

TEST REPORT
of the accredited test laboratory

TÜV Nr.:M/EMV-12/130

about
the following EMC - test/- research

Applicant: TRUMPF Maschinen Austria GmbH + Co. KG
Industriepark 24
A-4061 Pasching

Product: Wireless angle measurement system
OCB6000-Brosche

Serial Number: ---

Standard: FCC: 47 CFR Part 15 (October 1, 2011 edition)



Testing Laboratory,
Inspection Body,
Certification Body,
Calibration Laboratory

Notified Body 0408
IC 4413

Chairman of the
Supervisory Board:
KR Dipl.-Ing. Johann
MARIHART

Management:
Dipl.-Ing. Dr. Hugo
EBERHARDT
Mag. Christoph
WENNINGER

Registered Office:
Krugerstrasse 16
1015 Vienna/Austria

Branch Office:
Dornbirn, Graz,
Innsbruck, Klagenfurt,
Linz, Salzburg, St. Pölten,
Wels, Wien 1, Wien 20,
Wien 23, Brixen (I) und
Filderstadt (D)

Company Register
Court / - Number:
Vienna / FN 288476 f

Banking Connections:
BA CA 52949 001 066
IBAN
AT131200052949001066
BIC BKAUATWW
RBI 001-04.093.282
IBAN
AT153100000104093282
BIC RZBAATWW

UID ATU63240488
DVR 3002476

TÜV AUSTRIA SERVICES GMBH
Test laboratory for EMC

Supervisor of EMC-laboratory


Ing. Wilhelm Seier



Checked by


Ing. Michael Emminger

Copy Nbr.: 

A publication of this test report is only permitted literally.
Copying or reproduction of partial sections needs a written permission of
TÜV AUSTRIA SERVICES GMBH.

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

Contents

	Designation	page
1.	Applicant	3
2.	Description of EUT	4
3.	Standards / Final result	5
4.	Test results	
4.1.	FIELD STRENGTH (Intentional Radiator)	6
4.2	Radiated emission	7-8
Appendix	Designation	pages
1	Test equipment used	3
2	Photodocumentation	11
3	Measurement diagrams	3

1. Applicant

Company: TRUMPF Maschinen Austria GmbH + Co. KG

Department: ---

Address: Industriepark 24
A-4061 Pasching

Contact person: Mr. Dipl.-Ing. Steffen Kuhn

EUT received on: 15.03.2012

Tests were performed on: 15.03.2012

2. Description of EUT

EUT: Wireless angle measurement system
OCB6000-Brosche

Serial Number: ---

Manufacturer: TRUMPF Maschinen Austria GmbH + Co. KG
Industriepark 24
A-4061 Pasching

Description: TRUMPF Maschinen Austria GmbH + Co. KG provided the following configuration for the measurements:

The OCB6000-Brosche was mounted on the angel meter,
MARUI-KEIKI DP-601 article nr. 454000 150.
(no FCC ID)

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

3. Standards / Final result

Name	Title	Deviation	Result
FCC: 47 CFR Part 15 (October 1, 2011 edition)	Radio Frequency Devices	none	PASS
PASS EUT passed FAIL EUT failed			

4. Test results

4.1 FIELD STRENGTH (Intentional Radiator)

§ 15.249/a

Field strength at a distance of 3m						
f (MHz)	Bandwidth (MHz)	Limit (µV/m) (Average)	Average detector		Peak detector	
			dBµV/m	µV/m	dBµV/m	µV/m
2405	1	50000	82,1	12735	85,4	18621
Up to the 10 th harmonic	1	500	< 34	< 50	< 54	< 500
Measurement uncertainty ± 6 dB						

Bandwidth: this refers to the bandwidth of the measurement receiver

LIMIT

§ 15.249/a

f (MHz)	Bandwidth (MHz)	Field strength at a distance of 3 m	
		of fundamental emissions (mV/m)	of harmonic emissions (µV/m)
2400-2483,5	1	50	500

The above standing field strength limit is based on average limits.

