



OŚRODEK BADAWCZO-ROZWOJOWY
CENTRUM TECHNIKI MORSKIEJ
SPÓŁKA AKCYJNA

**Laboratorium Kompatybilności
Elektromagnetycznej**

81-109 GDYNIA, ul. Dickmana 62, tel. (0-58) 66 65
430; e-mail: bl@ctm.gdynia.pl
fax (0-58) 66 56 487



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Copy No.: 1

TEST REPORT

No. BL/014/339/12

ELECTROMAGNETIC COMPATIBILITY (EMC) TESTS

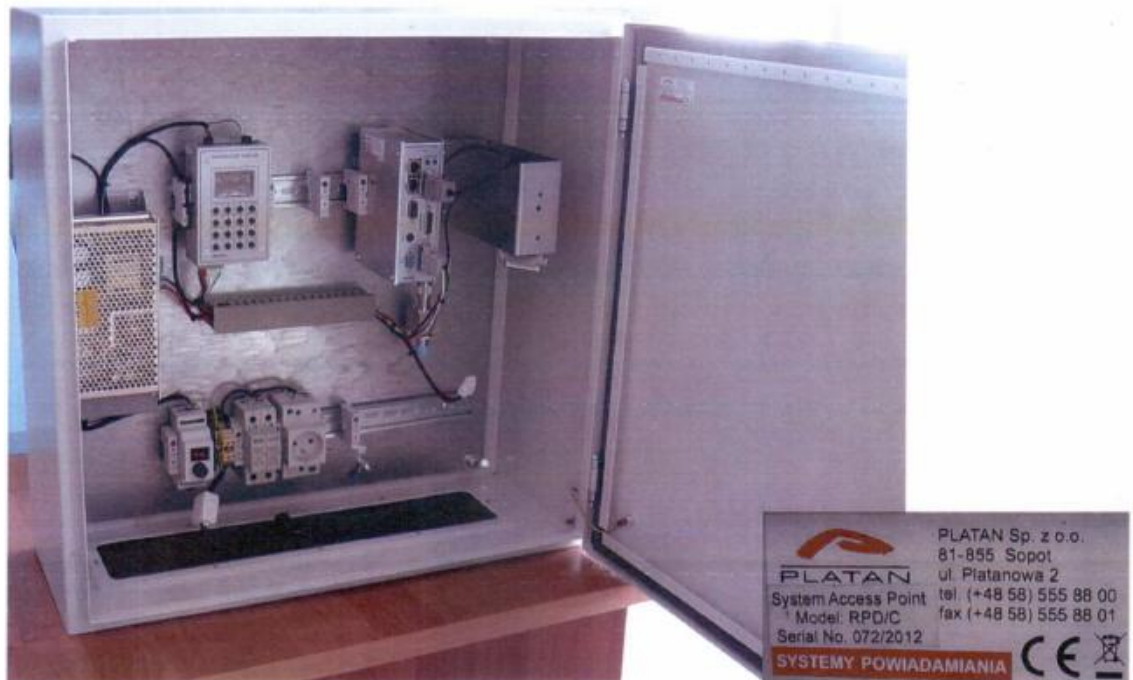
**RPD/C System Access Point
(Standard Version)**

1. Employer's name and address: PLATAN Sp. z o.o., sp.k. ul. Platanowa 2, 81-855 Sopot, Poland

2. Testing facility: Testing facility of Laboratorium Kompatybilności Elektromagnetycznej OBR Centrum Techniki Morskiej [EMC Lab of R&D Department of the Marine Technology Centre] in Gdynia and Laboratorium Badawcze Instytutu Elektrotechniki [Testing Laboratory of Electrotechnics Institute] Branch in Gdansk, Poland (measurement of radiated electromagnetic disturbances).

3. Characteristics and identification of tested object

3.1 Identification of tested object: RPD/C System Access Point (Standard Version).



3.2 Numbers of tested object: 072/2012.

3.3 Manufacturer: PLATAN Sp. z o.o. sp. k., ul. Platanowa 2, 81-855 Sopot, Poland.

3.4 Specifications of accessories:

See Table 1.

Table 1

Item	Equipment	Pcs	Type
1	Kenwood VHF/UHF Digital & FM Mobile Radio	1	NX-700/800
2	PC	1	Amilo

4. Date of reception of tested object: 01 October 2012.

5. Dates of tests: 02 October 2012; 03 October 2012; from 08 October 2012 to 10 October 2012; 12 October 2012; 15 October 2012.

