EMC TEST REPORT

No.508932-1

Electromagnetic disturbances

EQUIPMENT UNDER TEST

Equipment :	VoIP Gateway for Ericsson PBX
Type / model :	IPTC Albatross ™ DEX28-GE2P
Manufacturer :	IPTC Technology Communications AB
Tested by request of :	IPTC Technology Communications AB

SUMMARY

Referring to the emission limits, performance criteria and the operating mode during the tests specified in this report the equipment complies with the requirements according to the following standards.

EN 55022 (1998) + A1 (2000) & A2 (2002) Class B
EN 55024 (1998) + A1 (2001) & A2 (2003)
EN 61000-3-2 (2000) + A1 (2001)
EN 61000-3-3 (1995) + A1 (2001)
IEC/CISPR 22 (2003) Ed. 4.0 + A1 (2004) Class B
IEC/CISPR 24 (1997) + A1 (2001) & A2 (2002)
IEC 61000-3-2 (2000) + A1 (2001)
IEC 61000-3-3 (1995) + A1 (2001)
AS/NZS CISPR 22 (2004) Class B
AS/NZS CISPR 24 (2002)

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1. CLIENT INFORMATION

The EUT has been tested by request of

Company:	IPTC Technology Communications AB Pyramidbacken 6, 3tr. 141 75 Kungens Kurva
Name of contact:	Mikica B Kocic

2. EQUIPMENT UNDER TEST (EUT)

2.1. Identification of the EUT

Equipment:	VoIP Gateway for Ericsson PBX
Type/Model:	DEX28-GE2P
Brand name:	IPTC Albatross ™
Manufacturer:	IPTC Technology Communications AB
Rating:	48 V DC, or via AC/DC power supply: 100 V to 240 V AC, 50 HZ to 60 Hz.
Class:	I

Figure 1. EUT

2.2. Additional information about the EUT

The EUT was tested in a table top configuration
Maximum EUT clock frequency: 180 MHz.

The EUT consists of the following units:

Item	Units	Type	Manufacturer	Rlease	
				HW	SW
1	EUT	DEX28-GE2P	IPTC Tech. Comm. AB	R1B	Alpha.1
2	AC/DC PSU	BACS70-48-C14	M+R Multitronik GmbH	-	-

The EUT was tested with the following cables:

Cable / port	**Type**	**Length** (exposed during radiated emission)
Mains power (AC/DC adaptor)	Class I power cord, 3 wires.	1,5 m
DC power	Cord with 2 wires.	1,5 m
DTS 2, digital extension port *1	4 wire modular cable, unshielded.	2,0 m
LAN *1	4-pair, category 5E, STP	1,5 m
USB Type B (client service port).	Not connected.	-
Console, RS232, (service port).	Not connected.	-

Note: *1 – The ports are, according to the manufactures specification, **not** directly connected to outdoor cables.

2.3. Peripheral equipment

Peripheral equipment is defined as equipment needed for correct operation of the EUT, but not included as part of the EUT.

Item	**Units**	**Type**	**Manufacturer**	**Rlease**	
				HW	**SW**
3.	Ericsson PBX	MD110	Ericsson		BC12
4.	Ericsson DTS	DBC 223	Ericsson	R3A	P3L
5.	IPTC VoIP Gateway	DEX28-GE6P	IPTC Tech. Comm. AB	R2A	Alpha.1
6.	Ericsson DTS	DBC 223	Ericsson	R3A	P3L
-	Ethernet Switch	10 Mbps	D-Link	-	-
-	Digital extension board	ELU 28	Ericsson	R2A	-