4. 2. Radiated emission

Limits according to 15.209

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

Test result

4. 2.1.) Measurement in the frequency range 9 kHz to 25 GHz

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

Appendix 1

Test equipment used

☒	Anechoic Chamber with 3m measurement distance	NT-100	☐	ESVP - Test receiver 20 - 1000 MHz	NT-201
☐	Stripline according to ISO 11452-5	NT-108	☐	ESCI - Test receiver 9 kHz - 7 GHz	NT-203/1
☒	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-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	☐	Digital Radio Tester Aeroflex 3920	NT-212/1
☐	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	☐	DSO9104 Digital scope	NT-220/1
☐	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	☐	SRM-3006 Spectrumanalyzer	NT-233/1a
☐	Conical Dipol Antenna PCD8250	NT-138	☐	E-field probe SRM 75 MHz - 3 GHz	NT-234
☒	HF 906 - Horn Antenna 1 - 18 GHz (emission)	NT-139	☐	Field Meter NBM-500 incl. E- and H-Field probes	NT-240a-d
☐	HZ-1 Antenna tripod	NT-150	☐	Hall-Teslameter ETM-1	NT-241
☐	BN 1500 Antenna tripod	NT-151	☐	EFA-3 H-field- / E-field probe	NT-243
☐	Ant. tripod for EN61000-4-3 Model TP1000A	NT-156	☐	Field Meter EMR-200 100 kHz - 3 GHz	NT-244
☐	Power quality analyzer Fluke 1760 (complete set)	NT-160 - NT-172	☐	E-field probe 100 kHz - 3 GHz	NT-245
☐	Spectrumanalyzer - FSP7 9 kHz - 7 GHz	NT-200	☐	H-field probe 300 kHz - 30 MHz	NT-246

Division Medical
Technology/
Communication
Technology/ EMC

Department: EMC

Test report number:
M/EMV-12/130

Page: 1 of 3

Date: 20.03.2012

Checked by: 

Appendix 1 (continued)

Test equipment used

☐ E-field probe 3 MHz – 18 GHz	NT-247	☐ VCS 500-M6 Surge-Generator	NT-326
☐ H-field probe 27 MHz – 1 GHz	NT-248	☐ BTA-250 - RF-Amplifier 9 kHz - 220 MHz / 250 W	NT-330
☐ ELT-400 1 Hz – 400 kHz	NT-249	☐ T82-50 RF-Amplifier 2 GHz – 8 GHz	NT-331
☐ MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250	☐ 500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332
☐ FCC-203I EM Injection clamp	NT-251	☐ AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
☐ FCC-203I-DCN Ferrite 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
☐ Fluke 87 V True RMS Multimeter	NT-260	☐ Preamplifier 100 MHz – 23 GHz	NT-337
☐ Model 2000 Digital Multimeter	NT-261	☐ DC Block 10 MHz – 18 GHz Model 8048	NT-338
☐ Fluke 87 V Digital Multimeter	NT-262/1	☐ 2-97201 Electronic load	NT-341
☐ ESH2-Z5-U1 Artificial mains network 4x25A	NT-300	☐ TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-344
☐ ESH3-Z5-U1 Artificial mains network 2x10A	NT-301	☐ TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-345
☐ ESH3-Z6-U1 Artificial mains network 1x100A	NT-302	☐ VDS 200 Mobil-impuls-generator	NT-350
☐ ESH3-Z6-U1 Artificial mains network 1x100A	NT-302a	☐ 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	☐ AN 200 S1 Artificial Network	NT-354
☐ SMA100A - Signal generator 9 kHz - 6 GHz	NT-310/1	☐ FP-EFT 32M 3 ph. Coupling filter (Burst)	NT-400/1
☐ 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	☐ TK 9421 High Power Volt. Probe 150 kHz - 30 MHz	NT-409
☐ 40 MHz Arbitrary Generator TGA1241	NT-315	☐ ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
☐ Artificial mains network NSLK 8127-PLC	NT-316	☐ IP 4 - Capacitive clamp (Burst)	NT-411
☐ PEFT - Burst generator up to 4 kV	NT-320	☐ Highpass-Filter 100 MHz – 3 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 – 16 GHz	NT-415

Division Medical
Technology/
Communication
Technology/ EMC

Department: EMC

Test report number:
M/EMV-12/130

Page: 2 of 3

Date: 20.03.2012

Checked by: 

Appendix 1 (continued)