6. Test standards and procedures

PN-EN 61000-6-1 :2008 Electromagnetic compatibility (EMC) – Part 6-1: Generic standards. Immunity for residential, commercial and light-industrial environments;

PN-EN 61000-6-3 :2008 Electromagnetic compatibility (EMC)- Part 6-3: Generic standards. Emission standard for residential, commercial and light-industrial environments;

PN-EN 61000-3-2 :2007 + A1 :2010 + A2 :2010 Electromagnetic compatibility (EMC) – Part 3-2: Limits. Limits for harmonic current emissions (equipment input current ≤ 16 A per phase);

PN-EN 61000-3-3 :2011 Electromagnetic compatibility (EMC) – Part 3-3: Limits. Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection;

7. Scope of tests

7.1 Immunity to electromagnetic exposure

See Table 2.

Table 2 - The scope of electromagnetic exposure immunity tests

Item	Test	Signal characteristics, time and electrical parameters	Testing method as per	Notes
1	2	3	4	5
1	Immunity to electrostatic discharges – direct discharges	a) Contact discharge method: Amplitude 4 kV Polarisation "+" and "-" Discharge frequency 1/sec Discharge quantity 10/MN b) Air discharge method: Amplitude 2 kV, 4 kV, 8 kV Polarisation "+" and "-" Discharge frequency 1/s Quantity of discharges 10/MN	PN-EN 61000-4-2	MN – place of exposure: - metal housing; - locks installed in the housing, 2 pcs.
2	Immunity to series of fast electrical transients (bursts)	Impulse 5/50 ns Amplitude - power supply circuit 1 kV - signal lines 0.5 kV Impulse frequency 5 kHz Series duration 15 ms Series repetition interval 300 ms Polarisation "+" and "-" Test duration 60 s	PN-EN 61000-4-4	Exposure of power supply circuit 220 VAC, f=60 Hz and signal circuits (LAN connector) through capacity clamp
3	Immunity to surges	Impulse 1.2/50 μ s Amplitude, power supply circuit - line to earth 2 kV - line to line 1 kV Repetition interval 15 sec Polarisation "+" and "-" Impulse quantity 10	PN-EN 61000-4-5	Exposure of power supply circuit 220 VAC, f=60 Hz
4	Immunity to voltage dips	Voltage level 0 V Series duration 8.3 ms Voltage level 0 V Duration 16.7 ms Voltage level 154 V Duration 500 ms Repetition interval 10 sec Test cycle quantity 10 Phase angle 0°	PN-EN 61000-4-11	Exposure of power supply circuit 220 VAC, f=60 Hz

Table 2 continued

Item	Test	Signal characteristics, time and electrical parameters		Testing method as per	Notes
1	2	3		4	5
5	Immunity to short outages	Voltage level	0 V	PN-EN 61000-4-11	Exposure of power supply circuit 220 VAC, f=60 Hz
		Duration	5 sec		
		Repetition interval	10 sec		
		Test cycle quantity	5		
		Phase angle	0°		
6	Immunity to conducted disturbances	Frequency range	150kHz ÷ 80MHz	PN-EN 61000-4-6	Exposure of power supply cables 220 VAC, f=60 Hz; L, N, PE and signal lines (LAN1 connector)
		Interference level	3 V		
		Modulation	80%, AM, sinus		
		Modulation frequency	1 kHz		
7	Immunity to electromagnetic field radiation	Frequency range	80 MHz ÷ 1.0 GHz	PN-EN 61000-4-3	EUT exposure in the log-periodic antenna and comb antenna
		Field intensity	3 V/m		
		Modulation	80%, AM, sinus		
		Modulation frequency	1 kHz		
8	Immunity to electromagnetic field radiation	Frequency range	1.4 GHz ÷ 2.0 GHz		
		Field intensity	3 V/m		
		Modulation	80%, AM, sinus		
		Repetition frequency	1 kHz		
9	Immunity to electromagnetic field radiation	Frequency range	2.0 GHz ÷ 2.7 GHz		
		Field intensity	1 V/m		
		Modulation	80%, AM, sinus		
		Repetition frequency	1 kHz		

7.2 Measurement of electromagnetic disturbance level

See Table 3.

Table 3 - Measurement of electromagnetic disturbance level

Item	Test	Testing method as per
1	Measurement of voltages of disturbances on power supply terminals in the frequency range 150 kHz to 30 MHz	PN-EN 61000-6-3
2	Measurement of radiated disturbances in the frequency range 30 MHz to 1 GHz	PN-EN 61000-6-3
3	Measurement of harmonic current emission	PN-EN 61000-3-2 Table 1, Class A
4	Measurement of voltage fluctuations and flicker	PN-EN 61000-3-3 $P_{st} < 1.0$ $d_{max} < 4.0 \%$

8. List of instruments

See Table 4.

