Test report **2010-2521-3841N1-REN**

Date of issue: October 18, 2010
Number of pages: 60

Prepared for: **Barix GmbH**
Entwicklung
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Contact: Mr. Weinrich

Equipment under test:
Name: **Intercom device**
Model: **Annuncicom 155**
Manufacturer: Barix GmbH

The EUT has been modified during compliance testing.

Date of tests: 01/21/2010 - 06/18/2010 / 09/30/2010 - 10/06/2010

Test specifications:

Emission:
EN 55022:1998-09+A1:2000-10+A2:2003+01 (Limit class: B)
Germanischer Lloyd, Part VI-7-2, Ausgabe 2003 (Limit class: EMC1)
EN 50121-4:2006
EN 50121-3-2:2006
EN 50155:2007

Immunity:
EN 61000-6-2:2005
Germanischer Lloyd, Part VI-7-2, Ausgabe 2003
EN 50121-3-2:2006
EN 50155:2007
EN 50121-4:2006

Test summary:

Emission		**Tested port**	**Limit class**	**Result**
Conducted emissions at DC mains terminals	150 kHz - 30 MHz	24 VDC	B	Passed
Conducted emissions at DC mains terminals	150 kHz - 30 MHz	48 VDC	B	Passed
Conducted emissions at DC mains terminals	9 kHz - 30 MHz	24 VDC	EMC1	Passed
Conducted emissions at signal & telecommunication lines	150 kHz - 30 MHz	LAN	B	Passed
Radiated emissions - magnetic fields	150 kHz - 30 MHz	Enclosure	EMC1	Passed
Radiated emissions - electromagnetic fields	30 MHz - 1000 MHz	Enclosure	B	Passed
Radiated emissions - electromagnetic fields	30 MHz - 2000 MHz	Enclosure	EMC1	Passed

Immunity to ...		**Tested port**	**Test level**	**Crit.**	**Result**
Electrostatic discharge (ESD)		Enclosure	Air: 8 kV Cont.: 6 kV	A A	Passed
Electromagnetic fields (1)	80 MHz - 1000 MHz (AM)	Enclosure	20 V/m	A	Passed
Electromagnetic fields (2)	1000 MHz - 2700 MHz (AM)	Enclosure	10 V/m	A	Passed
Electrical fast transients (Burst)		AC-Mains Other	2 kV 2 kV	A A	Passed
Surge		24 VDC LAN	1 kV 1 kV	A A	Passed
Conducted RF disturbances	150 kHz - 80 MHz (AM)	See inside test report	10 V	A	Passed
Pulse magnetic fields		Enclosure	300 A/m	A	Passed
Power frequency magnetic fields		Enclosure	300 A/m	A	Passed
Voltage variations		DC-mains	see inside report		Passed
Voltage dips		DC-mains	see inside report		Passed
Overvoltage		DC-mains	see inside report		Passed
High Voltage (Insulation Test)			500V		Failed
High Voltage (Insulation Test)			500V		Passed
High Voltage (Insulation Test)			1500V		Passed

Testing location: **ELMAC GmbH**
Boschstraße 2
D-71149 Bondorf

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E-Mail: info@elmac.de

Deutscher Akkreditierungs Rat
Reg.-Nr.: DGA-PL-206/05-00

Tested by: Schmidt October 18, 2010
U. Schmidt Date

Verified by: Bühne October 18, 2010
J. Bühne Date

Content

ELMAC GmbH informs the client that testing is done in accordance with the standard procedures stated under paragraph 2. All deviations will be listed separately. The test results of this report exclusively refer to the specific sample tested under stated test conditions. ELMAC GmbH shall have no liability for any deductions, inferences or generalisations drawn from the test results. This report must only be reproduced in full. Publications or reproductions in the form of extracts have to be approved in written form by ELMAC GmbH.

2. Test specifications

Emission

Document No.	Title	Limit class
EN 55022:1998-09+A1:2000-10+A2:2003+01 IEC/CISPR 22:1997+A1:2000+A2:2002 DIN EN 55022:2003-09	Information technology equipment; Radio disturbance characteristics; Limits and methods of measurement	B
Germanischer Lloyd, Part VI-7-2, Ausgabe 2003		EMC1
EN 50121-4:2006 DIN EN 50121-4:2007	Railway applications, EMC, Emission and immunity of the signalling and telecommunication apparatus	
EN 50121-3-2:2006 DIN EN 50121-3-2:2007	Railway applications, EMC, Rolling Stock - Apparatus	
EN 50155:2007 DIN EN 50155:2008	Railway applications, Electronic equipment used on rolling stock	

Immunity

Document No.	Title	Severity level
EN 61000-6-2:2005 IEC 61000-6-2:2005 DIN EN 61000-6-2:2006-03	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments	
Germanischer Lloyd, Part VI-7-2, Ausgabe 2003		
EN 50121-3-2:2006 DIN EN 50121-3-2:2007	Railway applications, EMC, Rolling Stock - Apparatus	
EN 50155:2007 DIN EN 50155:2008	Railway applications, Electronic equipment used on rolling stock	
EN 50121-4:2006 DIN EN 50121-4:2007	Railway applications, EMC, Emission and immunity of the signalling and telecommunication apparatus	

emvID: 3103

3. Equipment Under Test (EUT)

Name	**Intercom device**	
Model	**Annuncicom 155**	
S/N	0008E100A792	
Manufacturer	Barix GmbH	
Kind/Type of EUT	Intercom device	
Day of receipt	01/21/2010	
Kind of EUT handling	Plug-in	During the tests: As table top equipment
Base unit covering the EUT	-	
Accessories (Part of the EUT)		
Support equipment (Not part of the EUT)	power supply 24VDC, 0.7A network switch Netgear FS108P Laptop Apple macBook Pro Load resistor 8 Ohms 8for loudspeaker output) 2 push buttons with resistors (for inputs) LED (for digital output) RS485 data generator, prototype Barix	
Connected cables and lines	network, 3m ethernet CAT5 microphone cable 4m unshielded combi cable (loudspeaker, lineout, digital I/O) 4m shielded power supply 5m shielded RS485 4m shielded	
Power supply	24 VDC	
Class of protection against electrical shock	III (SELV)	
Remarks		
EUT Modifications	The EUT was modified as following: R126 removed for surge C46+C47==1150uF; C on + of TR2; L7=4mH(744821240) for conducted emissions on DC-Terminals C33, C52 = 4,7nF for conducted emissions on DC-Terminals C48 increased to 1nF, C40 increased to 1nF, withstand voltage of diode D11 increased Insulating laquer on ethernet plug PCB-contacts	

eutID: 3841

Tested operation modes

Emission	**Immunity**	**Test criteria**
Audiostreaming, Pmax(5W), sin(1kHz)	Audiostreaming, Pmax(5W), sin(1kHz)	SINAD < -40dB
Remarks:		

4. General Test Conditions

4.1. Environment conditions

If not stated otherwise in this test report the tests have been carried out under the following environment conditions:

Temperature:	15 ... 35 °C
Relative Humidity:	30 ... 60 %
Atmospheric pressure:	860 ... 1060 hPa

4.2. Calibration of test equipment

All test equipment having an important influence on the certainty of the test results is incorporated into a system of regular calibration and maintenance. The calibration system is a part of ELMAC's quality management system.

4.3. Measurement uncertainty

All EMC tests have a measurement uncertainty. The measurement uncertainty is a parameter related to a quantitative testing characterizing the range of values that with a certain probability still can be assigned to the result. Commonly the measurement uncertainty is given so, that the named probability is 95 %.

In this Test Report, the measurement uncertainties are stated at each Emission test.

The measurement uncertainties for Immunity tests are available on request.

4.4. Perfomance criteria

If no other performance criteria specified in the standards listed in section 2. The performance criteria of EN 61326:1997 + A1:1998+A2:2001 section 6.5 are applied.

5. Test Results

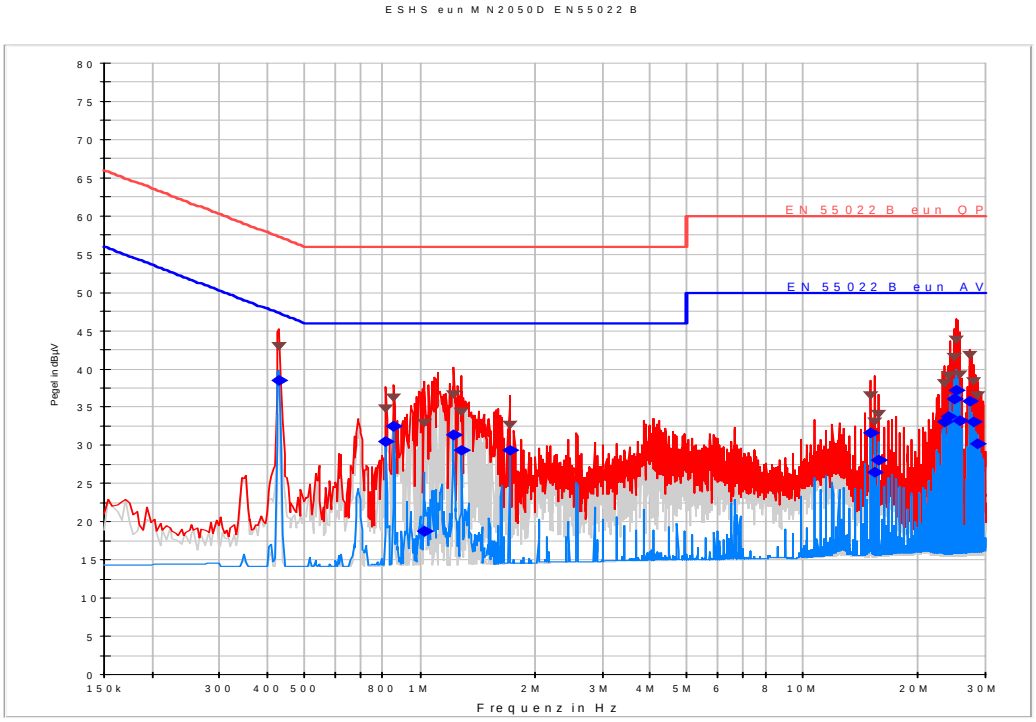
See next pages.