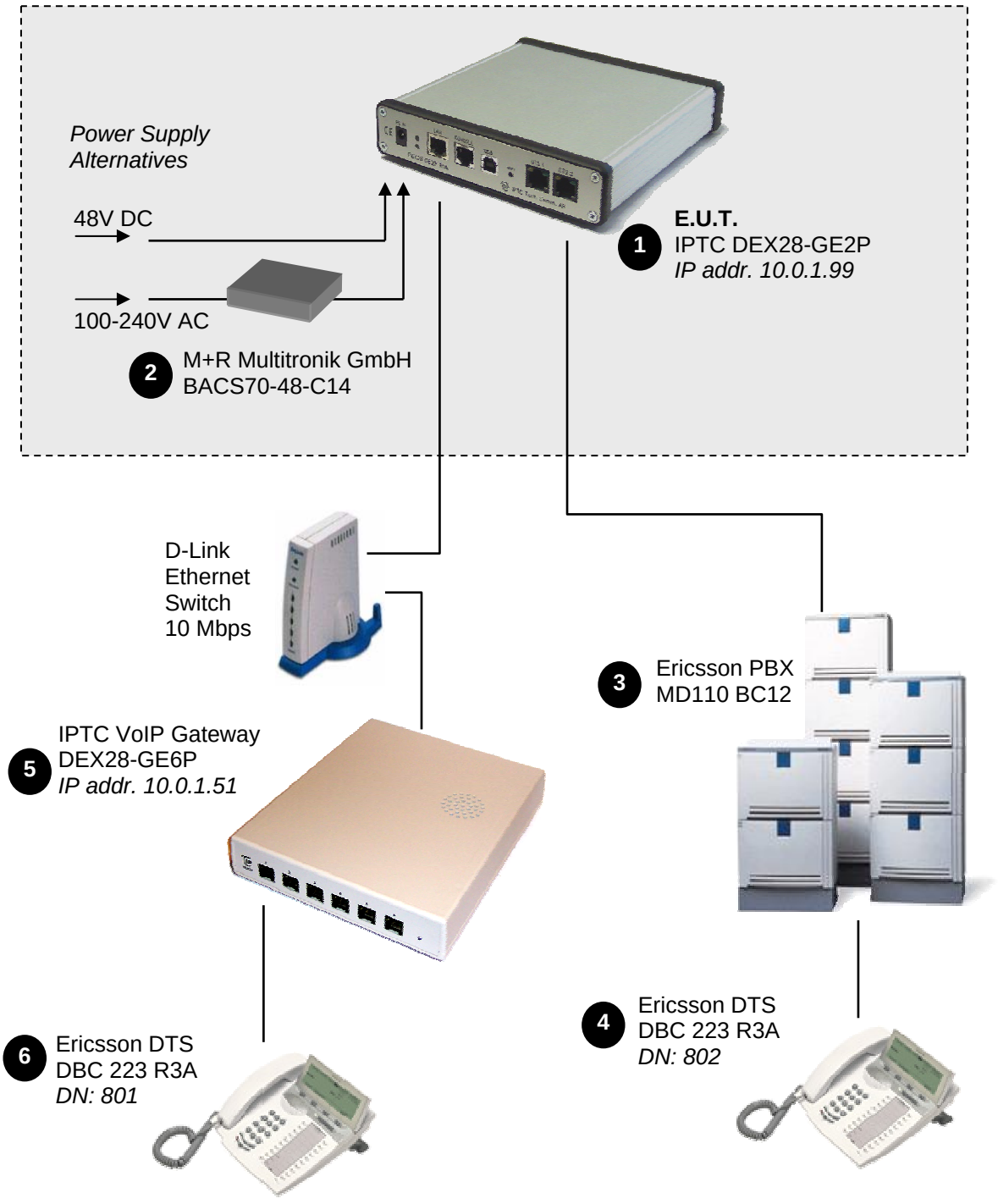

Figure 2. Test configuration.

3. TEST SPECIFICATIONS

3.1. Emission requirements

EN 55022 (1998) + A1 (2000) & A2 (2002): Limits and methods of measurement of radio disturbance characteristics of information technology equipment.
Limits according to Class B.

IEC/CISPR 22 (2003) Ed. 4.0 + A1 (2004): Limits and methods of measurement of radio disturbance characteristics of information technology equipment.
Limits according to Class B.

AS/NZS CISPR 22 (2004). Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement. Identical to IEC/CISPR 22 (2003) Ed. 4.0.

Table 1. Limits for conducted disturbances at the mains port of class B ITE

Frequency range (MHz)			Voltage Limit dB(µV)	
			Quasi peak	Average
0,15	-	0,5	66 to 56	56 to 46
0,5	-	5	56	46
5	-	30	60	50

Table 2. Limits of conducted common mode (asymmetric mode) disturbance at telecommunication ports in the frequency range 0,15 MHz to 30 MHz for class B equipment

Frequency range (MHz)			Voltage Limit dB(µV)		Current Limit dB(µA)	
			Quasi peak	Average	Quasi peak	Average
0,15	-	0,5	97 to 87	84 to 74	53 to 43	40 to 30
>0,5	-	30	87	74	43	30

Table 3. Limits for radiated disturbance of class B ITE at a measuring distance of 10 m

Frequency range (MHz)			Quasi peak Limit dB(µV/m)
30	-	230	30
230	-	1000	37

EN 61000-3-2 (2000) + A1 (2001) / IEC 61000-3-2 (2000) + A1 (2001): Limits for harmonic current emissions (equipment input current ≤ 16A per phase).