Table 4 - List of testing instruments

Item	Name, type	Serial number
1	Rohde & Schwartz EMI Test Receiver ESIB26	100400
2	VAISALA Humidity and Temperature Meter HM70	Y4020036
3	PMM Field Strength Meter Type 8053B	262WL71011
4	Electric Field Probe EP183 for PMM Field Strength Meter	000WJ60311
5	Electric Field Probe EP44M for PMM Field Strength Meter	000WJ30609
6	PMM L3-32 artificial mains network	1220X00309
7	ETS log-periodic antenna type 3144	86258
8	ETS 3115 Double-Ridged Guide Antenna	86509
9	AR power amplifier type 100W1000B	330819
10	AR power amplifier type 25S1G4A	311015
11	AR power amplifier type 100A250A	330349
12	AGILENT E8257D Signal Generator	MY 44320692
13	ANRITSU ML2430A Power Meter	4510015
14	MA2472D probe for ANRITSU Power Meter	1009111
15	Electromagnetic reverberation chamber	7917
16	Rosenberg MICRO-COAX cables	-
17	COVAL 5m long wind-up measuring tape	M01
18	PC	-
19	EM Test UCS500M/4 Ultra Compact Simulator	0998-05
20	MV 2616 autotransformer	0898-01
21	Capacitive Coupling Clamp, type HFK	-
22	FHT-25 Flicker and Harmonic Test System	101B3107
23	120ASX-UPC1M Power Supply	910
24	CNV 508 Coupling/Decoupling Networks	0798-03
25	MC 2630 transformer	F-500
26	AGILENT MS09404 A Digital Oscilloscope	MY 50410135
27	CDN M2/M3 Coupling/Decoupling Networks	14592
28	KEMZ 801 Ferrite Coupling Clamp	14298
29	ESD EMT Generator Type EDS 30N	V1221112688
30	Rohde & Schwarz ESU 26 EMI Test Receiver	100059
31	Log-periodic antenna, type 3142	OG-006-III-207
32	Anechoic chamber	OG

9. Test results

9.1 Immunity to electromagnetic exposure

See Table 5.

Table 5 - The results of electromagnetic exposure immunity tests

Item	Exposure type	Severity level	Test results
1	Immunity to electrostatic discharge – direct discharge: a) contact discharge method b) air discharge method	a) 4 kV b) 2 kV, 4 kV, 8 kV	<i>Normal operation within technical requirement limits meets the requirement of PN-EN 61000-6-1 :2008, Table 1 Assessment criterion A</i>
2	Immunity to fast electrical transients/bursts a) power supply circuit b) signal lines	a) 2 kV b) 0.5 kV	<i>Normal operation within technical requirement limits meets the requirement of PN-EN 61000-6-1 :2008, Table 2 Assessment criterion A</i>
3	Immunity to surges a) “line to earth” b) “line to line”	a) 2 kV b) 1 kV	<i>Normal operation within technical requirement limits meets the requirement of PN-EN 61000-6-1 :2008, Table 4 Assessment criterion A</i>
4	Immunity to voltage dips	0 V; 8.3 ms 0 V; 16.7 ms 154 V; 500 ms	<i>Normal operation within technical requirement limits meets the requirement of PN-EN 61000-6-1 :2008, Table 4 Assessment criterion A</i>
5	Immunity to short outages	0 V; 5 s	<i>Normal operation within technical requirement limits meets the requirement of PN-EN 61000-6-2 :2008, Table 4 Assessment criterion A</i>
6	Immunity to conducted disturbances in the frequency range 150 kHz - 80 MHz	3 V	<i>Normal operation within technical requirement limits meets the requirement of PN-EN 61000-6-1 :2008, Table 4 Assessment criterion A</i>
7	Immunity to radiated electromagnetic field in the frequency range 80 MHz - 1 GHz	3 V/m	<i>Normal operation within technical requirement limits meets the requirement of PN-EN 61000-6-1 :2008, Table 1 Assessment criterion A</i>
8	Immunity to radiated electromagnetic field in the frequency range 1.4 GHz – 2.0 GHz	3 V/m	<i>Normal operation within technical requirement limits meets the requirement of PN-EN 61000-6-1 :2008, Table 1 Assessment criterion A</i>
9	Immunity to radiated electromagnetic field in the frequency range 2.0 GHz – 2.7 GHz	1 V/m	<i>Normal operation within technical requirement limits meets the requirement of PN-EN 61000-6-1 :2008, Table 1 Assessment criterion A</i>