5.1.1 Conducted emissions at DC mains terminals 150 kHz - 30 MHz

euDCID: 535

EUT:	Intercom device Annuncicom 155	Kind of test:	Emission
		Basic standard:	EN 55022:1998-09+A1:2000-10+A2:2003+01
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)	Measurement uncer-tainty:	2.3 dB
Port:	24 VDC		
Date of test:	01/21/2010		
Tested by:	Sc	EUT modified:	Yes
		Result:	**Passed**
Limit class:	B		
Remarks:			

PEAK Detection



Test equipment used					
Name	Model	Manufacturer	S/N	INV	Remarks
V-LISN	MN2050D	Schaffner	1403	251	
EMI Receiver	ESHS 10	R&S	862970/012	35	

ad 5.1.1 Conducted emissions at DC mains terminals 150 kHz - 30 MHz

- Continuation -

euDCID: 535

EUT:	Intercom device Annuncicom 155		
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		

QUASI-PEAK Detection

Frequency(MHz)	QuasiPeak(dBµV)	Time(ms)	Line	Margin(dB)	Limit(dBµV)
0.430000	43.0	1000.0	L1	14.3	57.3
0.818000	34.8	1000.0	N	21.2	56.0
0.858000	36.2	1000.0	L1	19.8	56.0
1.026000	32.9	1000.0	N	23.1	56.0
1.226000	36.6	1000.0	N	19.4	56.0
1.286000	34.3	1000.0	N	21.7	56.0
1.714000	32.7	1000.0	N	23.3	56.0
15.002000	36.5	1000.0	N	23.5	60.0
15.434000	33.1	1000.0	L1	26.9	60.0
15.862000	34.1	1000.0	L1	25.9	60.0
23.574000	38.1	1000.0	L1	21.9	60.0
24.002000	39.1	1000.0	N	20.9	60.0
24.862000	41.5	1000.0	L1	18.5	60.0
25.290000	43.8	1000.0	L1	16.2	60.0
25.718000	39.3	1000.0	L1	20.7	60.0
27.434000	41.7	1000.0	N	18.3	60.0
28.074000	38.4	1000.0	N	21.6	60.0
28.502000	36.5	1000.0	N	23.5	60.0

AVERAGE Detection

Frequency(MHz)	Average(dBµV)	Time(ms)	Line	Margin(dB)	Limit(dBµV)
0.430000	38.5	1000.0	L1	8.8	47.3
0.818000	30.5	1000.0	N	15.5	46.0
0.858000	32.5	1000.0	L1	13.5	46.0
1.026000	18.7	1000.0	N	27.3	46.0
1.226000	31.4	1000.0	N	14.6	46.0
1.286000	29.4	1000.0	N	16.6	46.0
1.714000	29.3	1000.0	N	16.7	46.0
15.002000	31.7	1000.0	N	18.3	50.0
15.434000	26.4	1000.0	L1	23.6	50.0
15.862000	28.0	1000.0	L1	22.0	50.0
23.574000	33.0	1000.0	L1	17.0	50.0
24.002000	33.7	1000.0	N	16.3	50.0
24.862000	36.1	1000.0	L1	13.9	50.0
25.290000	37.3	1000.0	L1	12.7	50.0
25.718000	33.3	1000.0	L1	16.7	50.0
27.434000	35.8	1000.0	N	14.2	50.0
28.074000	33.1	1000.0	N	16.9	50.0
28.502000	30.1	1000.0	N	19.9	50.0

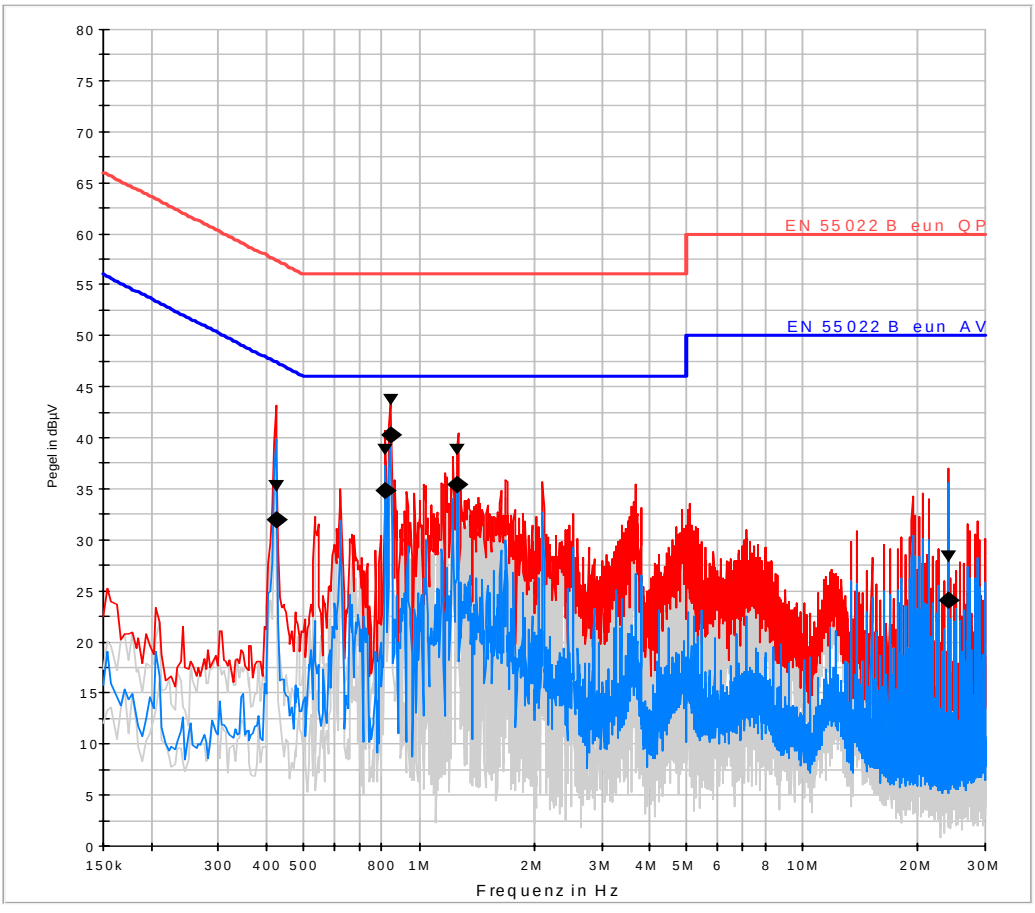
5.1.2 Conducted emissions at DC mains terminals 150 kHz - 30 MHz

euDCID: 535

EUT:	Intercom device Annuncicom 155	Kind of test:	Emission
		Basic standard:	EN 55022:1998-09+A1:2000-10+A2:2003+01
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)	Measurement uncer-tainty:	2.3 dB
Port:	48 VDC		
Date of test:	09/30/2010		
Tested by:	ce	EUT modified:	Yes
		Result:	**Passed**
Limit class:	B		
Remarks:			

PEAK Detection

ESCI3 eun MN2050D EN55022 B



ad 5.1.2 Conducted emissions at DC mains terminals 150 kHz - 30 MHz

- Continuation -

euDCID: 535

EUT:	Intercom device Annuncicom 155		
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		

QUASI-PEAK Detection

Frequency(MHz)	QuasiPeak(dBµV)	Time(ms)	Line	Margin(dB)	Limit(dBµV)
0.422000	35.3	1000.0	N	22.1	57.4
0.814000	38.9	1000.0	N	17.1	56.0
0.842000	43.8	1000.0	N	12.2	56.0
1.262000	38.9	1000.0	N	17.1	56.0
23.998000	28.3	1000.0	N	31.7	60.0

AVERAGE Detection

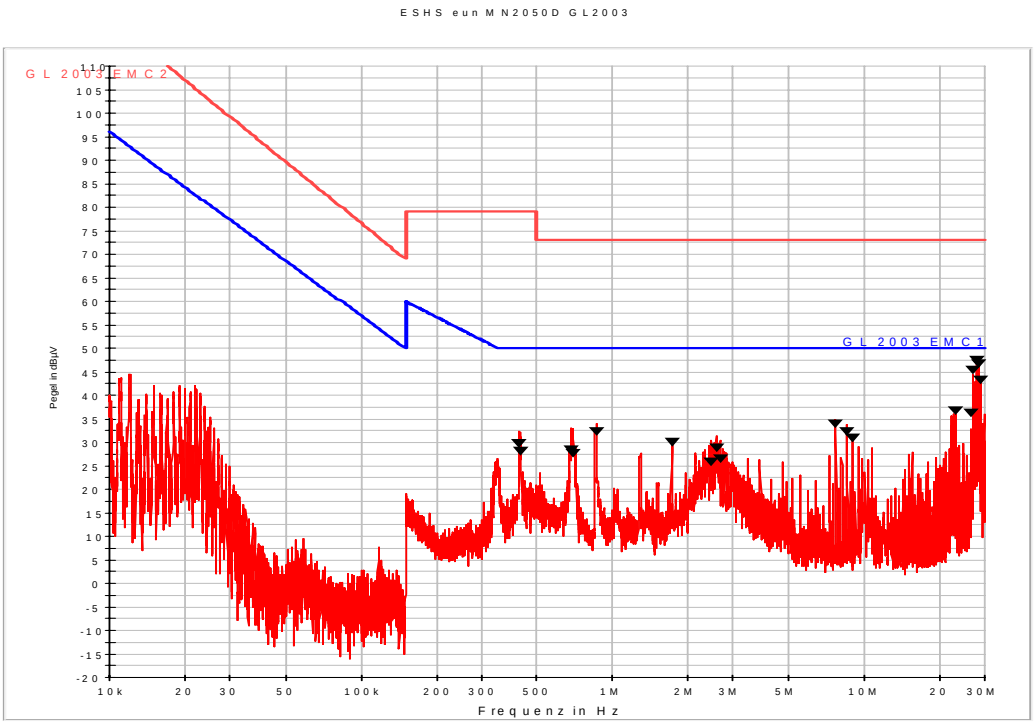
Frequency(MHz)	Average(dBµV)	Time(ms)	Line	Margin(dB)	Limit(dBµV)
0.422000	32.0	1000.0	N	15.4	47.4
0.814000	34.8	1000.0	N	11.2	46.0
0.842000	40.3	1000.0	N	5.7	46.0
1.262000	35.3	1000.0	N	10.7	46.0
23.998000	24.1	1000.0	N	25.9	50.0

