

TEST REPORT

of the accredited test laboratory

TÜV Nr.:M/EMV-13/186

about

the following EMC - test/- research

Applicant:

Automated Control Technology Partners, Inc

2400 Sandlake Rd Suite 600

32839 Orlando - Florida

USA

Tested Product:

Streaming audio device (Ethernet connection)

FCC-ID:

2AAO8-AZSS1

IC-ID:

11338A-AZSS1

Manufacturer:

See above

Standard:

FCC Part 15 (10-1-12 Edition);

TÜV AUSTRIA SERVICES GMBH **Test laboratory for EMC**

Supervisor of EMC-laboratory

Wilhelm Seier

16.09.2013

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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.

TÜV AUSTRIA SERVICES GMBH

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Division:

Medical Technology/ Communication Technology/ EMC

Department: Testing Body for

Communication Technology/ EMC

TÜV ®



Testing Laboratory, Inspection Body, Certification Body, Calibration Laboratory

Notified Body 0408 IC 2932K-1

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

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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 AT153100000104093282 **BIC RZBAATWW**

UID ATU63240488 DVR 3002476



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1. Applicant

Company: Automated Control Technology Partners, Inc

Department: ----

Address: 2400 Sandlake Rd Suite 600

32839 Orlando - Florida

USA

Contact person: Mr. Thomas Gruber

EUT received on: 29.07.2013

Tests were performed on: 29.07.-31.07.2013

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2. Description of EUT

EUT: Streaming audio device (Ethernet connection)

Manufacturer: Automated Control Technology Partners, Inc

2400 Sandlake Rd Suite 600 32839 Orlando - Florida

USA

Description: Automated Control Technology Partners, Inc provided the following

configuration for the measurements:

Streaming audio device connected via Ethernet to a Laptop PC streaming audio to the device which is playing the audio through the

connected loudspeakers

Additionally the AC mains emission was measured also during

streaming via Bluetooth and WIFI

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

Streaming a 1kHz sinusoidal signal

Climatic conditions in

the emc laboratory:

Relative humidity: 49 % Temperature: 27 °C



3. Standards / Final result

Name	Title	Deviation	Result		
FCC Part 15 (10-1-12 Edition)	Radio Frequency Devices	none	OK		
OK EUT passed NOK EUT failed					



4. Test results

4. 1.) Conducted emission on the AC supply-line

Class B Limits

Frequeny range	Lir	mit				
Detector	Quasi Peak	Average				
0,150 - 0,5 MHz	66 - 56 dBµV 56 - 46 dBµV decreasing with the logarithm of frequency frequency					
0,5 - 5 MHz	56 dBμV	46 dΒμV				
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/CAV
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

Measurement uncertainty

Expanded uncertainty U_c = 2,67 dB (Uncertainty budget = 3,44 dB)

Operating mode	Measuring result
Normal operation	Measurement diagram 1 -> Ethernet Measurement diagram 2 -> WIFI Measurement diagram 3 -> Bluetooth



Test result

4. 1.1.) Measurement with QP-Detector Ethernet streaming

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed- Mark	Phase	PE
4,050	48,53	56,00	7,47		N	GND
4,790	41,36	56,00	14,64		N	GND
4,825	41,72	56,00	14,28		N	GND
4,855	48,83	56,00	7,17		N	GND
4,875	48,54	56,00	7,46		N	GND
4,925	45,37	56,00	10,63		N	GND
4,935	43,12	56,00	12,88		L	GND
4,970	45,34	56,00	10,66		L	GND
4,995	50,73	56,00	5,27		L	GND
5,660	50,35	60,00	9,65		L	GND

4. 1.2.) Measurement with CISPR AV-Detector Ethernet streaming

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed- Mark	Phase	PE
0,295	49,48	50,38	0,90		N	GND
0,445	46,49	46,97	0,48		L	GND
0,740	42,41	46,00	3,59		L	GND
0,885	43,58	46,00	2,42		N	GND
0,895	39,21	46,00	6,79		N	GND
1,035	41,04	46,00	4,96		N	GND
1,490	40,01	46,00	5,99		N	GND
1,625	43,17	46,00	2,83		L	GND
4,040	43,23	46,00	2,77		N	GND
4,855	42,81	46,00	3,19		N	GND



4. 1.3.) Measurement with QP-Detector WIFI streaming

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed- Mark	Phase	PE
7,795	17,62	60,00	42,38		N	GND