9.2 Measurement of electromagnetic disturbance level

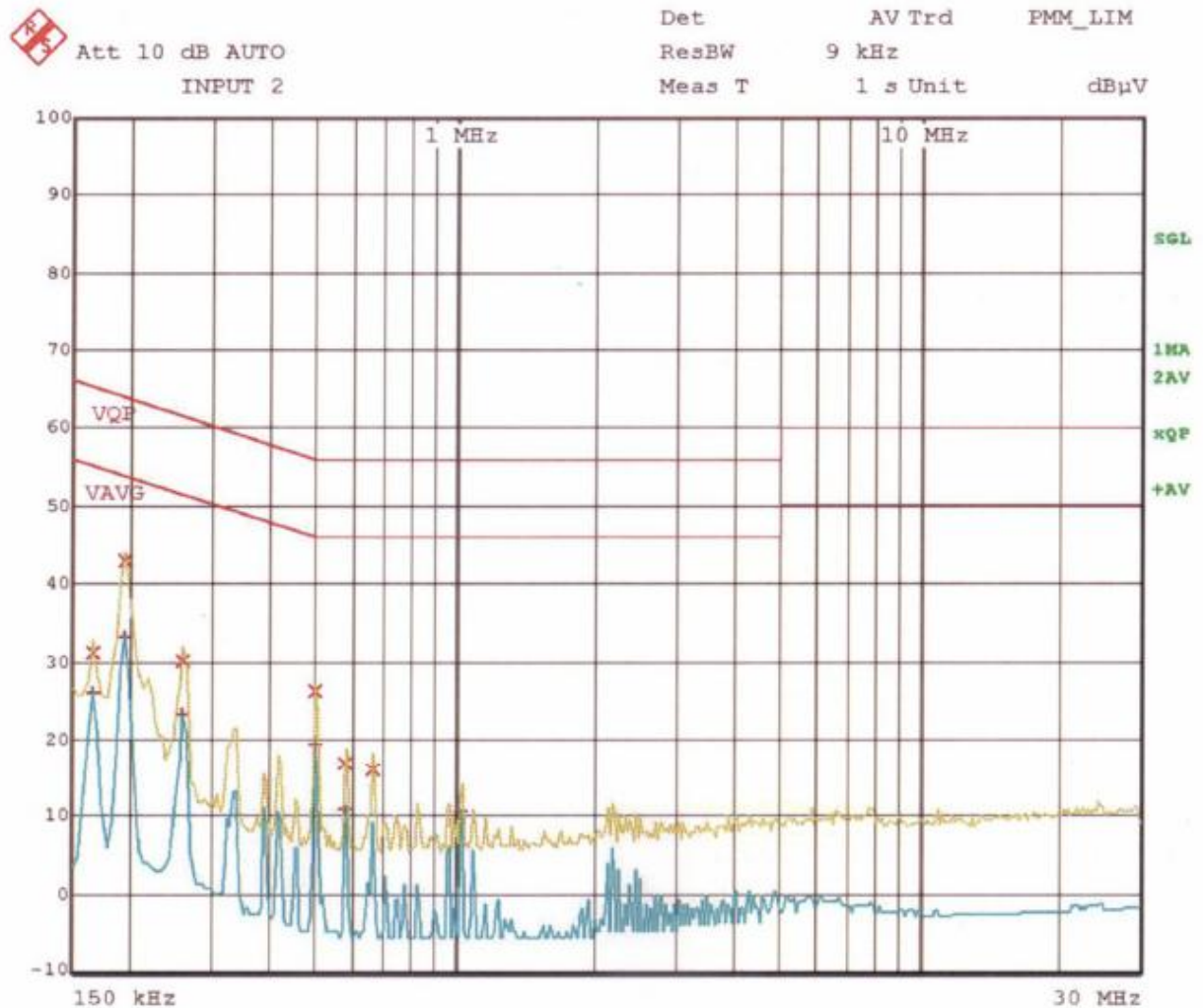
See Table 6.