EN 61000-3-3 (1995) + A1 (2001) / IEC 61000-3-3 (1995) + A1 (2001): Limitation of voltage fluctuations and flicker in low voltage supply systems for equipment with rated current ≤ 16A.

3.2. Immunity requirements

Requirements according to the standards:
EN 55024 (1998). + A1 (2001) & A2 (2003) / IEC/CISPR 24 (1997) + A1 (2001) & A2 (2002)
Information technology equipment – Immunity characteristics Limit and method of measurement.

AS/NZS CISPR 24 (2002) Information technology equipment - Immunity characteristics - Limits and methods of measurement

Immunity specification:

EN 61000-4-2 (1995) + A1 (1998) & A2 (2001) / IEC 61000-4-2 (1995) + A1 (1998) & A2 (2000):
Electrostatic discharge requirements.
Required test level:
± 2 kV, ± 4 kV contact discharge.
± 2 kV, ± 4 kV, ± 8 kV air discharge.
Performance criterion: B.

EN 61000-4-3 (2002) + A1 (2002) / IEC 61000-4-3 (2002) + A1 (2002):
Radiated radio frequency electromagnetic field - Immunity test.
Required test level:
3 V/m, AM 80% (1 kHz), 80 MHz to 1000 MHz.
Performance criterion: A.

EN 61000-4-4 (1995) + A1 (2001) & A2 (2001) / IEC 61000-4-4 (1995) + A1 (2000) & A2 (2001)
Electrical fast transient/burst immunity test.
Required test level:
±0,5 kV common mode, repetition rate 5 kHz, applied to DC power ports,.
±0,5 kV, repetition rate 5 kHz, applied to telecommunication ports and signal ports.
Performance criterion: B.

EN 61000-4-5 (1995) + A1 (2001) / IEC 61000-4-5 (1995) + A1 (2001):

Surge immunity test.
Required test level:
±1 kV line to line & ±2 kV line to ground , 1,2/50 (8/20) µs pulse applied to AC ports.
±1 kV, 1,2/50 (8/20) µs pulse (EN) / ±1,5 kV, 10/700 µs pulse (IEC) , applicable only to telecommunication ports which connect directly to outdoor cables.
Performance criterion: B.

EN 61000-4-6 (1996) + A1 (2001) / IEC 61000-4-6 (1996) + A1 (2000):
Conducted disturbances induced by radio-frequency fields.
Required test level:
3 V_{rms}, AM 80% (1 kHz), 0,15 – 80 MHz. Applicable to DC power ports signal ports and telecommunication ports.
Performance criterion: A.

EN 61000-4-11 (1994) + A1 (2001) / IEC 61000-4-11 (1994) + A1 (2000):
Voltage dips, short interruptions and voltage variations immunity tests.
Required test level:
> 95 % reduction for 10 ms (0,5 period).
Performance criterion: B.
30 % reduction for 50 ms (25 periods).
Performance criterion: B.
>95 % reduction for 5000 ms (250 periods).
Performance criterion: C.

3.3. Additions, deviations and exclusions from standards and accreditation

A coupling network according to CISPR22 (1997) and EN55022 (1998) has been used to measure the asymmetrical (common-mode) RFI voltage of unshielded symmetrical telecommunication ports of the EUT in the frequency range 150 kHz to 30 MHz.

Ferrite clamps according to clause 10.4 in CISPR22 (2003) has not been used.

Tests according to EN/IEC 61000-4-11 has only been carried out at nominal voltage 230 V AC.

No other additions, deviations or exclusions have been made from standards and accreditation.

3.4. Mode of operation during the test

The emission tests and immunity tests were carried out with the EUT supplied via the AC/DC power supply.
The conducted immunity tests, except for EN/IEC 61000-4-11, were also carried out with the EUT supplied from an external -48 V source.
During the tests a call was set up from one DTS (digital telephone set) to the next DTS.
See Figure 2. Test configuration.

3.5. Compliance

The performance criteria are based on the general criteria in the standard.

