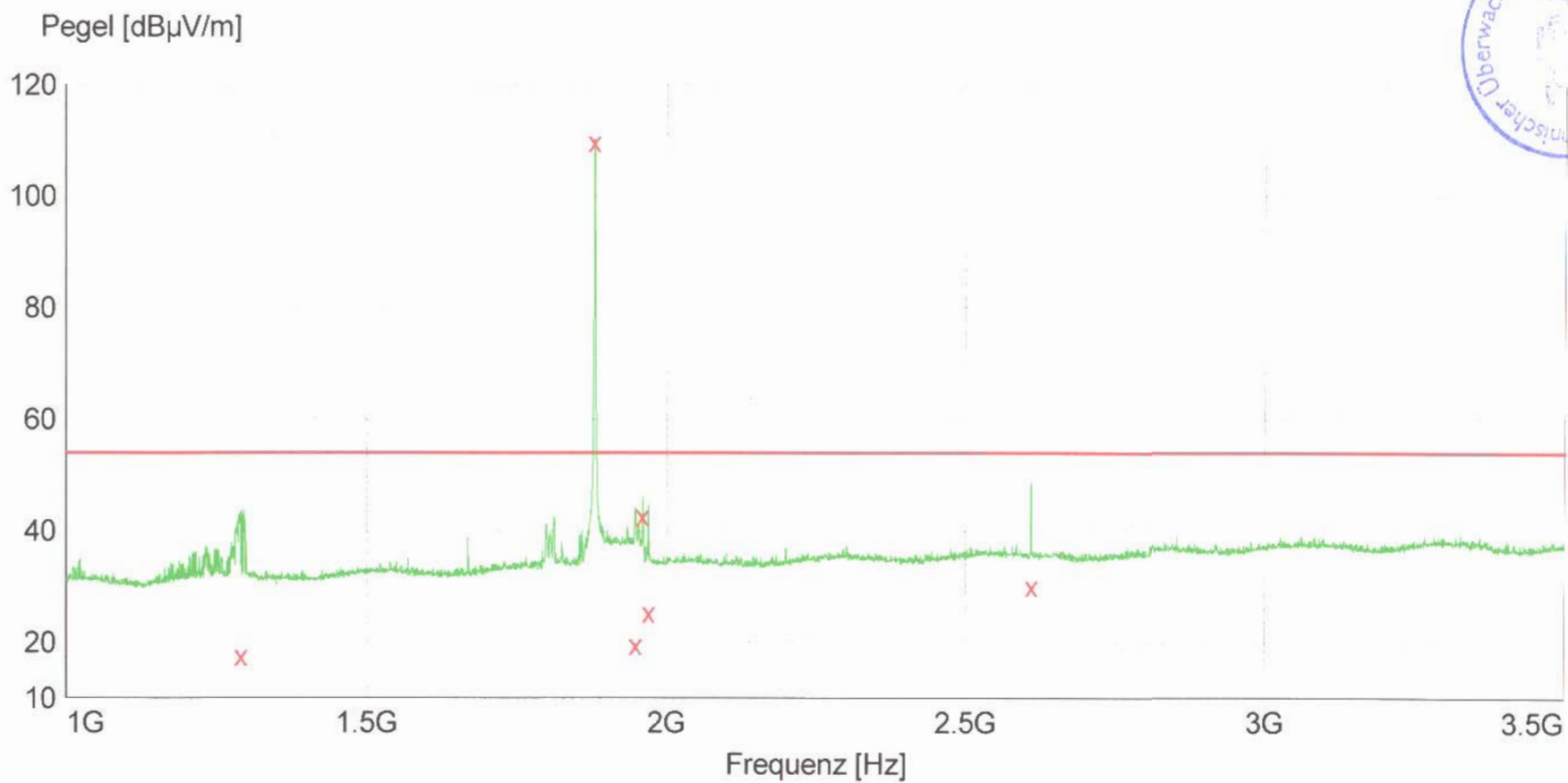




MES A733US_F01_pre PK
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m



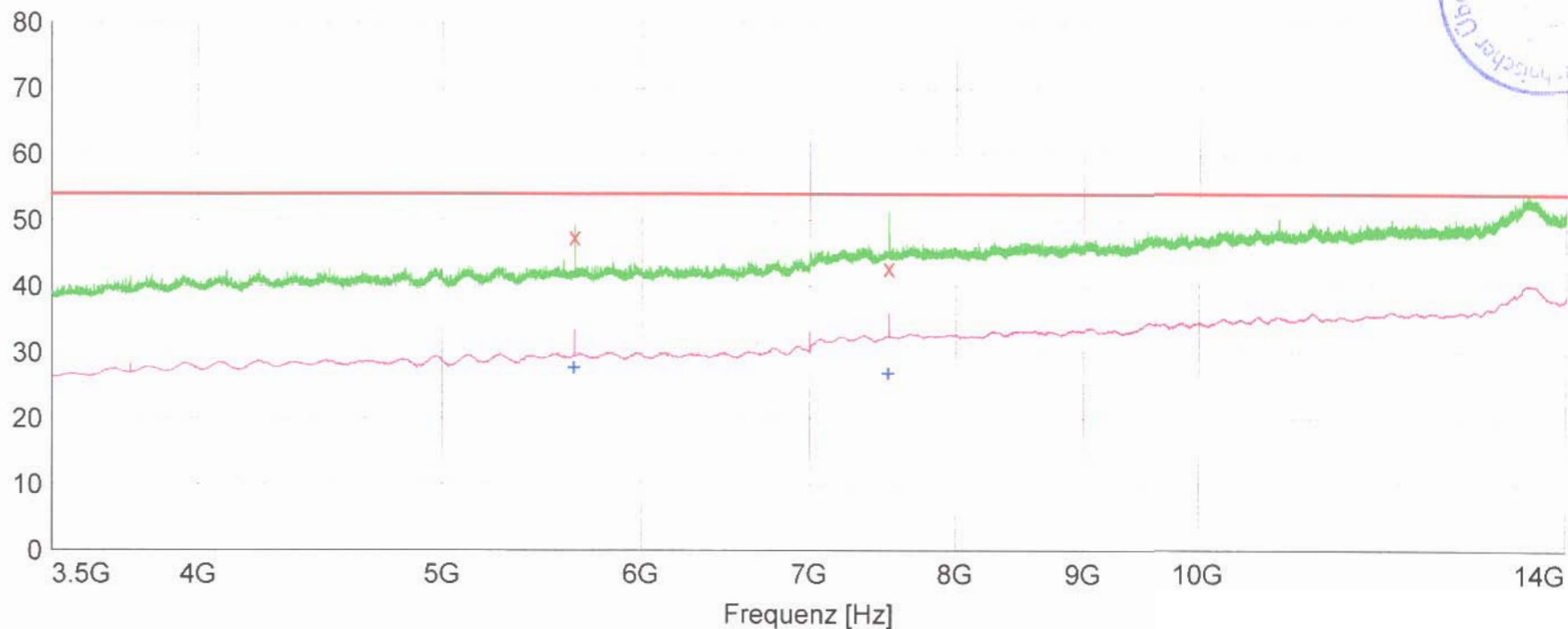
— MES A733US_F02_pre PK
 — LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m