Table 6 Measurement of electromagnetic disturbance level

Item	Exposure type	Severity level	Test results
1	Measurements of disturbance voltage levels on power supply terminals in the frequency range 150 kHz ÷ 30 MHz	66/56 dB μ V 56/46 dB μ V	<i>meets the requirement of PN-EN 61000-6-3 :2008, Table 1 for characteristics, see Fig. 1, 2</i>
2	Measurement of radiated disturbances level in the frequency range 30 MHz ÷ 1 GHz	30/37 dB μ V	<i>meets the requirement of PN-EN 61000-6-3 :2008, Table 1 for characteristics, see Fig. 3 & 4</i>
3	Measurement of harmonic current emission	PN-EN 61000-3-2 Table 1, Class A	<i>N/A The standard applies to the units supplied with phase voltages from 220VAC to 250VAC at 50Hz. The tested unit was supplied with 220VAC at 60Hz.</i>
4	Measurement of voltage fluctuations and flicker	PN-EN 61000-3-3 $P_{st} < 1.0$ $d_{max} < 4.0 \%$	<i>N/A The standard applies to the units with power consumption of: $P > 75W$. Power consumption measured in the tested unit was $P=17.0W$</i>

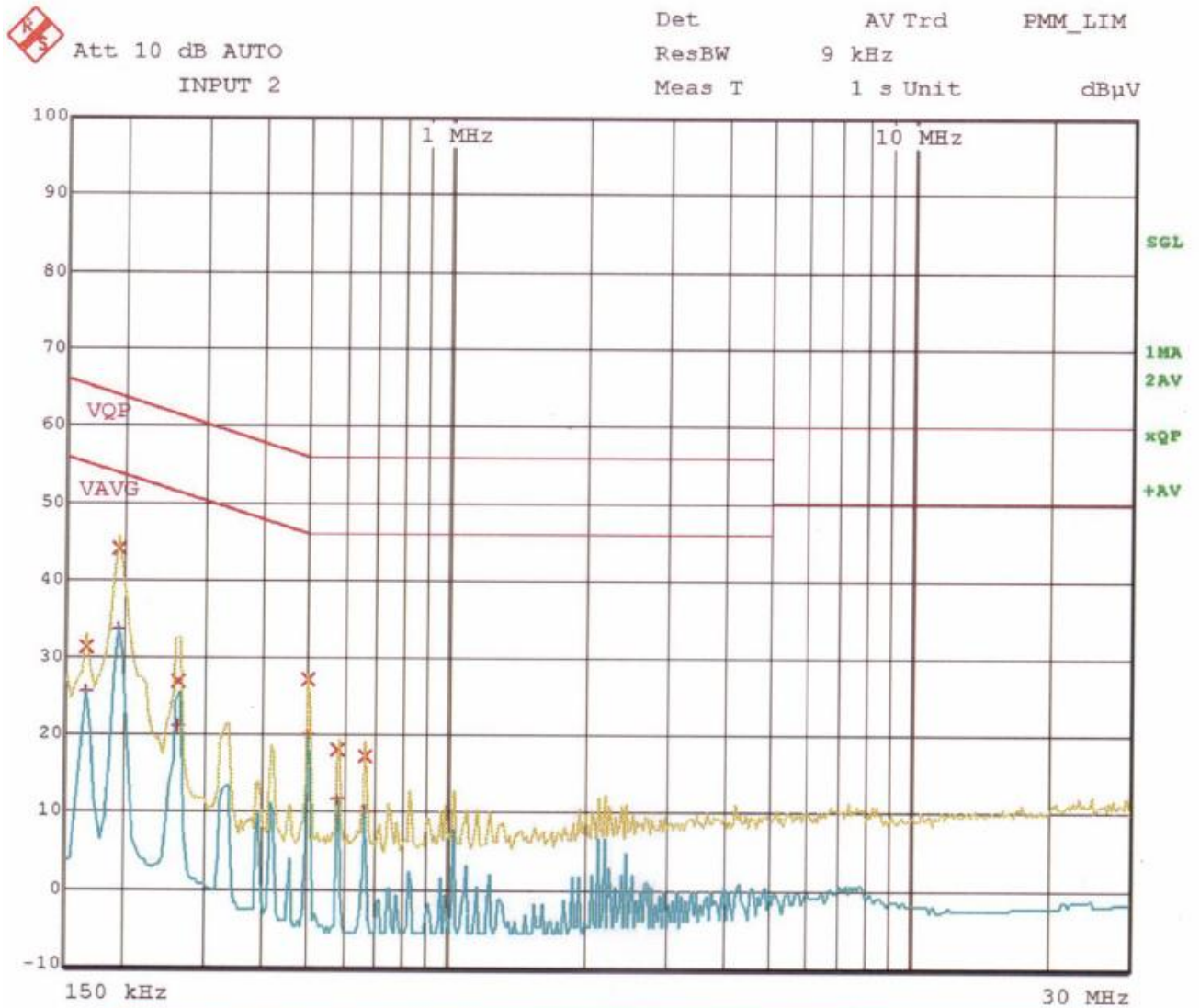
9.2.1 Results of measurements of disturbance voltage levels on power supply terminals in the frequency range 150 kHz to 30 MHz

Results of measurements are shown in Figures from 1 to 2. The characteristics shows disturbance level measured with the use of average, peak and quasi-peak value detector. Permissible levels are shown with a red line on the graph.