Criterion A
The apparatus shall continue to operate as intended during the test. No degradations of performance characteristics are allowed below the level specified in the standard.
The following parameters shall, according to the standard be fulfilled:

- The call between the DTS shall be maintained throughout the test.
- At the Ethernet port (LAN). The EUT shall operate without loss of the link.
- The demodulated differential mode noise and acoustic sound pressure levels in the receive direction shall not be grater than the values given in the table below.

Maximum demodulated differential mode noise levels according to relaxations in CISPR 24 A1:

Frequency band (MHz)	Type of immunity test:	Demodulated differential mode noise (dBm0)	Acoustic sound pressure level (dB(SPL))
0,15 to 10	Conducted	-50	55
10 to 30 (except for 26,95 to 27,29)	Conducted	-50 to -30	55 to 75
26,95 to 27,29	Conducted	-40	65
30 to 80	Conducted	-20	85
80 to 1000 (except at 900)	Radiated	-30	75
900	Radiated	-50	55

The following shall be fulfilled during the spot frequencies specified.

- It shall be able to establish a call via the EUT.
- It shall be able to end a call prior established via the EUT.

Criterion B
The apparatus shall continue to operate as intended after the test. During testing, degradations of performance characteristics are allowed, as specified by the manufacturer.
The following parameters shall, according to the standard be fulfilled:

- Connections shall be maintained throughout the test.
- The EUT shall return automatically to normal performance after the cessation of the exposure.

Requirements to be checked after the application of the phenomena:

- It shall be able to establish a call via the EUT.
- It shall be able to end a call prior established via the EUT.

Criterion C
Temporary loss of function is allowed during test, provided the function is self-recoverable or can be restored by the operation of the controls.

3.6. Performance verification

Criterion A
The acoustical noise level at the DTS is audible checked during test. If any noise is audible the level may be checked with a sound level meter.
Establishing and ending calls are manually carried out via the DTS during the tests.

Criterion B
Establishing and ending calls are manually carried out prior to and after the tests.

Criterion C
Establishing and ending calls are manually carried out prior to and after the tests.

3.7. Verification equipment

Equipment listed as peripheral equipment. Clause 2.3.

4. TEST SUMMARY

The test has been carried out at the Intertek Semko AB premises in Kista, Sweden.
The results in this report apply only to sample tested:

Standard	Description	Result
Emission		
EN 55 022 / CISPR 22	**AC power port continuous disturbance voltage in the frequency range 0,15 MHz to 30 MHz** The EUT complies with Class B limits. The margin to the limit was at least 7,9 dB at 0,470 MHz. See Figure 3, Table 4 and Table 5.	**PASS**
EN 55 022 / CISPR 22	**Telecommunication ports continuous disturbance voltage in the frequency range 0,15 MHz to 30 MHz** The EUT complies with Class B limits. For the LAN port, the margin to the limit was at least 1,4 dB at 0,250 MHz. See Figure 4, Table 6 and Note: * The margin to the limit is within the measurement uncertainty interval. Table 7. For the DTS port, the margin to the limit was at least 17 dB at 0,575 MHz. See Figure 5, Table 8 and Table 9.	**PASS**
EN 55 022 / CISPR 22	**Radiated electromagnetic field in the frequency range 30 MHz to 1000 MHz** The EUT complies with the Class B limits. The margin to the limit was at least 8,3 dB at 294,92 MHz. See Figure 6 and Table 10.	**PASS**
EN 61 000-3-2 / IEC 61 000-3-2	**Harmonic current emissions** The product has an active input power P≤ 75 W at rated load condition. According to the standard, no limits are applicable and the product is deemed to comply with the standard without testing.	**PASS**
EN 61 000-3-3 IEC 61 000-3-3	**Voltage fluctuations and flicker in low voltage supply systems** This product has a maximum power consumption of less than 75 W. It is therefore not likely to produce voltage fluctuations or flicker above the limits of the standard. The product is deemed to comply with the standard without testing.	**PASS**