Test equipment used

☒ Highpass-Filter 3500 MHz – 18 GHz	NT-416	☐ FCC-801-S25 Coupling decoupling network	NT-462
☐ RF-Attenuator 10 dB DC – 18 GHz / 50 W	NT-417	☐ FCC-801-T4 Coupling decoupling network	NT-463
☐ RF-Attenuator 6 dB DC – 18 GHz / 50 W	NT-418	☐ FCC-801-C1 Coupling decoupling network	NT-464
☐ RF-Attenuator 3 dB DC – 18 GHz / 50 W	NT-419	☐ F-16A - Current probe 1kHz - 70MHz	NT-465
☐ RF-Attenuator 20 dB DC - 1000 MHz / 25 W	NT-421	☐ 95242-1 – Current probe 1 MHz – 400 MHz	NT-468
☐ RF-Attenuator 30 dB DC - 1000 MHz / 1 W	NT-423	☐ 94106-1L-1 – Current probe 100 kHz – 450 MHz	NT-471
☐ RF-Attenuator 30 dB	NT-424	☐ GA 1240 Power amplifier according to EN 61000-4-16	NT-480
☐ RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-425	☐ Coupling networks according to EN 61000-4-16	NT-481 - NT-483
☐ RF-Attenuator 6 dB DC - 1000 MHz / 1 W	NT-426	☐ Van der Hoofden Test Head	NT-484
☐ RF-Attenuator 6 dB	NT-428	☒ PC P4 3 GHz Test computer	NT-500
☐ RF-Attenuator 0 dB - 81 dB	NT-429	☐ PC P4 1700 MHz Notebook	NT-505
☐ WRU 27 - Band blocking 27 MHz	NT-430	☐ Monitoring camera with Monitor	NT-511
☐ WHJ450C9 AA - High pass 450 MHz	NT-431	☐ ES-K1 Version 1.71 SP2 Test software	NT-520
☐ WHJ250C9 AA - High pass 250 MHz	NT-432	☒ EMC32 Version 8.52 Test software	NT-520/1
☐ RF-Load 150 W	NT-433	☐ SRM-TS Version 1.3 software for SRM-3000	NT-522
☐ Impedance transducer 1:4 ; 1:9 ; 1:16	NT-435	☐ SRM-TS Version 1.2 software for SRM-3006	NT-522/1
☐ RF-Attenuator DC – 18 GHz 6 dB	NT-436	☐ SPS-PHE Test software V2.5 voltage fluctuations/harmonics	NT-525
☐ RF-Attenuator DC – 18 GHz 6 dB	NT-437	☐ SPS-EM Test software V4.0 EN61000-4-11	NT-527
☐ RF-Attenuator DC – 18 GHz 10 dB	NT-438	☐ Noise power test apparatus according to EN 55014	NT-530
☐ RF-Attenuator DC – 18 GHz 20 dB	NT-439	☐ Vertical coupling plane (ESD)	NT-531
☐ I+P 7780 Directional coupler 100 - 2000 MHz	NT-440	☐ Test cable #4 for EN 61000-4-6	NT-553
☐ ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441	☐ Test cable #3 for conducted emission	NT-554
☐ Power Divider 6 dB/1 W/50 Ohm	NT-443	☐ Test cable #5+#6 ESD-cable (2x470k)	NT-555 + NT-556
☐ Directional coupler 0,1 MHz – 70 MHz	NT-444	☐ Test cable #8 Sucoflex 104EA	NT-559
☐ Directional coupler 0,1 MHz – 70 MHz	NT-445	☐ Test cable #9 (for outdoor measurements)	NT-580
☐ Tube imitations according to EN 55015	NT-450	☐ Test cable #10 (for outdoor measurements)	NT-581
☐ FCC-801-M3-16A Coupling decoupling network	NT-458	☐ Test cable #13 Sucoflex 104PE	NT-584
☐ FCC-801-M2-50A Coupling decoupling network	NT-459	☐ Test cable #21 for SRM-3000	NT-592
☐ FCC-801-M5-25 Coupling decoupling network	NT-460	☐ Shield chamber	NT-600
☐ FCC-801-AF10 Coupling decoupling network	NT-461	☐ Climatic chamber	M-1200