5.1.3 Conducted emissions at DC mains terminals 9 kHz - 30 MHz

euDCID: 536

EUT:	Intercom device Annuncicom 155	Kind of test:	Emission
		Basic standard:	Germanischer Lloyd, Part VI-7-2, Ausgabe 2003
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)	Measurement uncer-tainty:	2.3 dB
Port:	24 VDC		
Date of test:	01/21/2010		
Tested by:	Sc	EUT modified:	Yes
		Result:	**Passed**
Limit class:	EMC1		
Remarks:			

PEAK Detection



Test equipment used					
Name	Model	Manufacturer	S/N	INV	Remarks
V-LISN	MN2050D	Schaffner	1403	251	
EMI Receiver	ESHS 10	R&S	862970/012	35	

ad 5.1.3 Conducted emissions at DC mains terminals 9 kHz - 30 MHz

- Continuation -

euDCID: 536

EUT:	Intercom device Annuncicom 155		
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		

QUASI-PEAK Detection

Frequency(MHz)	QuasiPeak(dBµV)	Time(ms)	Line	Margin(dB)	Limit(dBµV)
0.427140	29.7	1000.0	N	20.3	50.0
0.431000	28.2	1000.0	N	21.8	50.0
0.684629	28.5	1000.0	N	21.5	50.0
0.700550	27.7	1000.0	N	22.3	50.0
0.855568	32.3	1000.0	N	17.7	50.0
1.712002	29.9	1000.0	N	20.1	50.0
2.475591	25.7	1000.0	N	24.3	50.0
2.568856	28.9	1000.0	N	21.1	50.0
2.660311	26.4	1000.0	N	23.6	50.0
7.705324	34.0	1000.0	N	16.0	50.0
8.566494	32.4	1000.0	N	17.6	50.0
8.987498	31.0	1000.0	N	19.0	50.0
22.905266	36.8	1000.0	N	13.2	50.0
26.330000	36.2	1000.0	N	13.8	50.0
27.190000	45.4	1000.0	N	4.6	50.0
27.822000	47.4	1000.0	N	2.6	50.0
28.254000	46.9	1000.0	N	3.1	50.0
28.890000	43.3	1000.0	N	6.7	50.0

ad 5.1. Conducted emissions at DC mains terminals 9 kHz - 30 MHz

euDCID: 536

EUT:	Intercom device Annuncicom 155		

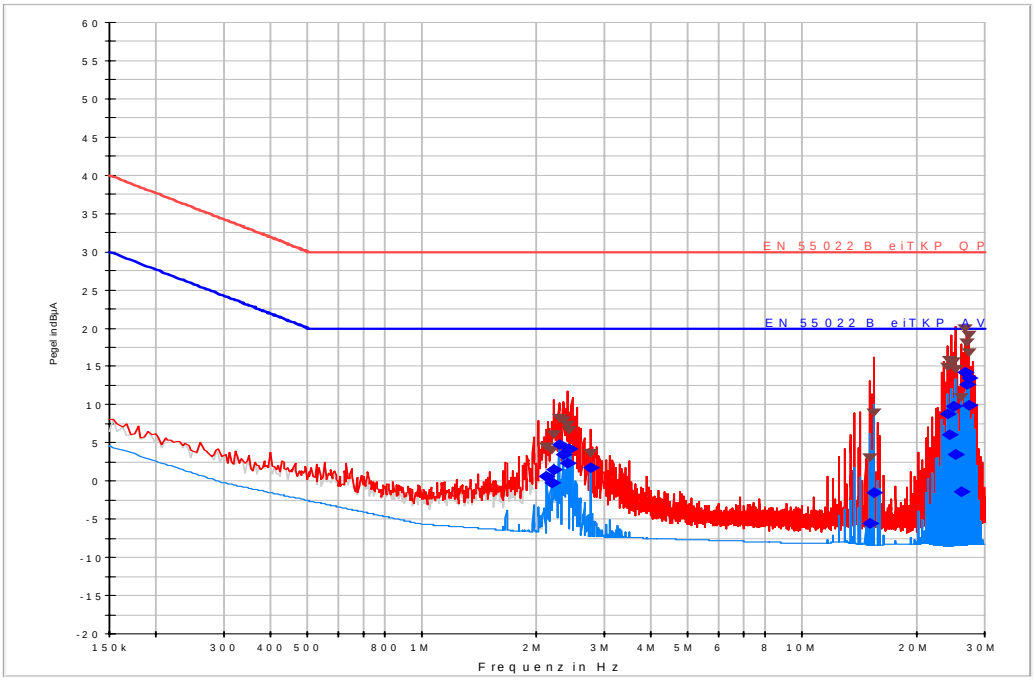
EuDC-1.jpg

5.2. Conducted emissions at signal & telecommunication lines 150 kHz - 30 MHz

euSigID: 404

EUT:	Intercom device Annuncicom 155	Kind of test:	Emission
		Basic standard:	EN 55022:1998-09+A1:2000-10+A2:2003+01
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)	Measurement uncer-tainty:	2.3 dB
Port:	LAN		
Date of test:	01/21/2010		
Tested by:	Sc	EUT modified:	Yes
Measured quantity:	Interference current	**Result:**	**Passed**
Limit class:	B		
Remarks:			

PEAK Detection - Interference current



Test equipment used					
Name	Model	Manufacturer	S/N	INV	Remarks
Current Clamp	PCL-25	Fairchild	215	310	
EMI Receiver	ESHS 10	R&S	862970/012	35	

ad 5.2. Conducted emissions at signal & telecommunication lines 150 kHz - 30 MHz

- Continuation -

euSigID: 404

EUT:	Intercom device Annuncicom 155		
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		

QUASI-PEAK Detection - Interference current

Frequency(MHz)	QuasiPeak(dBµA)	Time(ms)	Margin(dB)	Limit(dBµA)
2.118000	4.5	1000.0	25.5	30.0
2.178000	4.0	1000.0	26.0	30.0
2.210000	6.1	1000.0	23.9	30.0
2.282000	8.3	1000.0	21.7	30.0
2.338000	7.9	1000.0	22.1	30.0
2.406000	7.3	1000.0	22.7	30.0
2.442000	6.6	1000.0	23.4	30.0
2.762000	3.7	1000.0	26.3	30.0
15.002000	3.0	1000.0	27.0	30.0
15.430000	8.8	1000.0	21.2	30.0
23.974000	14.9	1000.0	15.1	30.0
24.402000	15.8	1000.0	14.2	30.0
24.838000	15.7	1000.0	14.3	30.0
25.258000	14.6	1000.0	15.4	30.0
26.142000	11.0	1000.0	19.0	30.0
26.758000	20.0	1000.0	10.0	30.0
26.970000	18.1	1000.0	11.9	30.0
27.186000	19.1	1000.0	10.9	30.0
27.398000	16.7	1000.0	13.3	30.0

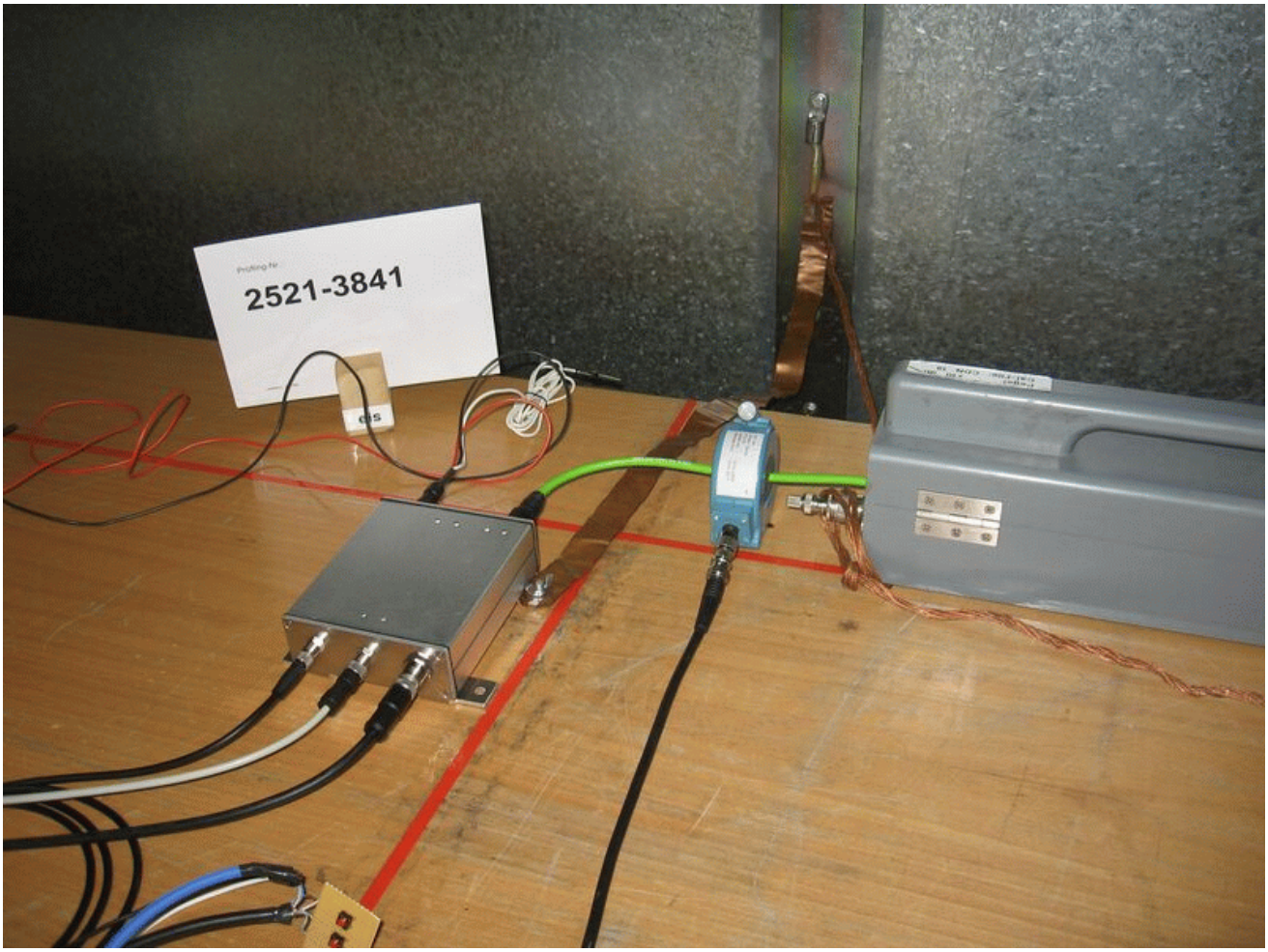
AVERAGE Detection - Interference current