x x : MES A733US_F03_fin QP
 — MES A733US_F03_pre PK
 — LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m



Pegel [dB μ V/m]

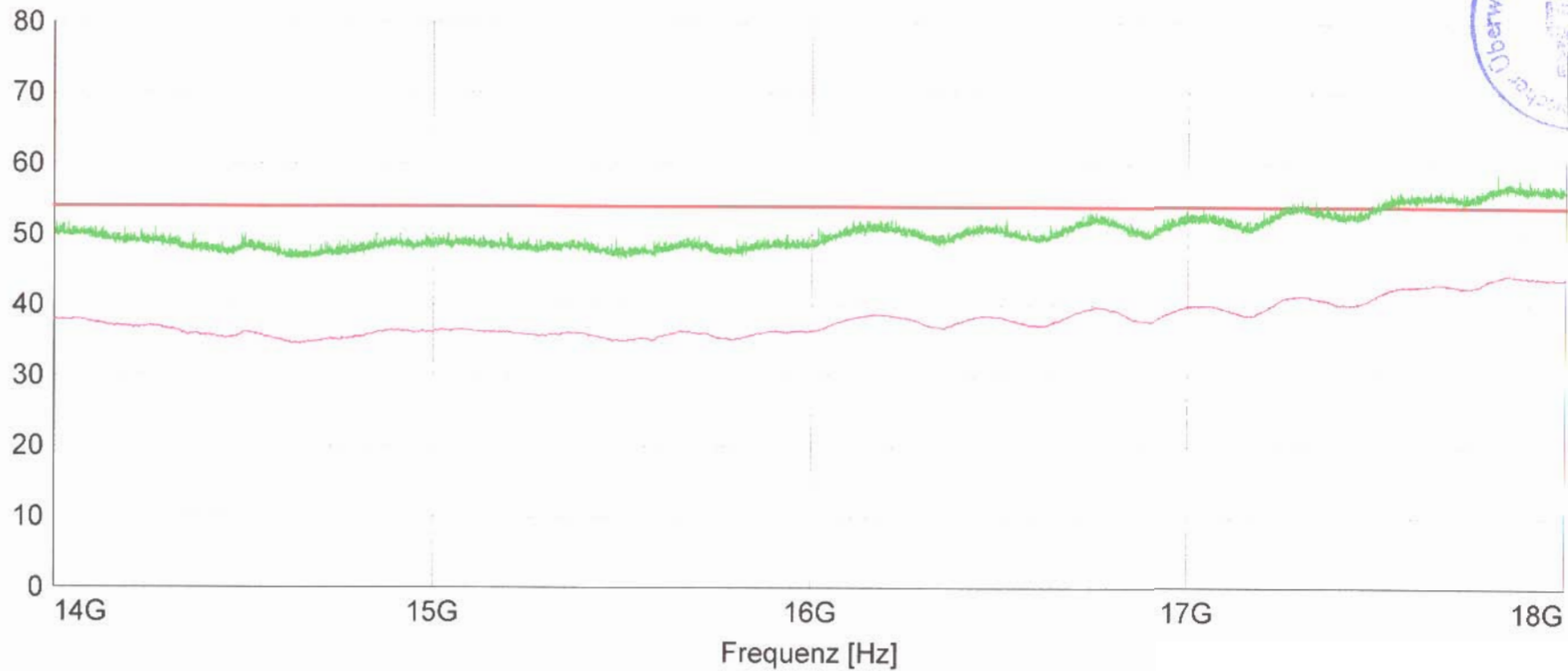


x x MES A733US_F04_fin QP
+ + -MES A733US_F04_fin AV
— MES A733US_F04_pre PK
— MES A733US_F04_pre AV
— LIM FCC ClassB F QP/AV
| MES STD_SUB1
| MES STD_SUB2

FCC ClassB, field strength 3m



Pegel [dB μ V/m]



MES	A733US_F05_pre PK	
MES	A733US_F05_pre AV	
LIM	FCC ClassB F QP/AV	FCC ClassB, field strength 3m
MES	STD_SUB1	
MES	STD_SUB2	