Division Medical
Technology/
Communication
Technology/ EMC

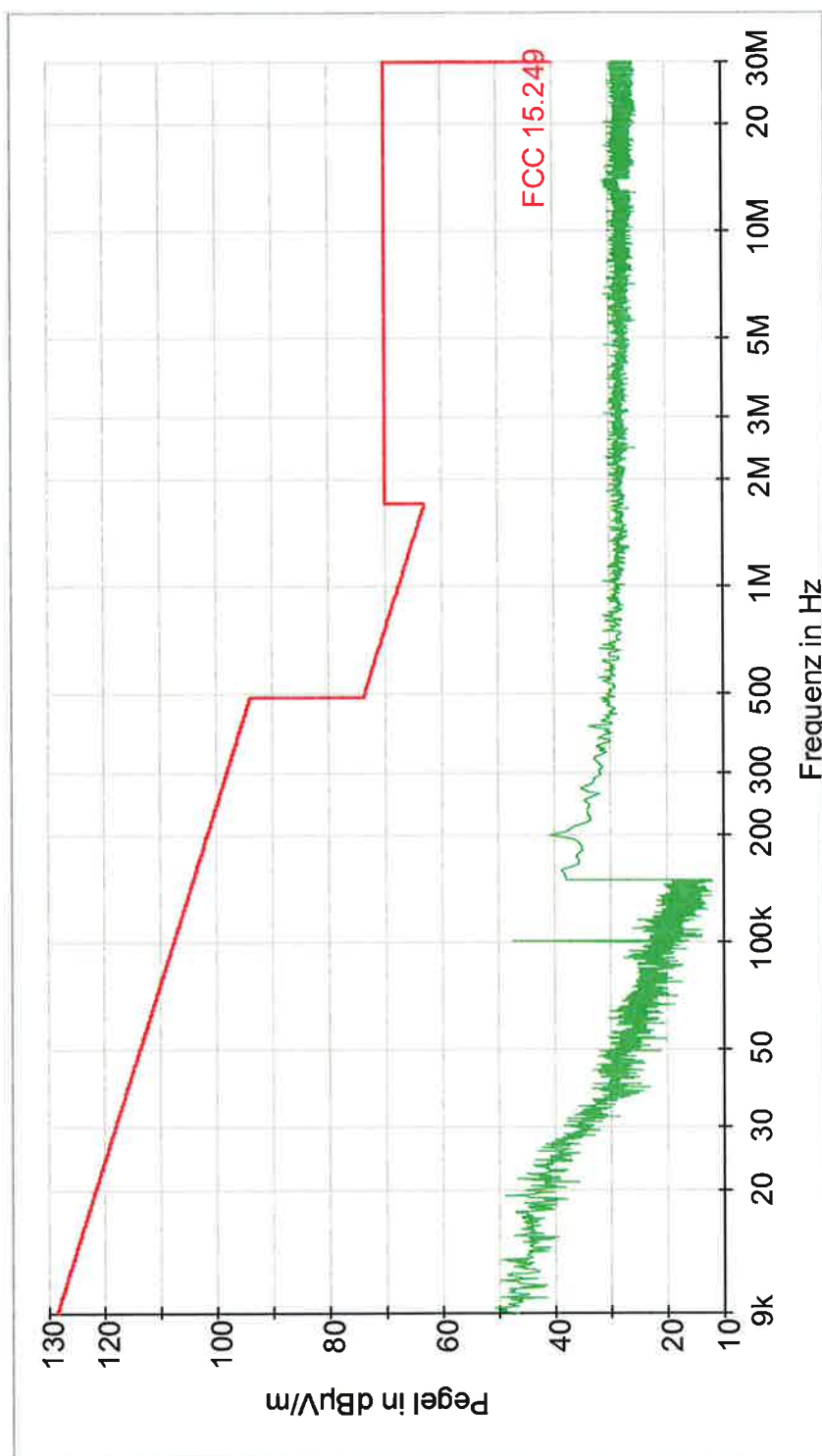
Department: EMC

Test report number:
M/EMV-12/130

Page: 3 of 3

Date: 20.03.2012

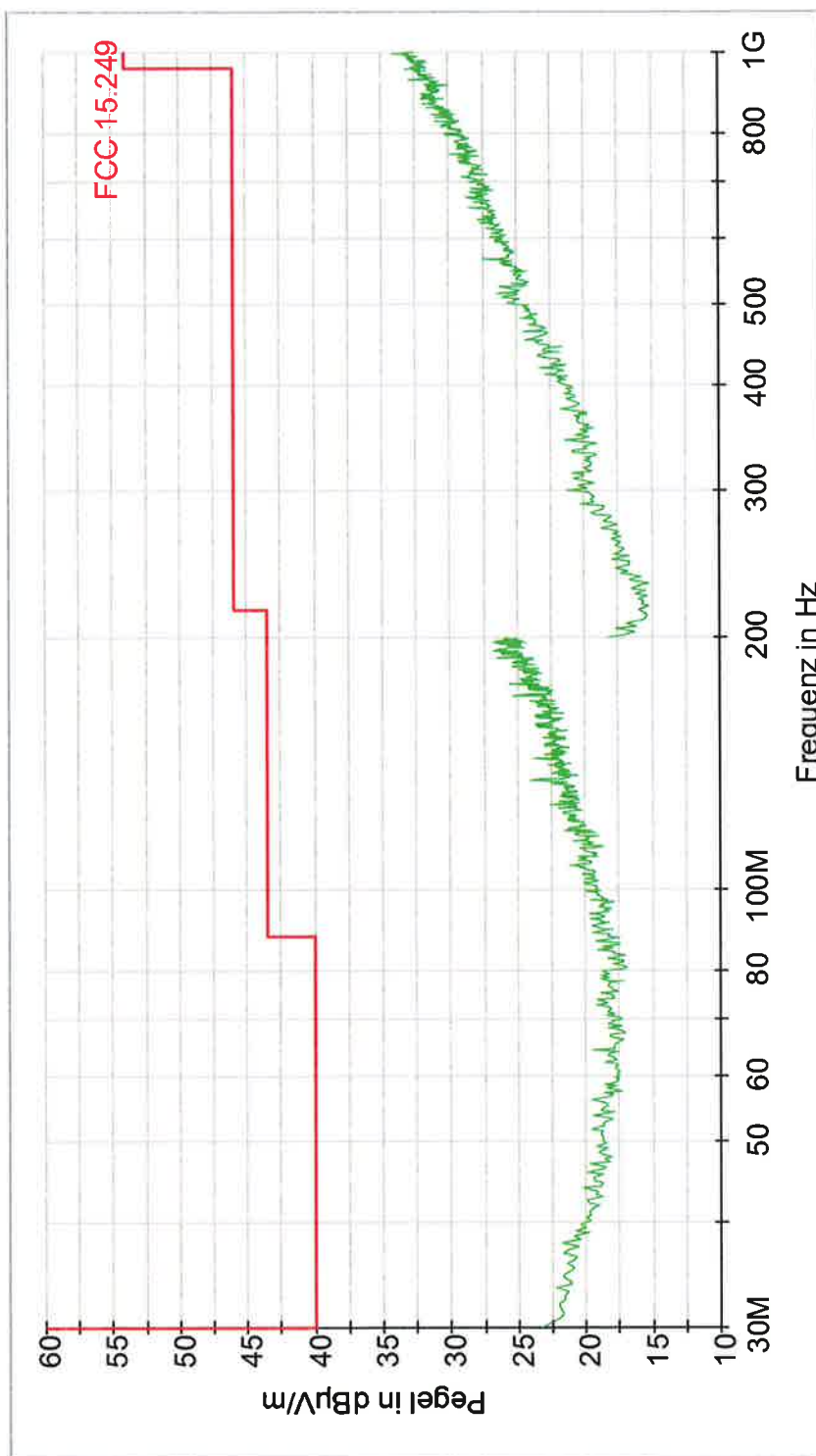
Checked by: 



FCC 15.249 [..\EMI radiated]
 Vormessergebnis 1-PK+ [Vormessergebnis 1.Result:1]
 * Datenreduktionsergebnis 1 [1]-PK+ [Datenreduktionsergebnis 1 [1].Result:1]

15.03.2012

09:49:16
 Division Medical Technology/
 Communication Technology/
 EMC
 Department: EMC
 Test report reference:
 M/EMV-12/130
 Measurement diagram:
 1 of 3
 Date: 20.03.2012
 checked by: *[Signature]*



Dongle_FCC:Sender 200 - 1000:MaxPeak-MaxHold [Sender 200 - 1000.Result:2]
 Dongle_FCC:Sender 30 - 200:MaxPeak-MaxHold [Sender 30 - 200.Result:2]
 FCC 15.249 [.\EMI radiated]

08:29:55

 Division Medical Technology/
 Communication Technology/
 EMC

Department: EMC

Test report reference:

M/EMV-12/ 130

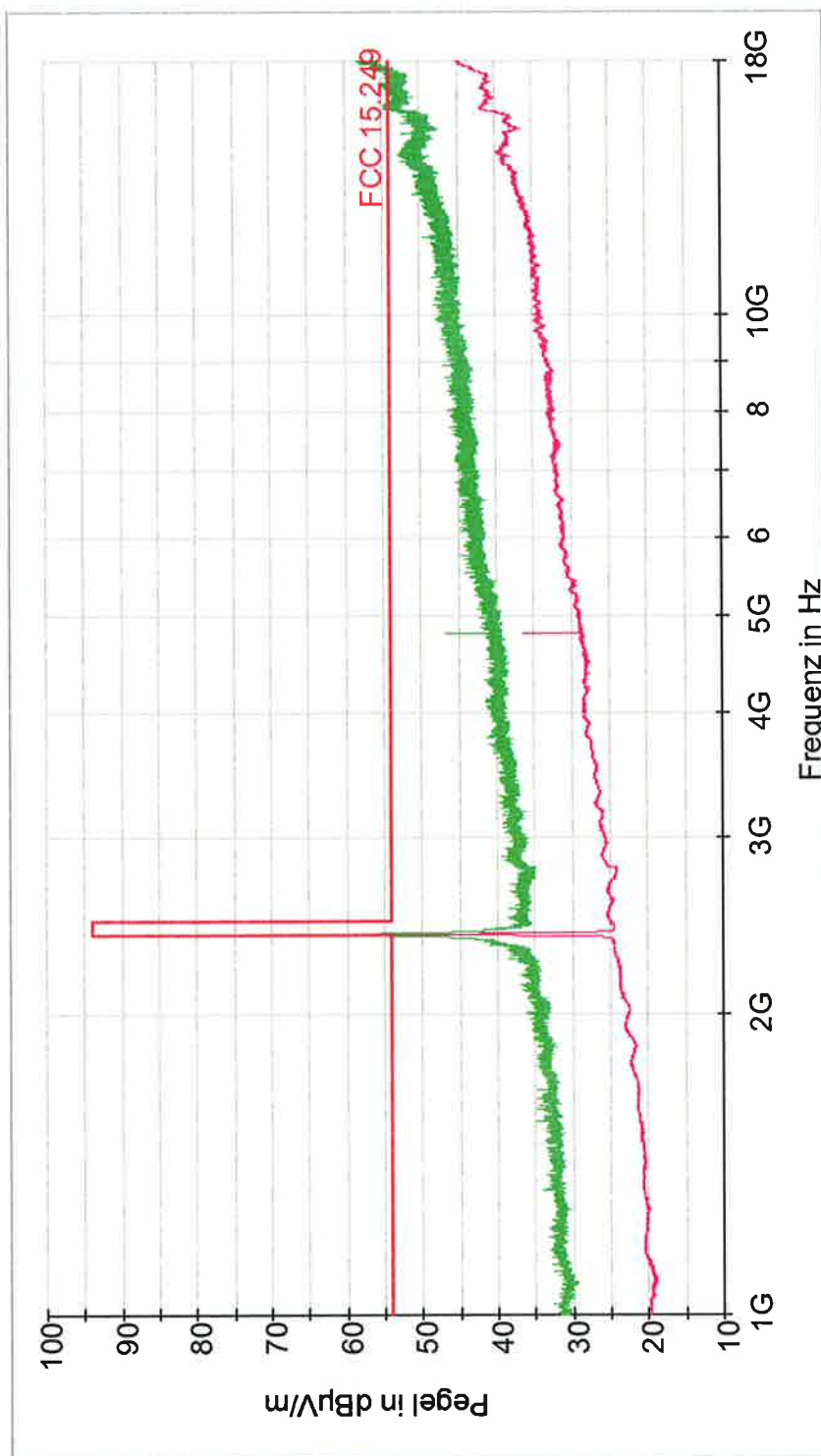
Measurement diagram:

2 of 3

Date: 20.03.2012

checked by:

15.03.2012



15.03.2012

09:07:48

Division Medical Technology/
Communication Technology/
EMC

Department: EMC

Test report reference:

M/EMV-12/ *B30*

Measurement diagram:

3 of *3*

Date: 20.03.2012

checked by: *[Signature]*