Standard	Description	Result
Immunity		
EN 61 000-4-2 / IEC 61 000-4-2	**Electrostatic discharge** Test level ±4 kV contact discharges and ±8 kV air discharges. The EUT operated without any degradation during the test The EUT complies with the performance criterion B.	**PASS**
EN 61 000-4-3 / IEC 61 000-4-3	**Radiated radio frequency electromagnetic field - Immunity test. Frequency range 80 – 2000 MHz.** Test level: 3 V/m with 80% AM @ 1 kHz. The EUT operated without any degradation during the test.. The EUT complies with the performance criterion A.	**PASS**
EN 61 000-4-4 / IEC 61 000-4-4	**Fast transient/burst** Test level: ±0,5 kV. Tested ports: AC power port; LAN port; DTS port 2 and DC power port. The EUT operated without any degradation after the test. The EUT complies with the performance criterion B.	**PASS**
EN 61 000-4-5 / IEC 61 000-4-5	**Surge** Test level: ±1 kV line to line & ±2 kV line to ground , Tested ports: AC power port. The EUT operated without any degradation during the test. The EUT complies with the performance criterion B.	**PASS**
EN 61 000-4-6 / IEC 61 000-4-6	**Conducted disturbances induced by RF-fields in the frequency range 0,15 MHz – 80 MHz** Test level: 3 V_{rms}. Tested ports: AC power port; LAN port; DTS port 2 and DC power port. The EUT operated without any degradation during the test. The EUT complies with the performance criterion A.	**PASS**
EN 61 000-4-11 / IEC 61 000-4-11	**Voltage dips and interruptions** Test level: > 95 % reduction for 10 ms (0,5 period). 30 % reduction for 50 ms (25 periods). Performance criterion: B. >95 % reduction for 5000 ms (250 periods). Performance criterion: C. The EUT operated without any degradation during the test. The EUT complies with the performance criteria.	**PASS**

5. TABLES AND DIAGRAMS

5.1. Conducted emission

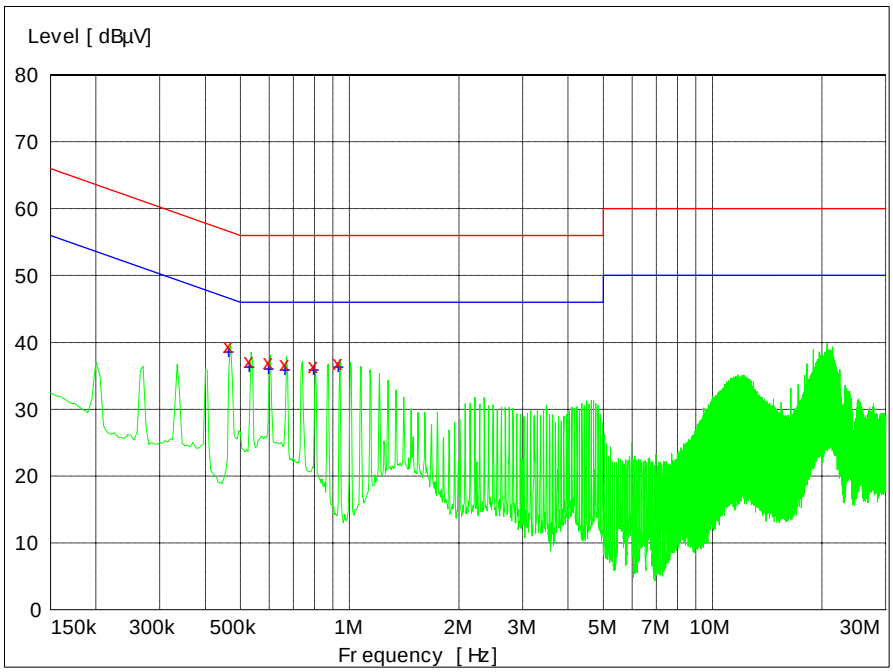

Figure 3 Overview sweep, conducted disturbance voltage at the AC power port.

Table 4. Measurement results. AC power port. Average.

Frequency MHz	Level dB(µV)	Limit dB(µV)	Margin dB
0,470	38,6	46,5	7,9
0,535	36,3	46	9,7
0,605	36,1	46	9,9
0,670	36	46	10
0,805	36	46	10
0,940	36,3	46	9,8

Table 5. Measurement results. AC power port. Quasi peak.