4. 1.4.) Measurement with CISPR AV-Detector WIFI streaming

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed- Mark	Phase	PE
0,405	39,59	47,75	8,16		N	GND
0,420	39,46	47,45	7,99		L	GND
0,465	39,80	46,60	6,80		L	GND

4. 1.5.) Measurement with QP-Detector Bluetooth streaming

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

4. 1.6.) Measurement with CISPR AV-Detector Bluetooth streaming

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed- Mark	Phase	PE
0,400	40,96	47,85	6,89		L	GND



4. 2.) Radiated emission according to FCC Part 15

Class B Limits

≤ 1 GHz → > 1 GHz →	Quasi Peak Limit Average Limit (Peak Limit 20 dB
	above average Limit)

Frequency range	Limit	Bandwith	Measurement distance
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

Measuring apparatus parameters

Parameter	Preview measurement	Final measurement	Parameter	Preview measure- ment	Final measure- ment
Start frequency	30 / 1000 MHz	30 / 1000 MHz	Detector	Max Peak	Quasi Peak
Stop frequency	1 GHz / 5 GHz	1 GHz / 5 GHz	Measuring time	10 ms	1 s
Stepsize	50 / 500 kHz	50 / 500 kHz	RF-attenuation	0dB	0dB
IF- Bandwidth	120 / 1000 kHz	120 / 1000 kHz	Preamplifier	20 dB	20 dB

Measurement uncertainty

30-200 MHz horizontal: Expanded uncertainty U_c = 3,20 dB (Uncertainty budget = 5,06 dB) 30-200 MHz vertical: Expanded uncertainty U_c = 4,33 dB (Uncertainty budget = 5,17 dB) 0,2-1 GHz horizontal: Expanded uncertainty U_c = 4,26 dB (Uncertainty budget = 5,45 dB) 0,2-1 GHz vertical: Expanded uncertainty U_c = 5,32 dB (Uncertainty budget = 6,47 dB) 1-6 GHz: Expanded uncertainty U_c = 5,14 dB (Uncertainty budget = 5,17 dB)

Operating mode	Measuring result
Normal operation	Measurement diagram 4-6



Test result

4. 2.1.) Measurement with QP-Detector (30 MHz - 1000 MHz)

Frequency MHz	Level dBµV/m	Limit dBµV/m	Margin dB	Exceed- Mark	Height cm	Azimuth deg	Polarization
39,05	32,53	40,00	7,47		99	310	vertical
39,85	32,76	40,00	7,24		103	315	vertical
40,25	31,78	40,00	8,22		108	295	vertical
40,65	34,41	40,00	5,59		103	315	vertical
41,05	31,83	40,00	8,17		102	241	vertical
41,50	33,76	40,00	6,24		99	266	vertical
41,90	32,35	40,00	7,65		99	297	vertical
42,30	33,84	40,00	6,16		103	261	vertical
43,10	33,06	40,00	6,94		99	293	vertical
189,05	30,95	43,50	12,55		155	-8	vertical
303,85	34,92	46,00	11,08		114	274	horizontal
305,05	35,98	46,00	10,02		103	279	horizontal
305,85	36,01	46,00	9,99		150	281	horizontal
306,70	36,63	46,00	9,37		115	279	horizontal
306,80	34,29	46,00	11,71		118	182	horizontal
308,40	34,00	46,00	12,00		103	181	horizontal
308,95	34,41	46,00	11,59		112	171	horizontal
310,15	33,85	46,00	12,15		123	186	horizontal
311,70	33,09	46,00	12,91		116	185	horizontal
312,30	34,20	46,00	11,80		113	176	horizontal