Frequency(MHz)	Average(dBµA)	Time(ms)	Margin(dB)	Limit(dBµA)
2.118000	0.7	1000.0	19.3	20.0
2.178000	-0.2	1000.0	20.2	20.0
2.210000	1.5	1000.0	18.5	20.0
2.282000	4.8	1000.0	15.2	20.0
2.338000	3.4	1000.0	16.6	20.0
2.406000	2.4	1000.0	17.6	20.0
2.442000	4.1	1000.0	15.9	20.0
2.762000	1.7	1000.0	18.3	20.0
15.002000	-5.6	1000.0	25.6	20.0
15.430000	-1.5	1000.0	21.5	20.0
23.974000	8.8	1000.0	11.2	20.0
24.402000	6.0	1000.0	14.0	20.0
24.838000	9.7	1000.0	10.3	20.0
25.258000	3.4	1000.0	16.6	20.0
26.142000	-1.4	1000.0	21.4	20.0
26.758000	14.3	1000.0	5.7	20.0
26.970000	12.6	1000.0	7.4	20.0
27.186000	13.5	1000.0	6.5	20.0
27.398000	10.0	1000.0	10.0	20.0

ad 5.2. Conducted emissions at signal & telecommunication lines 150 kHz - 30 MHz

euSigID: 404

EUT:	Intercom device Annuncicom 155		



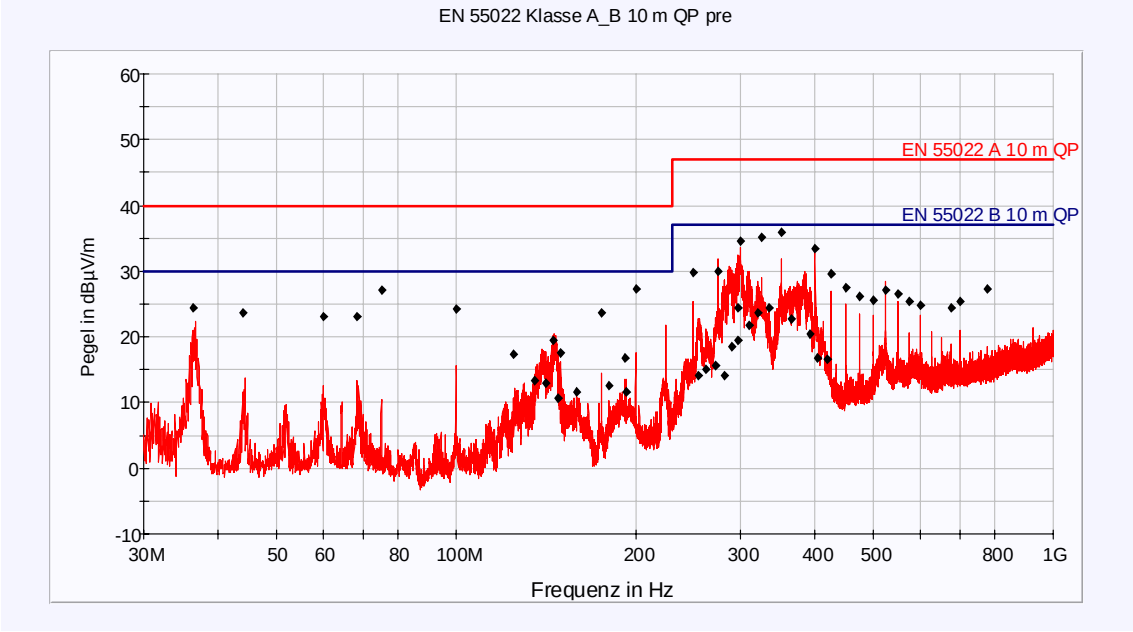
EuSig-1.jpg

5.3.1 Radiated emissions - electromagn. fields 30 MHz - 1000 MHz

eeID: 4284

EUT:	Intercom device Annuncicom 155	Kind of test:	Emission
		Generic standard:	EN 55022:1998-09+A1:2000-10+A2:2003+01
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)	Measurement uncer-tainty:	4.5 dB
Port:	Enclosure		
Date of test:	01/21/2010		
Tested by:	Sc		
Prescan:	Done		
Final test:	Done		
Test site (final):	Open Area Test Site (OATS)	EUT modified:	No
Antenna distance:	10 m	**Result:**	**Passed**
Limit class:	B		
Remarks:			

QUASI-PEAK Detection



Test equipment used					
Name	Model	Manufacturer	S/N	INV	Remarks
BiConiLog Antenna	3141	EMCO	9806-1102	357	
EMI TEST RECEIVER	ESCI3	R&S	100901	422	

ad 5.3.1 Radiated emissions - electromagn. fields 30 MHz - 1000 MHz

- Continuation -

eeID: 4284

EUT:	Intercom device Annuncicom 155		
Operation mode:			

QUASI-PEAK Detection

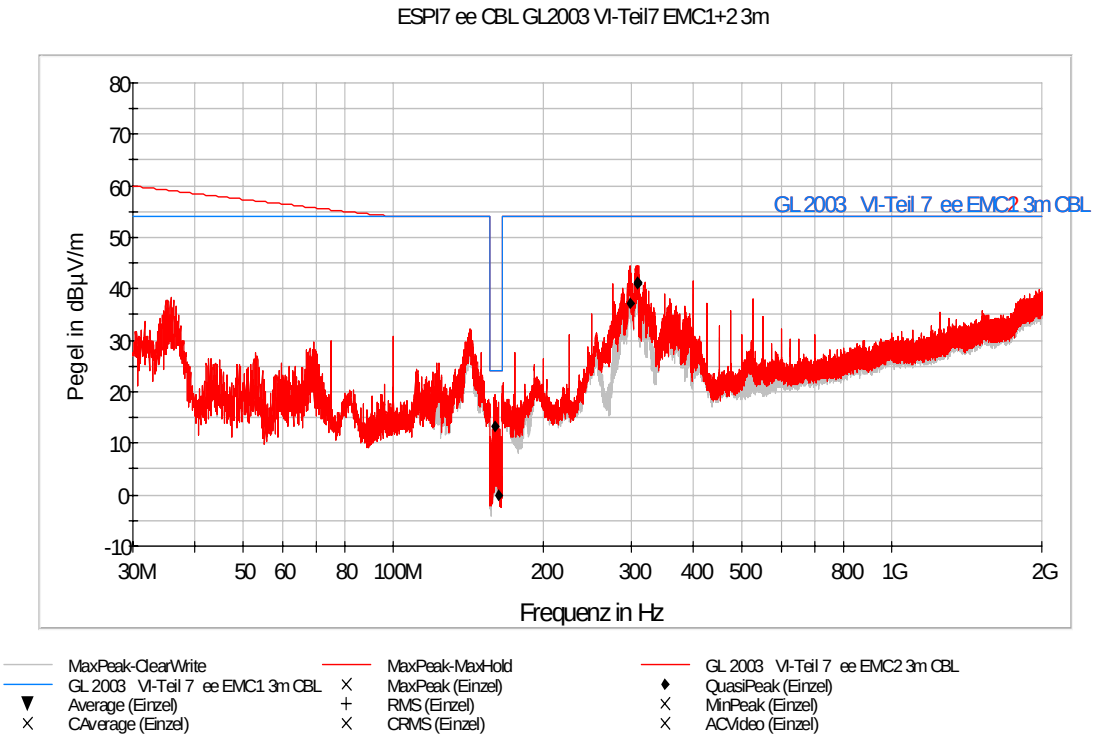
Frequency(MHz)	QuasiPeak(dBµV/m)	Antenna(cm)	Polarisation	Margin(dB)	Limit(dBµV/m)
36.240000	24.4	102.0	V	5.6	30.0
43.960000	23.7	102.0	V	6.3	30.0
60.000000	23.0	102.0	V	7.0	30.0
68.360000	23.2	102.0	V	6.8	30.0
75.000000	27.2	98.0	V	2.8	30.0
100.000000	24.3	98.0	V	5.7	30.0
125.000000	17.3	98.0	V	12.7	30.0
135.400000	13.3	102.0	V	16.7	30.0
141.280000	13.0	102.0	V	17.0	30.0
145.120000	19.5	102.0	V	10.5	30.0
148.160000	10.7	102.0	V	19.4	30.0
150.000000	17.5	98.0	V	12.5	30.0
159.240000	11.5	102.0	V	18.5	30.0
175.000000	23.7	98.0	V	6.3	30.0
180.640000	12.6	102.0	V	17.4	30.0
192.040000	16.7	102.0	V	13.3	30.0
193.160000	11.5	102.0	V	18.5	30.0
200.000000	27.4	98.0	V	2.6	30.0
250.000000	29.8	98.0	V	7.2	37.0
255.080000	14.1	377.0	H	22.9	37.0
262.520000	15.0	377.0	H	22.0	37.0
272.760000	15.6	98.0	V	21.4	37.0
275.000000	29.9	355.0	H	7.1	37.0
281.280000	14.1	102.0	V	22.9	37.0
290.000000	18.5	377.0	H	18.5	37.0
296.800000	24.4	377.0	H	12.6	37.0
296.800000	19.5	102.0	V	17.5	37.0
299.960000	34.6	244.0	H	2.4	37.0
309.760000	21.7	102.0	V	15.3	37.0
319.840000	23.7	102.0	V	13.3	37.0
325.000000	35.1	244.0	H	1.9	37.0
334.080000	24.4	377.0	H	12.6	37.0
350.000000	36.0	182.0	H	1.0	37.0
364.320000	22.7	377.0	H	14.3	37.0
392.000000	20.4	102.0	V	16.6	37.0
399.960000	33.5	182.0	H	3.5	37.0
402.000000	16.7	102.0	V	20.3	37.0
418.200000	16.6	102.0	V	20.4	37.0
425.000000	29.5	181.0	H	7.5	37.0
450.000000	27.4	181.0	H	9.6	37.0
475.000000	26.1	241.0	H	10.9	37.0
500.000000	25.5	161.0	H	11.5	37.0
525.000000	27.0	117.0	H	10.0	37.0
550.000000	26.5	117.0	H	10.5	37.0
575.000000	25.5	117.0	H	11.5	37.0
600.000000	24.8	159.0	H	12.2	37.0
675.000000	24.4	159.0	H	12.6	37.0
700.000000	25.4	159.0	H	11.6	37.0
775.000000	27.3	159.0	H	9.7	37.0