Frequency MHz	Level dB(µV)	Limit dB(µV)	Margin dB
0,470	39	57	17
0,535	37	56	19
0,605	37	56	19
0,670	37	56	19
0,805	37	56	20
0,940	37	56	19

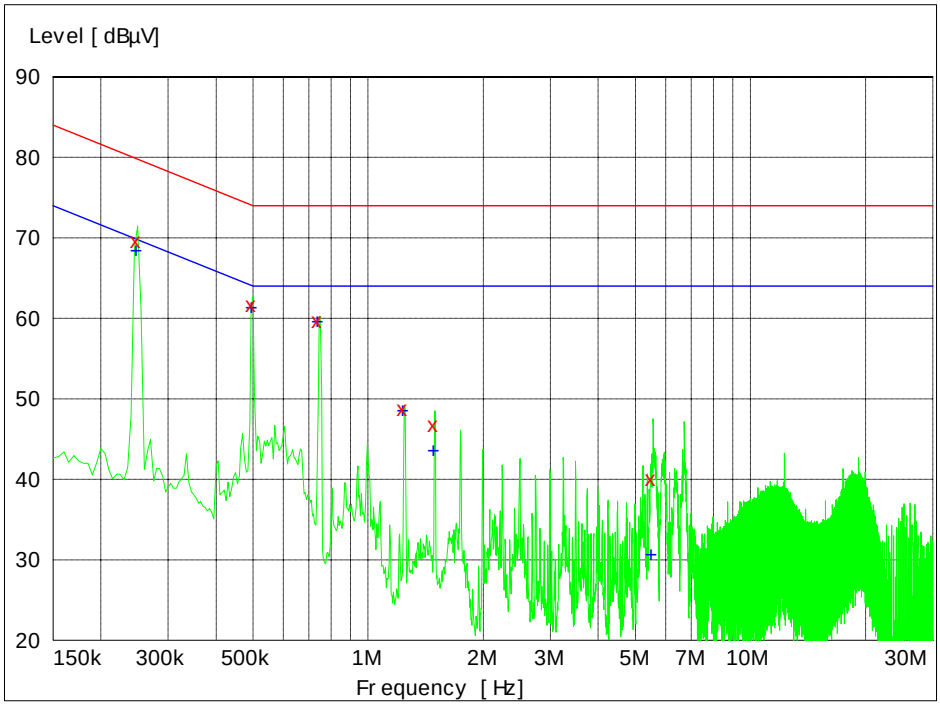

Figure 4. Overview sweep, conducted disturbance voltage at the LAN port.

Table 6. Measurement results. LAN port. Average.

Frequency MHz	Level dB(µV)	Limit dB(µV)	Margin dB
0,250	68,4	69,8	**1,4 ***
0,500	61,3	64	**2,7 ***
0,745	59,6	64	4,4
1,245	49	64	16
1,495	44	64	21
5,565	31	64	33

Note: * The margin to the limit is within the measurement uncertainty interval.

Table 7. Measurement results. LAN port. Quasi peak.

Frequency MHz	Level dB(µV)	Limit dB(µV)	Margin dB
0,250	69,7	79,8	10
0,500	62	74	12
0,745	60	74	14
1,245	49	74	25
1,495	47	74	27
5,565	40	74	34