EDIT PEAK LIST (Final Measurement Results)			
Trace1: VQP		Trace2: VAVG	
Trace3: ---		Trace4: ---	
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Quasi Peak	166.0000 kHz	31.15	-34.00
2 Average	166.0000 kHz	26.00	-29.15
1 Quasi Peak	194.0000 kHz	42.91	-20.95
2 Average	194.0000 kHz	32.90	-20.96
1 Quasi Peak	258.0000 kHz	29.92	-31.56
2 Average	258.0000 kHz	23.18	-28.31
1 Quasi Peak	498.0000 kHz	26.13	-29.89
2 Average	498.0000 kHz	19.33	-26.69
1 Quasi Peak	582.0000 kHz	16.92	-39.07
2 Average	582.0000 kHz	10.84	-35.15
1 Quasi Peak	666.0000 kHz	16.12	-39.87
2 Average	1.0340 MHz	10.47	-35.52

Fig. 1 – Voltage disturbance levels on power supply terminals in the frequency range from 150 kHz to 30 MHz for Line L; power supply 220VAC at f=60Hz

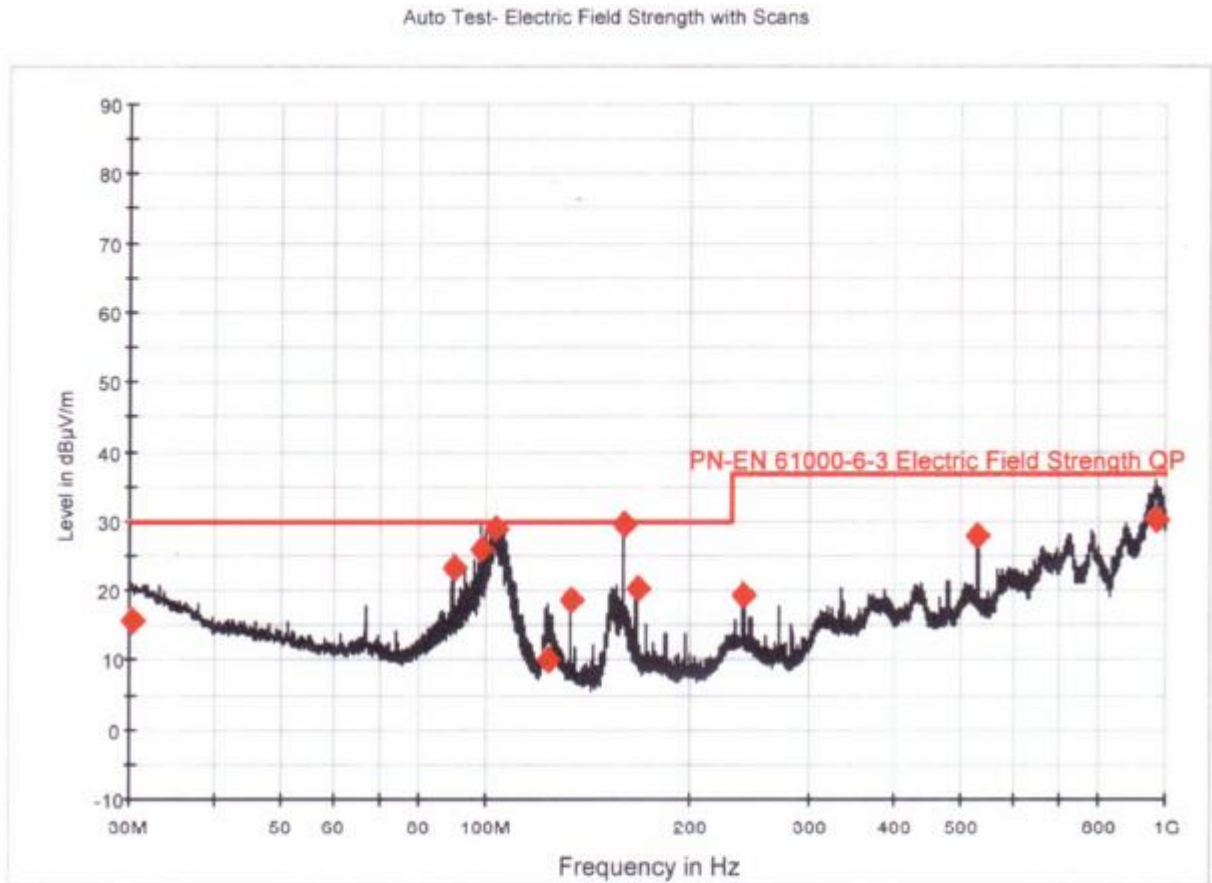


EDIT PEAK LIST (Final Measurement Results)			
Trace1: VQP		Trace2: VAVG	
Trace3: ---		Trace4: ---	
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Quasi Peak	166.0000 kHz	31.08	-34.07