5.3.2 Radiated emissions - electromagn. fields 30 MHz - 2000 MHz

eeID: 4285

EUT:	Intercom device Annuncicom 155	Kind of test:	Emission
		Generic standard:	Germanischer Lloyd, Part VI-7-2, Ausgabe 2003
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)	Measurement uncer-tainty:	4.5 dB
Port:	Enclosure		
Date of test:	01/21/2010		
Tested by:	Sc		
Prescan:	Done		
Final test:	Done		
Test site (final):	Fully Anechoic Chamber	EUT modified:	No
Antenna distance:	3 m	**Result:**	**Passed**
Limit class:	EM		
Remarks:			

QUASI-PEAK Detection



Test equipment used

Name	Model	Manufacturer	S/N	INV	Remarks
BiLog Antenna	CBL6140A	Schaffner	1118	219	
EMI TEST RECEIVER	ESPI7	R&S	100090	359	

ad 5.3.2 Radiated emissions - electromagn. fields 30 MHz - 2000 MHz

- Continuation -

eeID: 4285

EUT:	Intercom device Annuncicom 155		
Operation mode:			

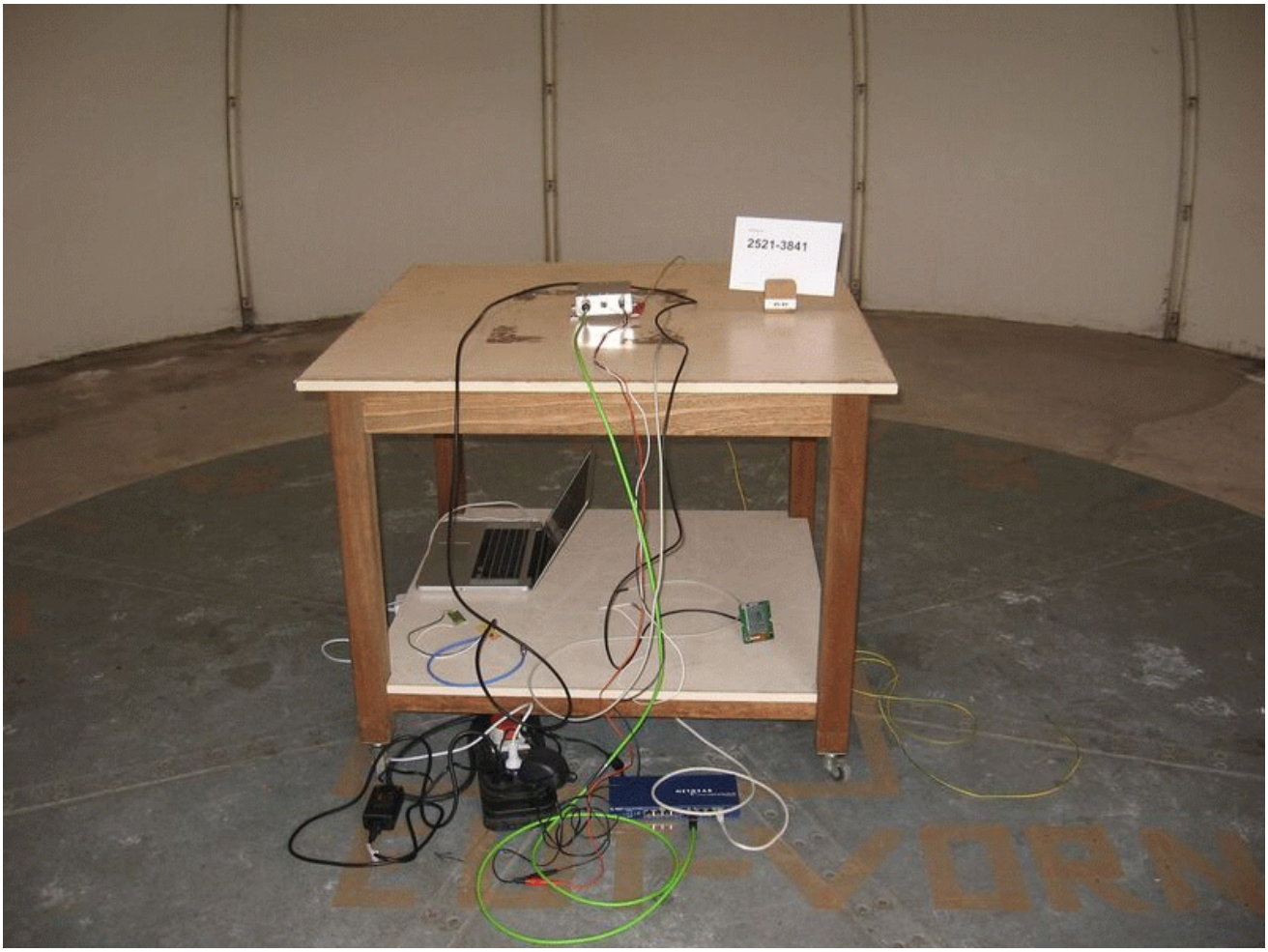
QUASI-PEAK Detection

Frequency(MHz)	QuasiPeak(dBµV/m)	Polarisation	Margin(dB)	Limit(dBµV/m)
159.932000	13.4	H	10.6	24.0
162.496000	-0.1	V	24.1	24.0
298.680000	37.2	V	16.8	54.0
308.360000	41.3	H	12.7	54.0
309.000000	41.0	H	13.0	54.0