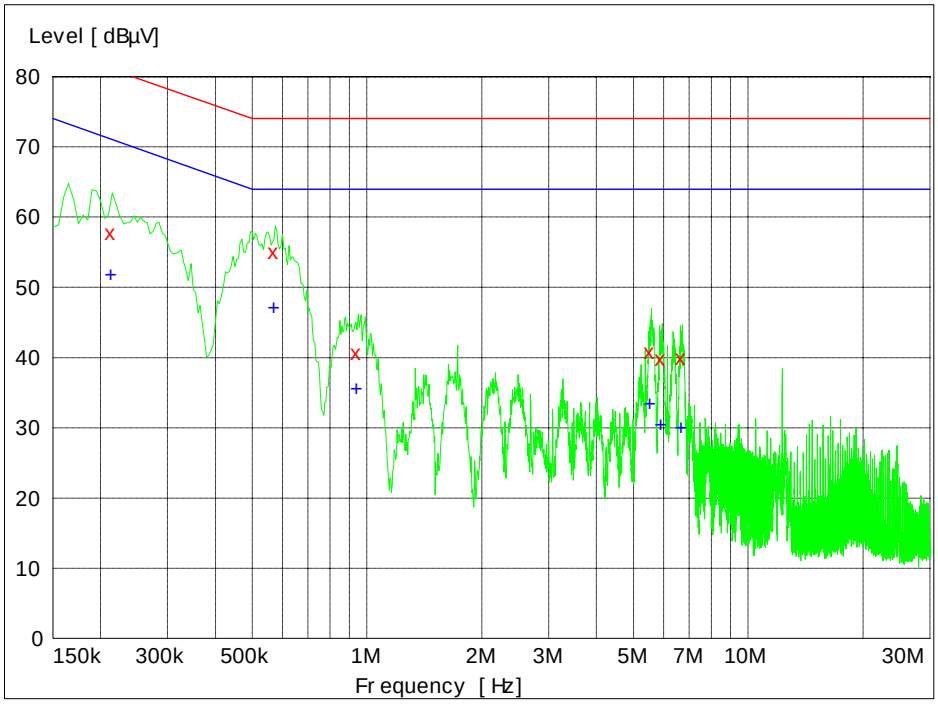

Figure 5. Overview sweep, conducted disturbance voltage at the DTS port 2.

Table 8. Measurement results. DTS port 2. Quasi peak.

Frequency MHz	Level dB(µV)	Limit dB(µV)	Margin dB
0,215	58	81	23
0,575	55	74	19
0,950	41	74	33
5,575	41	74	33
5,955	40	74	34
6,720	40	74	34

Table 9. Measurement results. DTS port 2. Average.

Frequency MHz	Level dB(µV)	Limit dB(µV)	Margin dB
0,215	52	71	19
0,575	47	64	17
0,950	36	64	28
5,575	33	64	31
5,955	31	64	34
6,720	30	64	34

5.2. Radiated emission

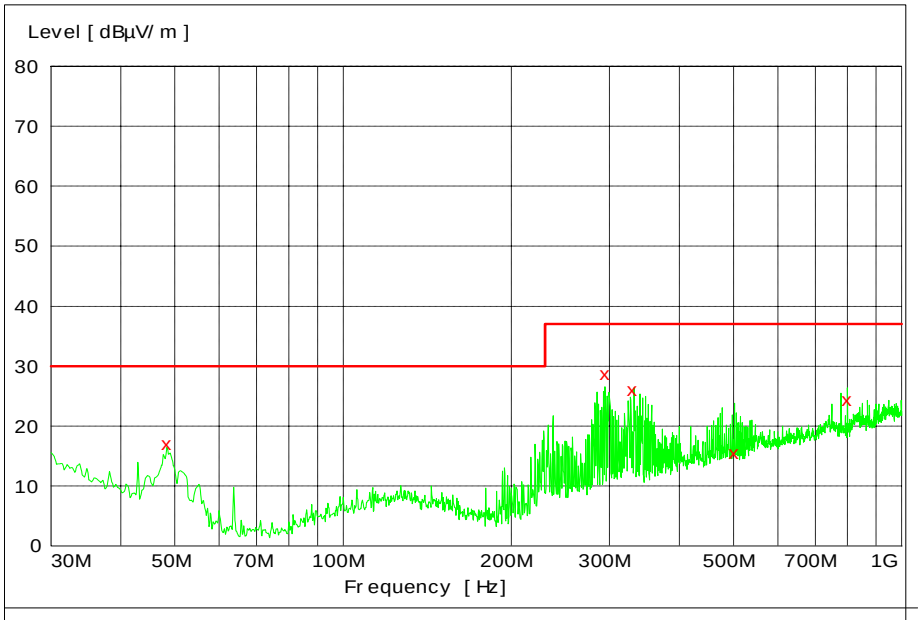

Figure 6. Radiated emission 30 MHz to 1000 MHz. Peak overview sweep. Class B limit.

Table 10. Measurement results. Quasi peak.

Frequency MHz	Level dB(µV/m)	Limit dB(µV/m)	Margin dB
48,36	17	30	12
294,92	28,7	37	8,3
329,72	26	37	11
501,74	15	37	21
800,00	24	37	12

6. PHOTOS

Figure 7. Test set-up for the radiated emission tests.