2 Average	166.0000 kHz	25.37	-29.78
1 Quasi Peak	194.0000 kHz	44.10	-19.76
2 Average	194.0000 kHz	33.66	-20.19
1 Quasi Peak	262.0000 kHz	26.83	-34.53
2 Average	262.0000 kHz	20.81	-30.55
1 Quasi Peak	498.0000 kHz	26.92	-29.10
2 Average	498.0000 kHz	19.92	-26.10
1 Quasi Peak	582.0000 kHz	17.85	-38.14
2 Average	582.0000 kHz	11.52	-34.47
1 Quasi Peak	666.0000 kHz	17.20	-38.79
2 Average	666.0000 kHz	10.02	-35.98

Fig. 2 – Voltage disturbance levels on power supply terminals in the frequency range 150 kHz to 30 MHz for Line N; power supply 220VAC at f=60Hz

9.2.2 Results of measurements of radiated disturbances in the frequency range 30 MHz to 1 GHz

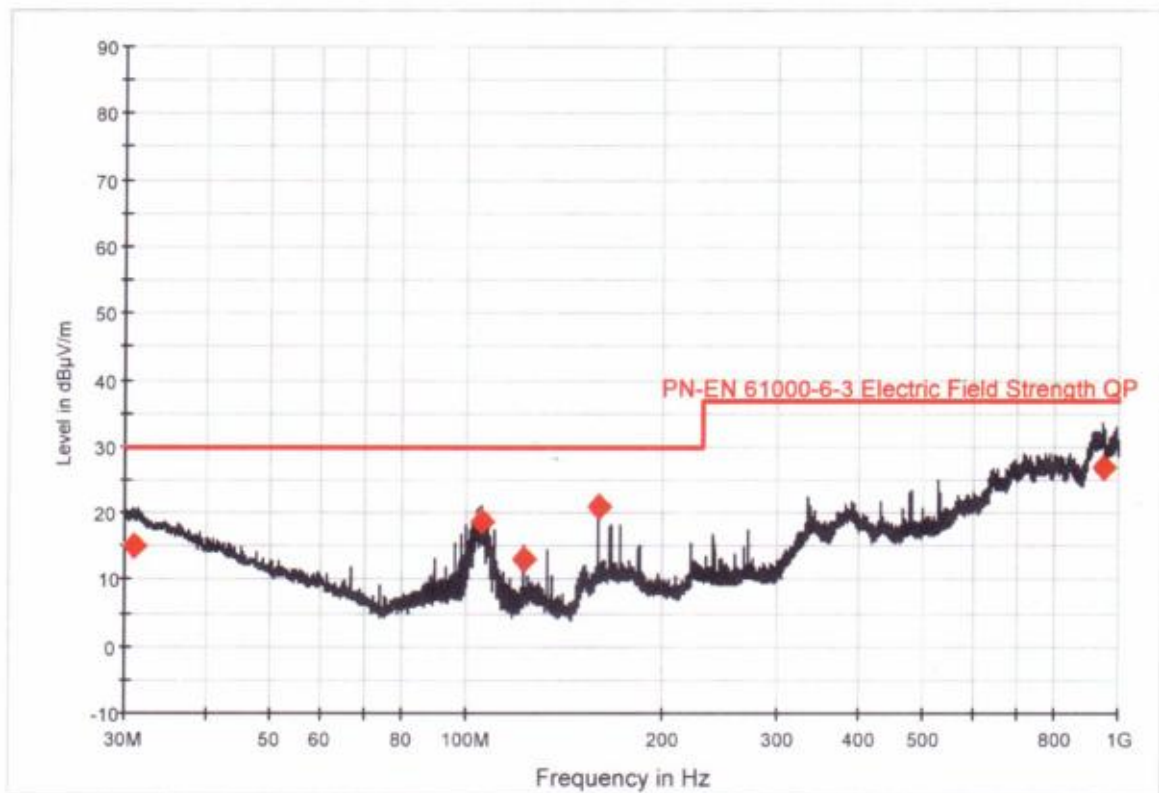
Results of measurements are shown in Figures 3 to 4. The characteristics show disturbance levels, measured with peak value detector and quasi-peak value detector. Permissible level is marked with a red line on the graph.



Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
30.300000	15.8	3000.0	120.000	V	17.4	14.2	30.0	
89.500000	23.2	3000.0	120.000	V	11.0	6.8	30.0	
98.350000	25.8	3000.0	120.000	V	10.5	4.2	30.0	
103.100000	28.8	3000.0	120.000	V	9.5	1.2	30.0	
123.450000	10.1	3000.0	120.000	V	5.1	19.9	30.0	
133.300000	18.7	3000.0	120.000	V	4.8	11.3	30.0	
159.750000	29.5	3000.0	120.000	V	6.2	0.5	30.0	
166.650000	20.3	3000.0	120.000	V	5.7	9.7	30.0	
240.050000	19.5	3000.0	120.000	V	9.2	17.5	37.0	
528.050000	27.9	3000.0	120.000	V	14.6	9.1	37.0	
971.450000	30.4	3000.0	120.000	V	30.0	6.6	37.0	

Fig. 3 - Level of radiated disturbances in the frequency range 30 MHz to 1 GHz for vertical antenna polarisation; power supply 220VAC at f=60Hz

Auto Test- Electric Field Strength with Scans



Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Polarization	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
30.900000	15.0	3000.0	120.000	H	16.6	15.0	30.0	
105.750000	18.6	3000.0	120.000	H	1.6	11.4	30.0	
122.900000	13.1	3000.0	120.000	H	2.8	16.9	30.0	
159.750000	21.1	3000.0	120.000	H	6.8	8.9	30.0	
945.750000	26.8	3000.0	120.000	H	26.4	10.2	37.0	

Fig. 4 - Level of radiated disturbances in the frequency range 30 MHz to 1 GHz for horizontal antenna polarisation; power supply 220VAC at f=60Hz

10. Statements on measurement uncertainty

Table 7 specifies the measurement uncertainty values, which are uncertainties extended at the approx. level of confidence 95 % and extension coefficient $k=2$.

Table 7 - Measurement uncertainty

Item	Test	Measurement uncertainty
1	Measurements of disturbance voltage levels on power supply terminals in the frequency range 150 kHz to 30 MHz	2.2 dB
2	Measurements of radiated electromagnetic disturbances in the frequency range 30 MHz to 1 GHz	2.8 dB
3	Measurements of harmonic current emission	4.7 %
4	Measurements of voltage fluctuations and flicker	6.9 %

11. Other information on tests

11.1 Tests were carried out under the following environmental conditions:

- ambient temperature, variable in the range from 19.8 °C to 21.5 °C
- relative humidity, variable in the range from 44.3 % to 54.6 %
- intensity of electromagnetic field less or equal to 1 V/m.

11.2 *Correct functioning of the RPD/C System Access Point (Standard Version) means that:*

- the manipulator display is highlighted green (no communication errors)
- functions from the keys 1 to 4 of the manipulator panel can be called, and
- the unit communicates with the external PC, i.e. it responds correctly to the 192.168.1.65 address ping (LAN connector)

Notes:

- *The Report can be duplicated only as a whole, subject to written consent by Laboratorium Kompatybilności Elektromagnetycznej OBR CTM S.A..*
- *Test results refer exclusively to RPD/C System Access Point (Standard Version), serial number 072/2012.*

Tests carried out by**Test Leader:**

Maciej STEPNIAK

3.1 PAZ 2012 *Stepniak**(date and signature)***Test personnel:**

Andrzej KACZMAREK

3.1 PAZ 2012 *Kaczmarek**(date and signature)*

Mateusz BECKER

3.1 PAZ 2012 *Becker**(date and signature)***Person responsible for authorization
of Test Report**

Kierownik Laboratoriów Badawczych

Namiotko

dr inż. Rafał Namiotko

3.1 PAZ 2012

(name stamp or legible name, surname, function, date and signature)