Appendix 1 Test equipment used



	Anechoic Chamber with 3m measurement distance	NT-100		Spectrumanalyzer – FSP7 9 kHz – 7 GHz	NT-200
	Stripline according to ISO 11452-5	NT-108		ESCI - Test receiver 9 kHz - 7 GHz	NT-203/1
\boxtimes	MA4000 - Antenna mast 1 - 4 m height	NT-110/1	\boxtimes	ESI26 – Test receiver 20 Hz – 26,5 GHz	NT-207
	DS - Turntable 0 - 400 ° Azimuth	NT-111/1		Digital Radio Tester CTS55	NT-208
\boxtimes	CO3000 Controller Mast+Turntable	NT-112/1		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		Mixer M28HW 26,5 GHz - 40 GHz	NT-214
	3115 - Horn Antenna 1 - 18 GHz (immunity)	NT-125	\boxtimes	RubiSource T&M Timing reference	NT-216
	3116 - Horn Antenna 18 - 40 GHz	NT-126		Radiocommunicationanalyzer SWR 1180 MD	NT-217
	SAS-200/543 - Bicon. Antenna 20 MHz - 300 MHz	NT-127		Mixer M19HWD 40 GHz – 60 GHz	NT-218
	AT-1080 - Log. Per. Antenna 80 - 1000 MHz	NT-128		Mixer M12HWD 60 GHz – 90 GHz	NT-219
	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-129		DSO9104 Digital scope	NT-220/1
	HK-116 - bicon. Antenna 20 MHz - 300 MHz	NT-130		TPS 2014 Digital scope	NT-222
\boxtimes	3146 - Log. Per. Antenna 200 – 1000 MHz	NT-131		Artificial Ear according to IEC 60318	NT-224
	Loop Antenna H-Field	NT-132		1 kHz Sound calibrator	NT-225
	Horn Antenna 500 MHz - 2900 MHz	NT-133		B10 - Harmonics and flicker analyzer	NT-232
	Horn Antenna 500 MHz - 6000 MHz	NT-133/1		ARS 16/3 – Harmonics- flicker analyzer	NT-232/1
	Log. per. Antenna 800 MHz - 2500 MHz	NT-134		SRM-3000 Spectrumanalyzer	NT-233
	Log. per. Antenna 800 MHz - 2500 MHz	NT-135		SRM-3006 Spectrumanalyzer	NT-233/1a
	BiConiLog Antenna 26 MHz – 2000 MHz	NT-137		E-field probe SRM 75 MHz – 3 GHz	NT-234
	Conical Dipol Antenna PCD8250	NT-138		Field Meter NBM-500 incl. E- and H-Field probes	NT-240a-d
\boxtimes	HF 906 - Horn Antenna 1 - 18 GHz (emission)	NT-139		Hall-Teslameter ETM-1	NT-241
	HZ-1 Antenna tripod	NT-150		EFA-3 H-field- / E-field probe	NT-243
	BN 1500 Antenna tripod	NT-151		Field Meter EMR-200 100 kHz – 3 GHz	NT-244
	Ant. tripod for EN61000-4-3 Model TP1000A	NT-156		E-field probe 100 kHz – 3 GHz	NT-245
	Power quality analyzer Fluke 1760 (complete set)	NT-160 - NT-173		H-field probe 300 kHz – 30 MHz	NT-246

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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	Oscillatory Wave Simulator incl. Coupling networks	NT- 328a+b+c
	ELT-400 1 Hz – 400 kHz	NT-249	BTA-250 - RF-Amplifier 9 kHz - 220 MHz / 250 W	NT-330
	MDS 21 - Absorbing clamp 30 - 1000 MHz	NT-250	T82-50 RF-Amplifier 2 GHz – 8 GHz	NT-331
	FCC-203l EM Injection clamp	NT-251	500W1000M7 - RF-Amplifier 80 - 1000 MHz / 500 W	NT-332
	FCC-203I-DCN Ferrite decoupling network	NT-252	AS0102-65R - RF-Amplifier 1 GHz - 2 GHz	NT-333
	PR50 Current Probe	NT-253	APA01 – RF-Amplifier 0,5 GHz – 2,5 GHz	NT-334
	PR630 Current Probe	NT-254	Preamplifier 1 GHz - 4 GHz	NT-335
	Fluke 87 V True RMS Multimeter	NT-260	Preamplifier for GPS MKU 152 A	NT-336
	Model 2000 Digital Multimeter	NT-261	Preamplifier 100 MHz – 23 GHz	NT-337
	Fluke 87 V Digital Multimeter	NT-262/1	DC Block 10 MHz – 18 GHz Model 8048	NT-338
	ESH2-Z5-U1 Artificial mains network 4x25A	NT-300	2-97201 Electronic load	NT-341
	ESH3-Z5-U1 Artificial mains network 2x10A	NT-301	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-344
	ESH3-Z6-U1 Artificial mains network 1x100A	NT-302	TSX3510P - Power supply 0-30 V / 0 - 10 A	NT-345
	ESH3-Z6-U1 Artificial mains network 1x100A	NT-302a	VDS 200 Mobil-impuls-generator	NT-350
	PHE 4500/B Power amplifier	NT-304	LD 200 Mobil-impuls-generator	NT-351
\boxtimes	PAS 5000 Power amplifier	NT- 304/1a	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
	RefRad Reference generator	NT-312	PHE 4500 - Mains impedance network	NT-401
	SMP 02 Signal generator 10 MHz - 20 GHz	NT-313	IP 6.2 Coupling filter for data lines (Surge)	NT-403
	40 MHz Arbitrary Generator TGA1241	NT-315	TK 9421 High Power Volt. Probe 150 kHz - 30 MHz	NT-409
	Artificial mains network NSLK 8127-PLC	NT-316	ESH2-Z3 - Probe 9 kHz - 30 MHz	NT-410
	Inrush Current Source for PAS 5000	NT-317a	IP 4 - Capacitive clamp (Burst)	NT-411
	Control and measurement device Sycore	NT-318	Highpass-Filter 100 MHz – 3 GHz	NT-412
	PEFT - Burst generator up to 4 kV	NT-320	Highpass-Filter 600 MHz – 4 GHz	NT-413
	ESD 30 System up to 25 kV	NT-321	Highpass-Filter 1250 MHz – 4 GHz	NT-414
	PSURGE 4.1 Surge generator	NT-324	Highpass-Filter 1800 MHz – 16 GHz	NT-415
	TRANSIENT 1000 Immunity test system	NT-325		