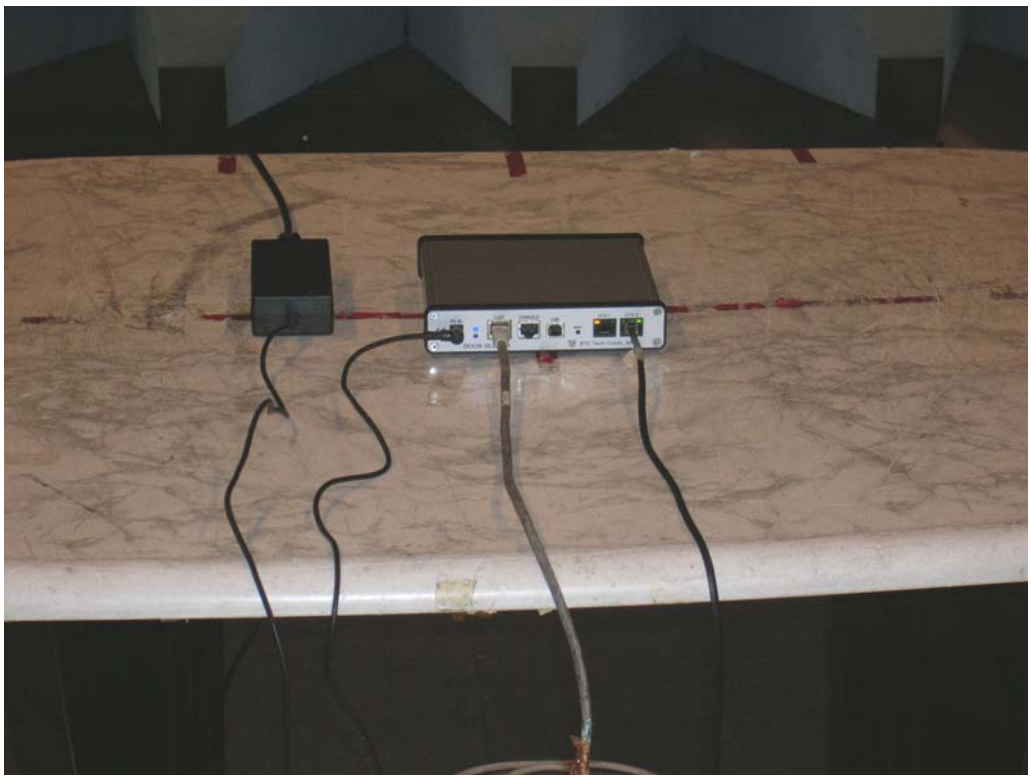

Figure 8. The EUT and the AC/DC power supply.

Figure 9. Test set-up for the radiated immunity tests.

7. INTERTEK SEMKO EMC CENTER MEASUREMENT UNCERTAINTIES

All uncertainties are given with a level of confidence of approximately 95% (k=2) and are the maximum values within the complete range. Measurement uncertainties are calculated in accordance with EA-4/02:1997.

Continuous conducted disturbances with AMN in the frequency range 9 kHz to 30 MHz	± 3,6 dB
Measurement uncertainty with a passive probe in the frequency range 0,15 - 30 MHz	± 3,0 dB
Measurement uncertainty for radiated disturbance	
Uncertainty for the frequency range 30 to 1000 MHz at 3 m	± 4,8 dB
Uncertainty for the frequency range 30 to 1000 MHz at 10 m	± 4,6 dB
Measurement uncertainty for harmonics	± 8,4 %
Measurement uncertainty for voltage fluctuations and flicker	± 9,2 %
Measurement uncertainty for ESD immunity test	
Air discharge	
Voltage	± 26 %
First peak current	± 27 %
Rise time	± 37 %
Current at 30 and 60 ns	± 43 %
Contact discharge	
Voltage	± 57 %
First peak current	± 23 %
Rise time	± 38 %
Current at 30 and 60 ns	± 42 %
Measurement uncertainty for radiated immunity, EN 61 000-4-3	
3 V/m 26 MHz to 1000 MHz	± 0,8 V/m / ± 2,4 dB
Measurement uncertainty for fast transient/burst immunity tests	± 32 %
Measurement uncertainty for surge immunity test	± 13,0 %
Measurement uncertainty for immunity to conducted disturbances	
CDN	
3 V	± 0,9 V / ± 2,7 dB
10 V	± 3,1 V / ± 2,7 dB
EM clamp	
3 V	± 1,3 V / ± 3,7 dB
10 V	± 4,3 V / ± 3,7 dB
Current clamp (BCI)	
3 V	± 1,5 V / ± 4,3 dB
10 V	± 5,0 V / ± 4,3 dB
Direct injection	
3 V	± 1,3 V / ± 3,8 dB
10V	± 4,4 V / ± 3,8 dB
Measurement uncertainty for power frequency magnetic field immunity test	± 34 % / ± 2,5 dB
Measurement uncertainty for voltage dips, short interruptions and voltage variations	
Time	± 4,6 %
Voltage	± 6,4 %