ad 5.3. Radiated emissions - electromagn. fields 30 MHz - 2000 MHz

eeID: 4285

EUT:	Intercom device Annuncicom 155		



Ee-1.jpg

ad 5.3. Radiated emissions - electromagn. fields 30 MHz - 2000 MHz

eeID: 4285

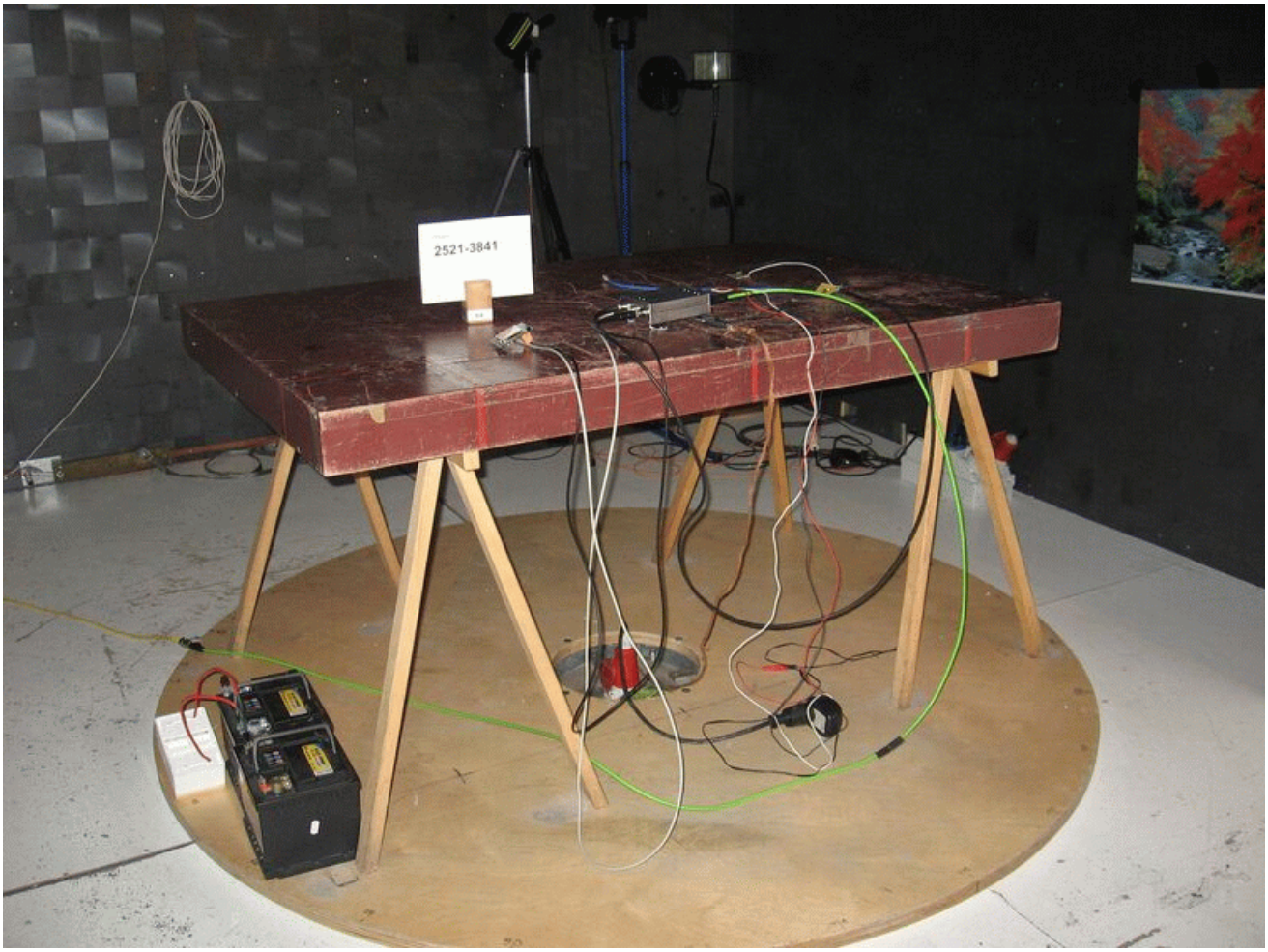
EUT:	Intercom device Annuncicom 155		

Ee-2.jpg

ad 5.3. Radiated emissions - electromagn. fields 30 MHz - 2000 MHz

eeID: 4285

EUT:	Intercom device Annuncicom 155		



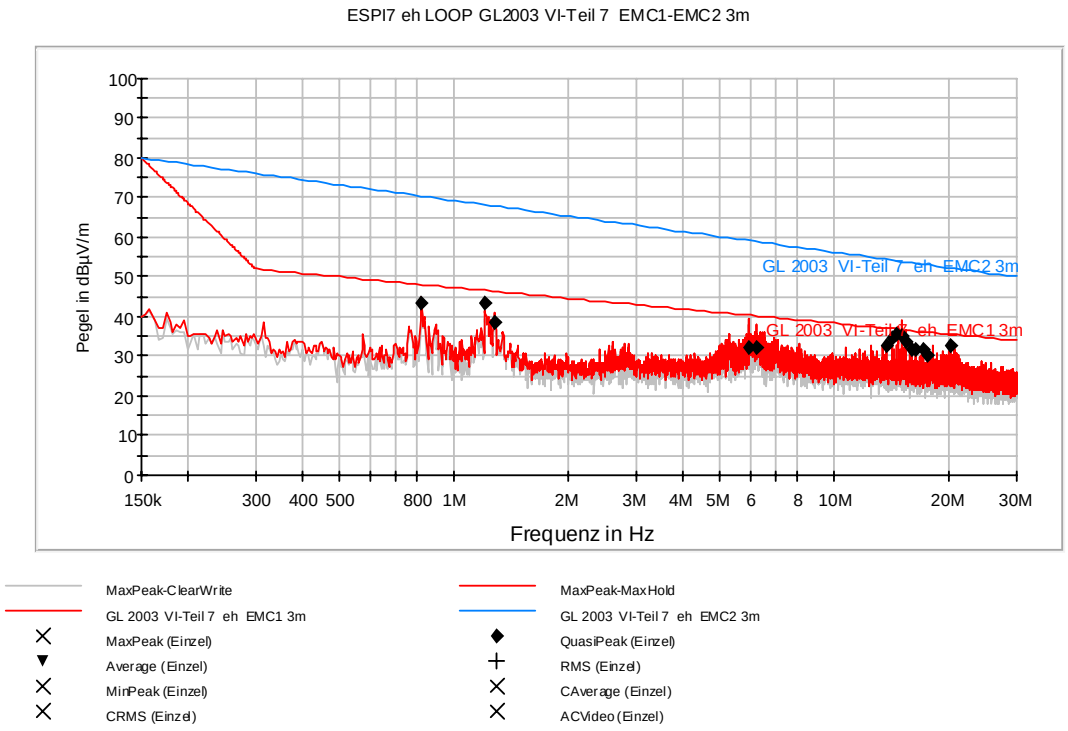
ee-3.jpg

5.4. Radiated emissions - magnetic fields 150 kHz - 30 MHz

ehID: 225

EUT:	Intercom device Annuncicom 155	Kind of test:	Emission
		Basic standard:	Germanischer Lloyd, Part VI-7-2, Ausgabe 2003
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)	Measurement uncer-tainty:	2.3 dB
Port:	Enclosure		
Date of test:	01/21/2010		
Tested by:	Sc		
Test site:	Fully Anechoic Chamber	EUT modified:	No
Antenna distance:	3 m	**Result:**	**Passed**
Limit class:	EMC1		
Remarks:			

PEAK Detection



Test equipment used					
Name	Model	Manufacturer	S/N	INV	Remarks
Loop Antenna	HFH2-Z2	R&S	59	60	
EMI TEST RECEIVER	ESPI7	R&S	100090	359	

ad 5.4. Radiated emissions - magnetic fields 150 kHz - 30 MHz

- Continuation -

ehID: 225

EUT:	Intercom device Annuncicom 155		
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		

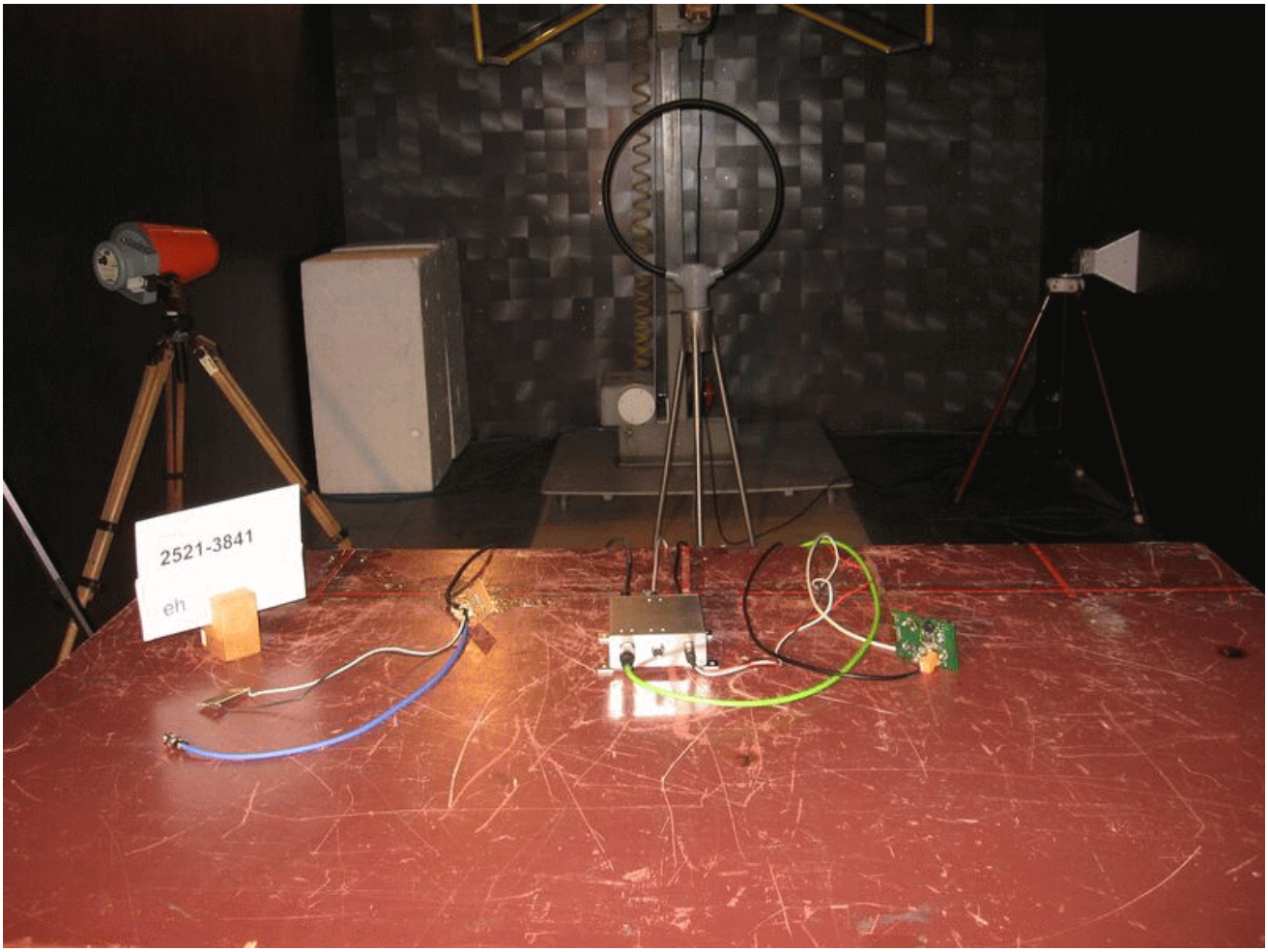
QUASI-PEAK Detection

Frequency(MHz)	QuasiPeak(dBµV/m)	Margin(dB)	Limit(dBµV/m)
0.814000	43.6	4.5	48.1
1.202000	43.5	3.1	46.6
1.270000	38.4	8.0	46.4
5.950000	32.1	8.2	40.3
6.238000	32.1	8.0	40.1
13.706000	32.7	4.4	37.1
14.146000	34.8	2.1	36.9
14.566000	35.4	1.4	36.8
15.006000	35.4	1.3	36.7
15.426000	33.7	2.9	36.6
15.846000	31.9	4.6	36.5
16.290000	31.9	4.5	36.4
17.138000	31.5	4.7	36.2
17.578000	30.4	5.7	36.1
20.130000	32.9	2.7	35.6

ad 5.4. Radiated emissions - magnetic fields 150 kHz - 30 MHz

ehID: 225

EUT:	Intercom device Annuncicom 155		



Eh-1.jpg

5.5. Electrostatic discharge (ESD)

idID: 2139

EUT:	Intercom device Annuncicom 155	Kind of test:	Immunity
		Basic standard:	EN 61000-4-2:1995 + A1:1998 + A2:2001
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
Tested Port:	Enclosure	Environment:	Temp. 24 °C
			Humidity 47 %
Date of test:	06/18/2010		Atm. press. 959 hPa
Tested by:	CE	EUT modified:	No
Required performance criterion	B	**Result:**	**Passed**
Remarks:			

Kind of discharge	Kind of coupling	Done	Test points of EUT			Max. test voltage (kV)	Passed Performance criterion	Remarks
Air	Direct	✔	see fotos			8	A	
Contact	Direct	✔	see fotos			6	A	
	Indirect	✔	HKP: ✔		VKP: ✔	6	A	

Notes:

HKP = Horizontal coupling plate
VKP = Vertical coupling plate

All tests were done at the following steps of test voltage (until max. test voltage): 2 / 4 / 6 / 8 kV.
At each test voltage at least 10 positive test pulses with a time interval of 1 s and 10 negative test pulses with a time interval of 1 s were carried out.