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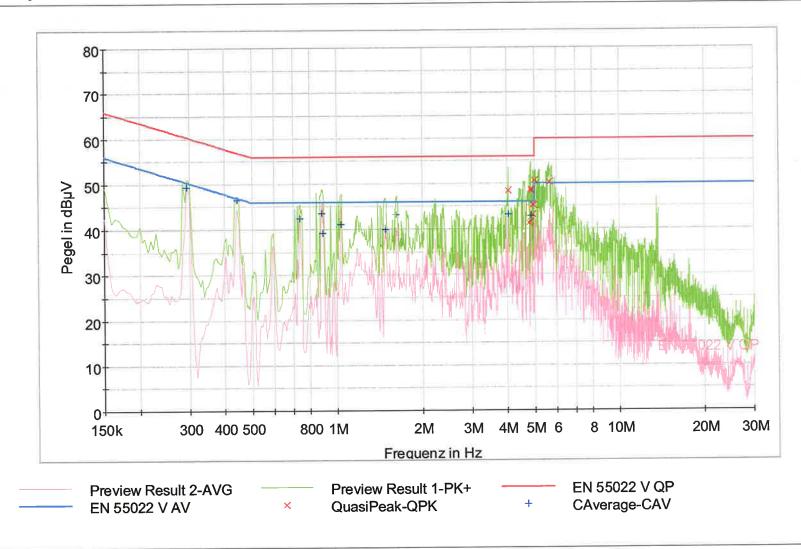
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Appendix 1 (continued) Test equipment used



Division Medical

	Highpass-Filter 3500 MHz – 18 GHz	NT-416		FCC-801-S25 Coupling decoupling network	NT-462	Division Medical Technology/ Communication Technology/ EMC
	RF-Attenuator 10 dB DC – 18 GHz / 50 W	NT-417		FCC-801-T4 Coupling decoupling network	NT-463	Department: EMC
	RF-Attenuator 6 dB DC – 18 GHz / 50 W	NT-418		FCC-801-C1 Coupling decoupling network	NT-464	Test report number: M/EMV-13/186
	RF-Attenuator 3 dB DC – 18 GHz / 50 W	NT-419		F-16A - Current probe 1kHz - 70MHz	NT-465	Page: 3 of 3
	RF-Attenuator 20 dB DC - 1000 MHz / 25 W	NT-421		95242-1 – Current probe 1 MHz – 400 MHz	NT-468	Date: 16.09.2013
	RF-Attenuator 30 dB DC - 1000 MHz / 1 W	NT-423		94106-1L-1 – Current probe 100 kHz – 450 MHz	NT-471	Checked by:
	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	\boxtimes	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	\boxtimes	EMC32 Version 9.01 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 1.3.1 software for SRM-3006	NT-522/1	
	RF-Attenuator DC – 18 GHz 6 dB	NT-436		Spitzenberger und Spies Test software V3.4	NT-525	
	RF-Attenuator DC – 18 GHz 6 dB	NT-437		Noise power test apparatus according to EN 55014	NT-530	
	RF-Attenuator DC – 18 GHz 10 dB	NT-438		Vertical coupling plane (ESD)	NT-531	
	RF-Attenuator DC – 18 GHz 20 dB	NT-439		Test cable #4 for EN 61000-4-6	NT-553	
	I+P 7780 Directional coupler 100 - 2000 MHz	NT-440	\boxtimes	Test cable #3 for conducted emission	NT-554	
	ESH3-Z2 - Pulse limiter 9 kHz - 30 MHz	NT-441		Test cable #5+#6 ESD-cable (2x470k)	NT-555 + NT-556	
	Power Divider 6 dB/1 W/50 Ohm	NT-443		Test cable #8 Sucoflex 104EA	NT-559	
	Directional coupler 0,1 MHz – 70 MHz	NT-444		Test cable #9 (for outdoor measurements)	NT-580	
	Directional coupler 0,1 MHz – 70 MHz	NT-445		Test cable #10 (for outdoor measurements)	NT-581	
	Tube imitations according to EN 55015	NT-450		Test cable #13 Sucoflex 104PE	NT-584	
	FCC-801-M3-16A Coupling decoupling network	NT-458		Test cable #21 for SRM-3000	NT-592	
	FCC-801-M2-50A Coupling decoupling network	NT-459		Shield chamber	NT-600	
	FCC-801-M5-25 Coupling decoupling network	NT-460		Climatic chamber	M-1200	
	FCC-801-AF10 Coupling decoupling network	NT-461				