Test equipment used

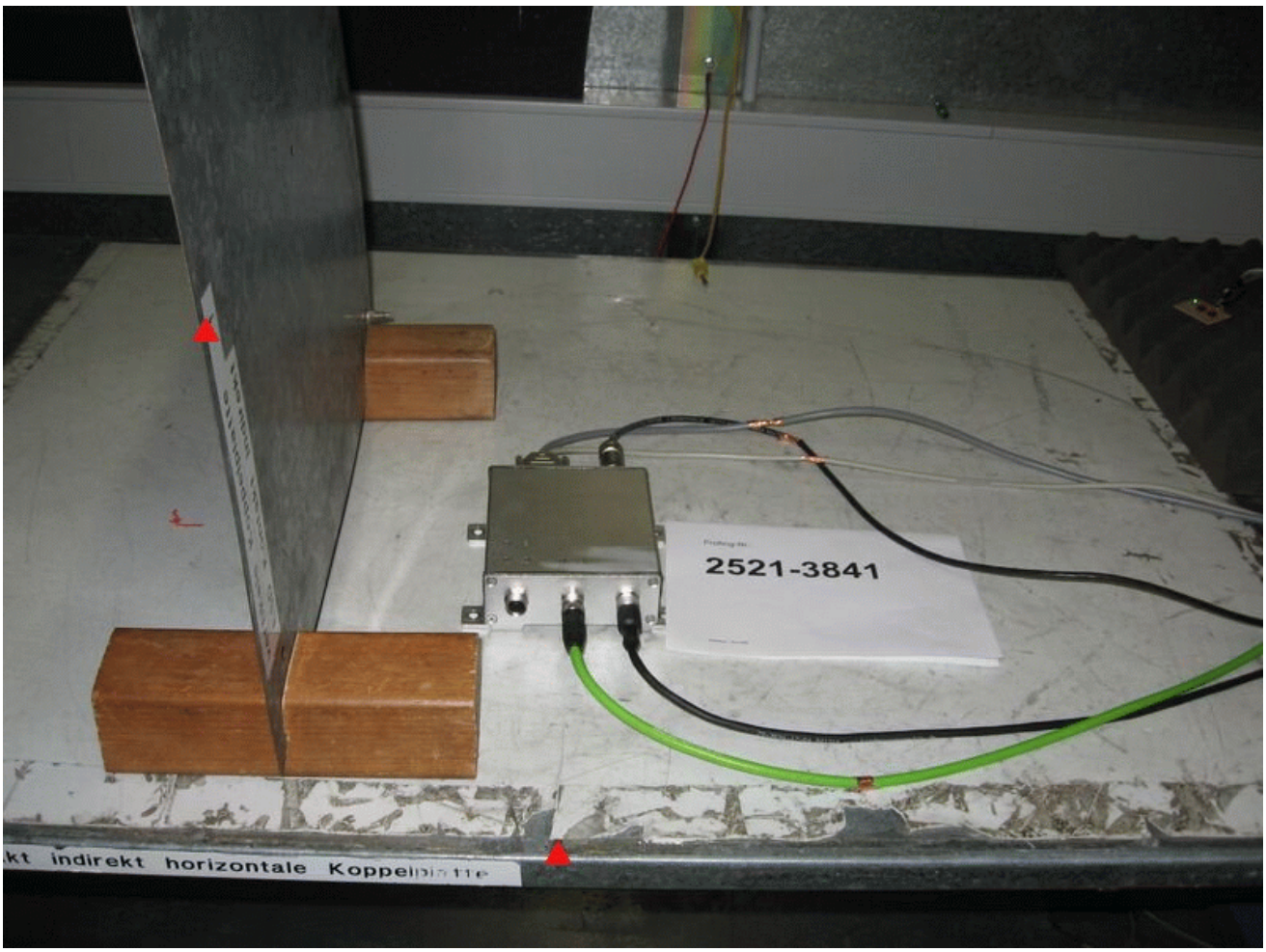
Name	Model	Manufacturer	S/N	INV	Remarks
ESD Generator	NSG 435	Schaffner	222	182	

ad 5.5. Electrostatic discharge (ESD)

idID: 2139

EUT:	Intercom device Annuncicom 155		

● Air discharge ▲ Contact discharge



Id-1.jpg

ad 5.5. Electrostatic discharge (ESD)

idID: 2139

EUT:	Intercom device Annuncicom 155		

● Air discharge ▲ Contact discharge

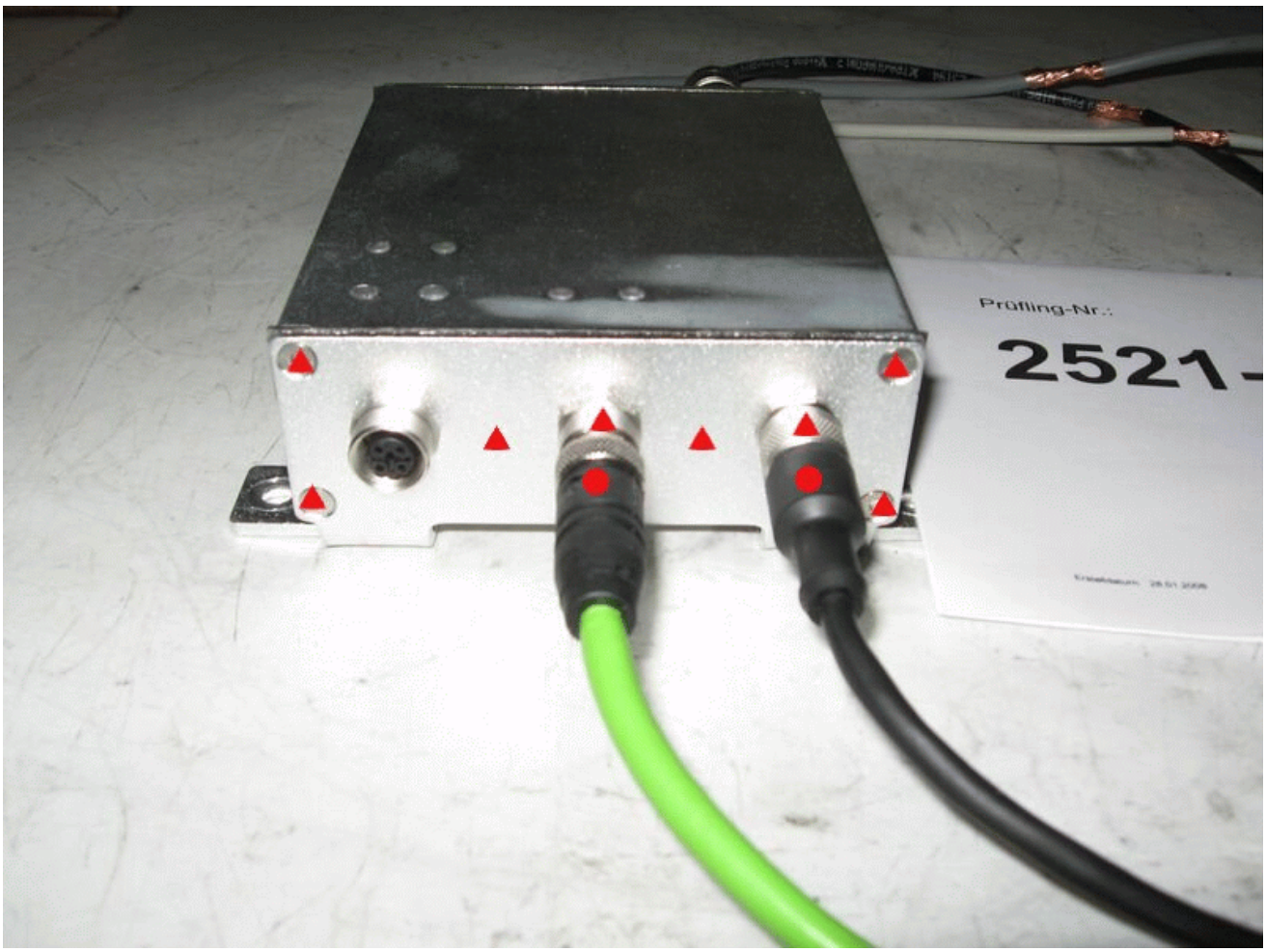
Id-2.jpg

ad 5.5. Electrostatic discharge (ESD)