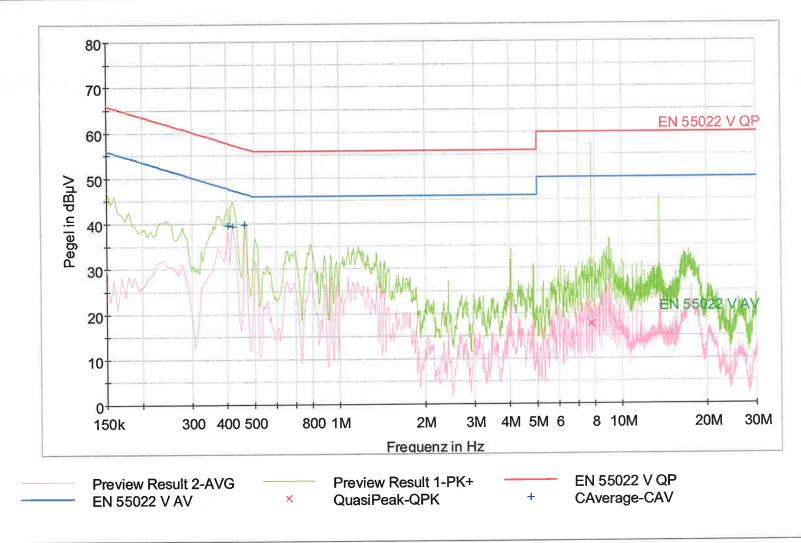
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Measurement diagram:

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Department: EMC
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Measurement diagram



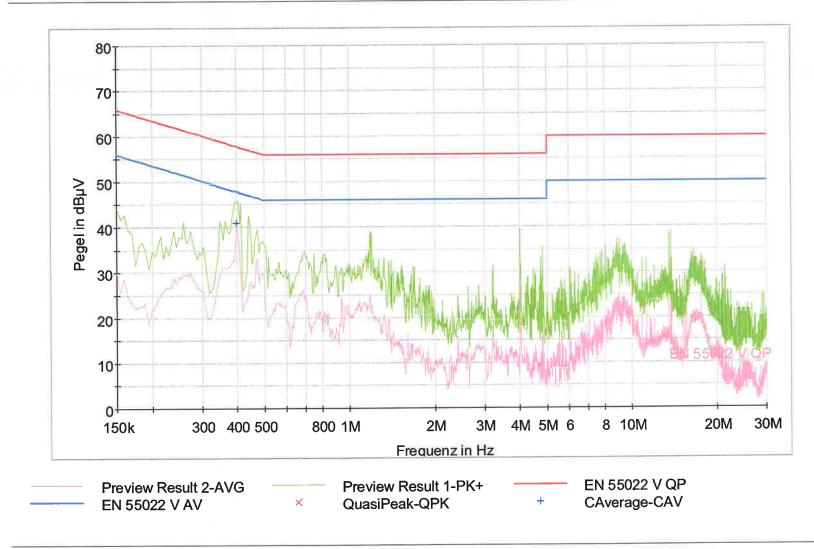


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Measurement diagram: 2 of 6 Date: 16.09.2013

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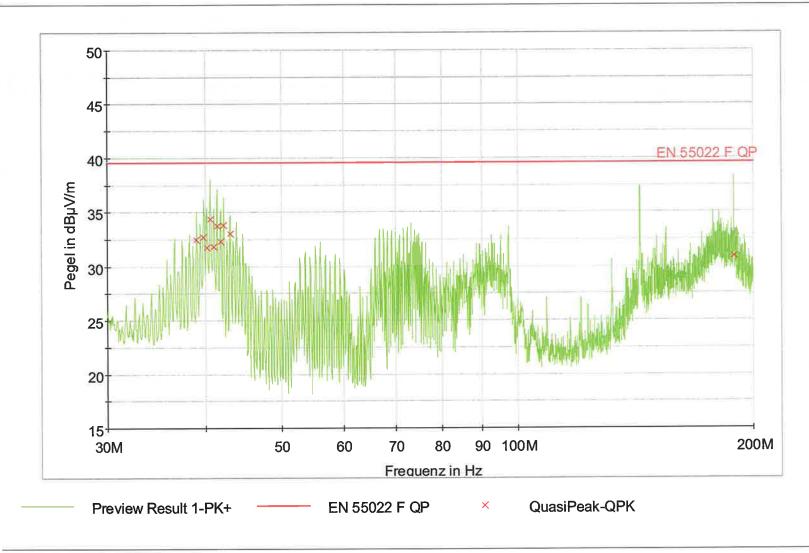
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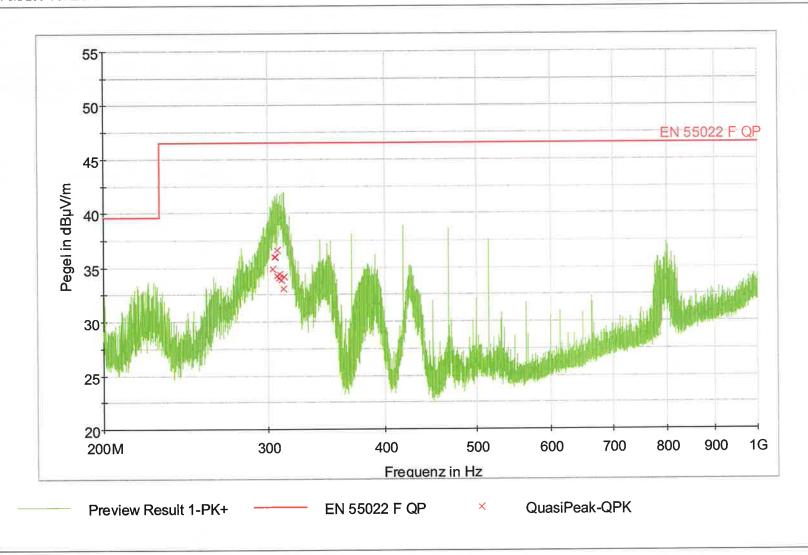
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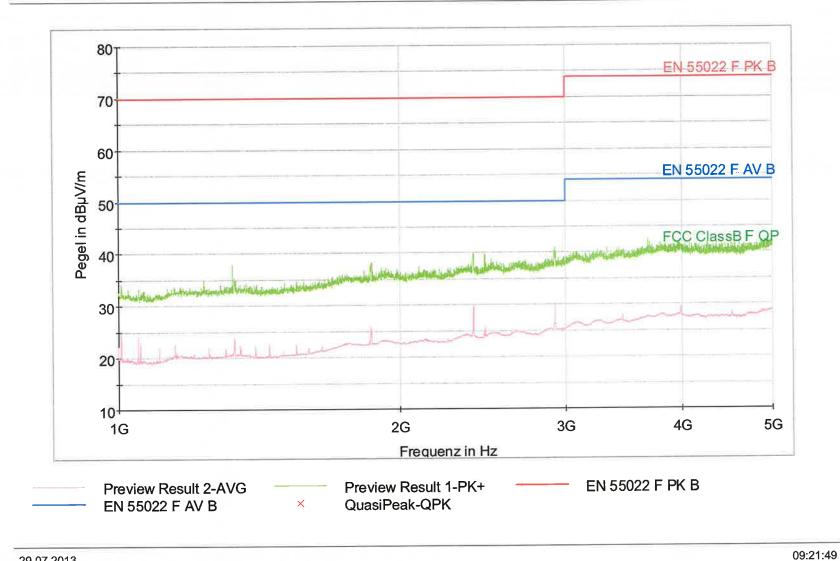
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