idID: 2139

EUT:	Intercom device Annuncicom 155		

● Air discharge ▲ Contact discharge



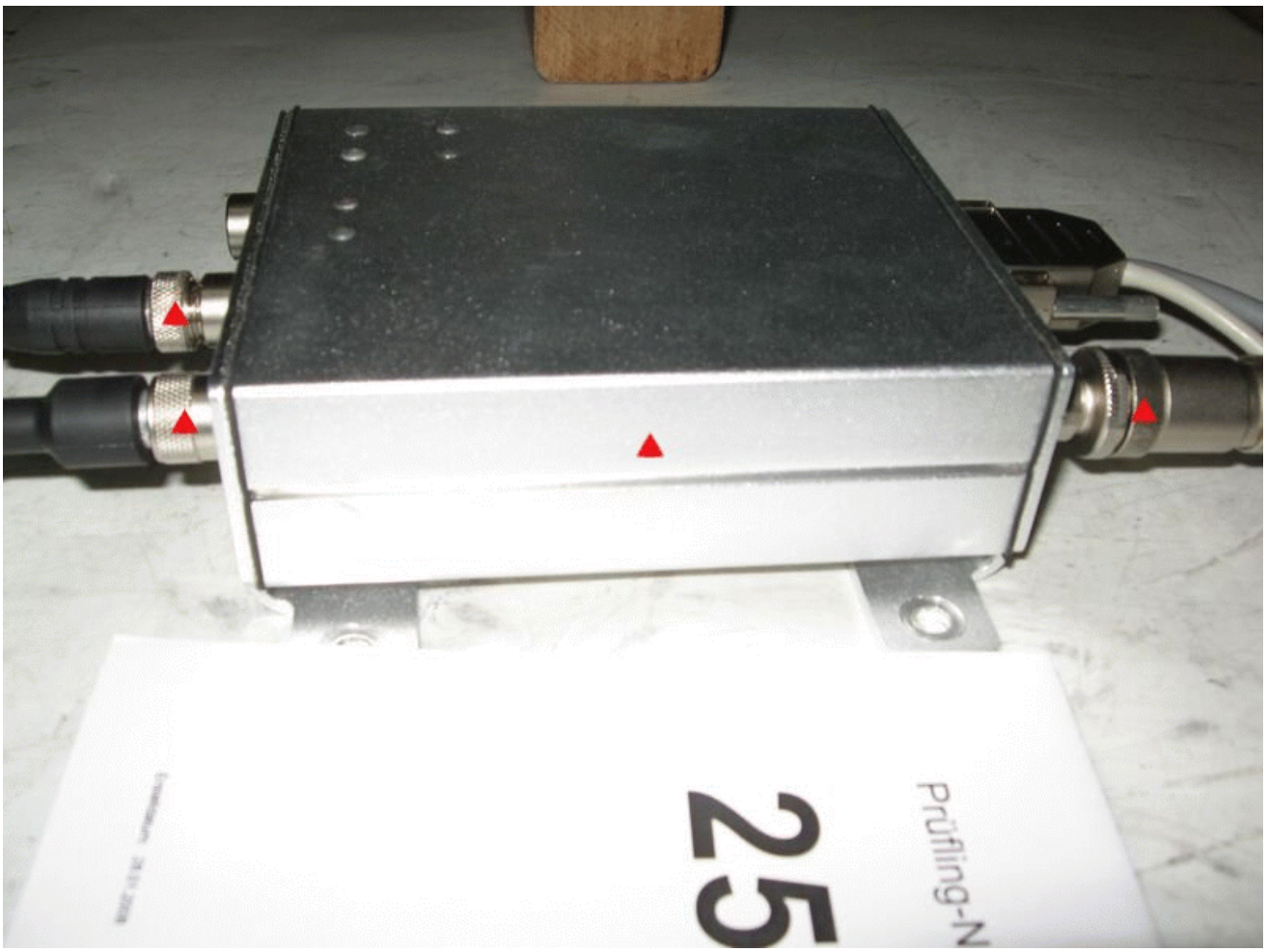
Id-3.jpg

ad 5.5. Electrostatic discharge (ESD)

idID: 2139

EUT:	Intercom device Annuncicom 155		

● Air discharge ▲ Contact discharge



Id-4.jpg

5.6.1 Radio-frequency electromagnetic fields 80 MHz - 1000 MHz

ifID: 3514

EUT:	Intercom device Annuncicom 155	Kind of test:	Immunity
		Basic standard:	EN 61000-4-3:2006+A1:2008
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
Port:	Enclosure	Environment:	Temp. 29 °C
Test site:	Fully Anechoic Chamber		Humidity 36 %
Date of test:	06/11/2010		Atm. press. 958 hPa
Tested by:	CE	EUT modified:	No
Required performance criterion:	A	**Result:**	**Passed**
Remarks:			

Test parameters	**Settings**	
	Amplitude-modulated Field	**Puls-modulated Field**
Frequency range	80 MHz - 1000 MHz	
Frequency step Dwell time	1 % 1 s	
Modulation	1 kHz/AM 80%	
Test level (field strength)	20 V/m	
Polarization	horizontal + vertical	
Distance transmitting antenna - EUT	3 m (> 1GHz 1m)	
Tested sides of the EUT	front, rear	
Result		
Passed Performance criterion	A	
Remarks		

Test equipment used					
Name	Model	Manufacturer	S/N	INV	Remarks
Signal Generator	SML03	R&S	100935	353	
Power Amplifier	100W1000M1	Ampl. Res.	12812	45	
Power Amplifier	5101F	OPHIR	1006 "N/C"	296	
BiLog Antenna	CBL6140A	Schaffner	1118	219	
Double Ridged Guide Antenna	3115	EMCO	9607-4883	156	

5.6.2 Radio-frequency electromagnetic fields 1000 MHz - 2700 MHz

ifID: 3515

EUT:	Intercom device Annuncicom 155	Kind of test:	Immunity
		Basic standard:	EN 61000-4-3:2006+A1:2008
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
Port:	Enclosure	Environment:	Temp. 29 °C
Test site:	Fully Anechoic Chamber		Humidity 36 %
Date of test:	06/11/2010		Atm. press. 958 hPa
Tested by:	CE	EUT modified:	No
Required performance criterion:	A	**Result:**	**Passed**
Remarks:			

Test parameters	**Settings**	
	Amplitude-modulated Field	**Puls-modulated Field**
Frequency range	1000 MHz - 2700 MHz	
Frequency step Dwell time	1 % 1 s	
Modulation	1 kHz/AM 80%	
Test level (field strength)	10 V/m	
Polarization	horizontal + vertical	
Distance transmitting antenna - EUT	3 m (> 1GHz 1m)	
Tested sides of the EUT	front, rear	
Result		
Passed Performance criterion	A	
Remarks		

Test equipment used					
Name	Model	Manufacturer	S/N	INV	Remarks
Signal Generator	SML03	R&S	100935	353	
Power Amplifier	100W1000M1	Ampl. Res.	12812	45	
Power Amplifier	5101F	OPHIR	1006 "N/C"	296	
BiLog Antenna	CBL6140A	Schaffner	1118	219	
Double Ridged Guide Antenna	3115	EMCO	9607-4883	156	

ad 5.6. Radio-frequency electromagnetic fields

ifID: 3515

EUT:	Intercom device Annuncicom 155		

If-1.jpg

ad 5.6. Radio-frequency electromagnetic fields

ifID: 3515

EUT:	Intercom device Annuncicom 155		

If-2.jpg

5.7. Electrical fast transients (Burst)

ibID: 2161

EUT:	Intercom device Annuncicom 155	Kind of test:	Immunity
		Basic standard:	EN 61000-4-4:2004
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
		Environment:	Temp. 29 °C
			Humidity 36 %
Date of test:	06/11/2010		Atm. press. 958 hPa
Tested by:	CE	EUT modified:	No
Required performance criterion:	B	**Result:**	**Passed**
Remarks:			

Coupling devices and Kind of coupling	Tested cables/lines	Test voltage (kV)	Passed Performance criterion	Remarks
Coupling device network (in each case unsymmetrically and asymmetrically)	AC-Mains	2	A	
Capacitive coupling clamp (asymmetrically)	DC	2	A	
	all others	2	A	

Notes:

Tested polarization: Positive + Negative (at each kind of coupling)
Duration of test: 300 s at each polarity and kind of coupling
Test puls: 5/50 ns; Z_i = 50 Ohm
Repetition frequency: 5 kHz; at test level ≥ 4 kV: 2.5 kHz

Test equipment used

Name	Model	Manufacturer	S/N	INV	Remarks
Burst Generator	NSG 2025	Schaffner	1188	237	
Capacitive Coupling Clamp	CDN 125	Schaffner	647	239	

ad 5.7. Electrical fast transients (Burst)

ibID: 2161

EUT:	Intercom device Annuncicom 155		

Ib-1.jpg

5.8. Surge

isID: 1948

EUT:	Intercom device Annuncicom 155	Kind of test:	Immunity
		Basic standard:	EN 61000-4-5:1995+ A1:2001
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
		Environment:	Temp. 24 °C
			Humidity 47 %
Date of test:	06/18/2010		Atm. press. 959 hPa
Tested by:	CE	EUT modified:	Yes
Required performance criterion:	B	**Result:**	**Passed**
Remarks:			

Tested port	Lines	Kind of coupling	Coupling impedance	Max. test voltage (kV)	Passed Performance criterion	Remarks
24 VDC	A1 - A2	s	18 µF	1	A	
24 VDC	A1/A2-PE/(Enclosure)	u	9 µF + 10 Ohm	2	A	
LAN	shield	u	18 µF	1	A	

Notes:

Kind of coupling: s = symmetrically
u = unsymmetrically

Test puls: 1.2/50µs; Z_i = 2 Ohm
Polarity: positive and negative at each test voltage
Number of test pulses: ≥ 6 at each test voltage
Time interval between pulses: ≥10 s
Tested voltage steps: 0,5 / 1 kV, if max. test voltage = 1 kV
0,5 / 1 / 1,5 / 2 kV, if max. test voltage = 2 kV
1 / 2 / 3 / 4 kV, if max. test voltage = 4 kV
Tested phase angels (at AC): 90°/180°/270°

Test equipment used

Name	Model	Manufacturer	S/N	INV	Remarks
Kombigenerator	NSG 3040	TESEQ	097	446	

5.9. Conducted disturbances, induced by radio-frequency fields 150 kHz - 80 MHz

icsID: 2248

EUT:	Intercom device Annuncicom 155	Kind of test:	Immunity
		Basic standard:	EN 61000-4-6:1996 + A1:2001
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
		Environment:	Temp. 24 °C
			Humidity 47 %
Date of test:	06/18/2010		Atm. press. 959 hPa
Tested by:	CE	EUT modified:	No
Required performance criterion:	A	**Result:**	**Passed**
Remarks:			

Test parameter	**Settings**
Frequency range	150 kHz - 80 MHz
Frequency step Dwell time	1 % 1 s
Modulation	1 kHz/AM 80%
Test voltage	10 V

Tested cables/lines	**Cable/line/port of the EUT**	**Coupling device used**	
	DC in	CDN 801 M2/M3	INV 307
	dig. I/O + Audio out	CDN 801 S	INV 198
	Mic in	CDN 801 S	INV 198
	RS485	CDN 801 S	INV 198
	LAN	CDN 801 S	INV 198

Result	
Passed Performance criterion	A
Remarks	

Test equipment used

Name	Model	Manufacturer	S/N	INV	Remarks
RF Generator	NSG 2070-1	Schaffner	135	222	
Coupling Network	CDN 801 M2/M3	Lüthi	935064	307	
Coupling Network	CDN 801 S	ELMAC		198	
Coupling Network	CDN 801 S	ELMAC		198	
Coupling Network	CDN 801 S	ELMAC		198	
Coupling Network	CDN 801 S	ELMAC		198	

ad 5.9. Conducted disturbances, induced by radio-frequency fields 150 kHz - 80 MHz

icsID: 2248

EUT:	Intercom device Annuncicom 155		

Ics-1.jpg

ad 5.9. Conducted disturbances, induced by radio-frequency fields 150 kHz - 80 MHz

icsID: 2248

EUT:	Intercom device Annuncicom 155		

Ics-2.jpg

ad 5.9. Conducted disturbances, induced by radio-frequency fields 150 kHz - 80 MHz

icsID: 2248

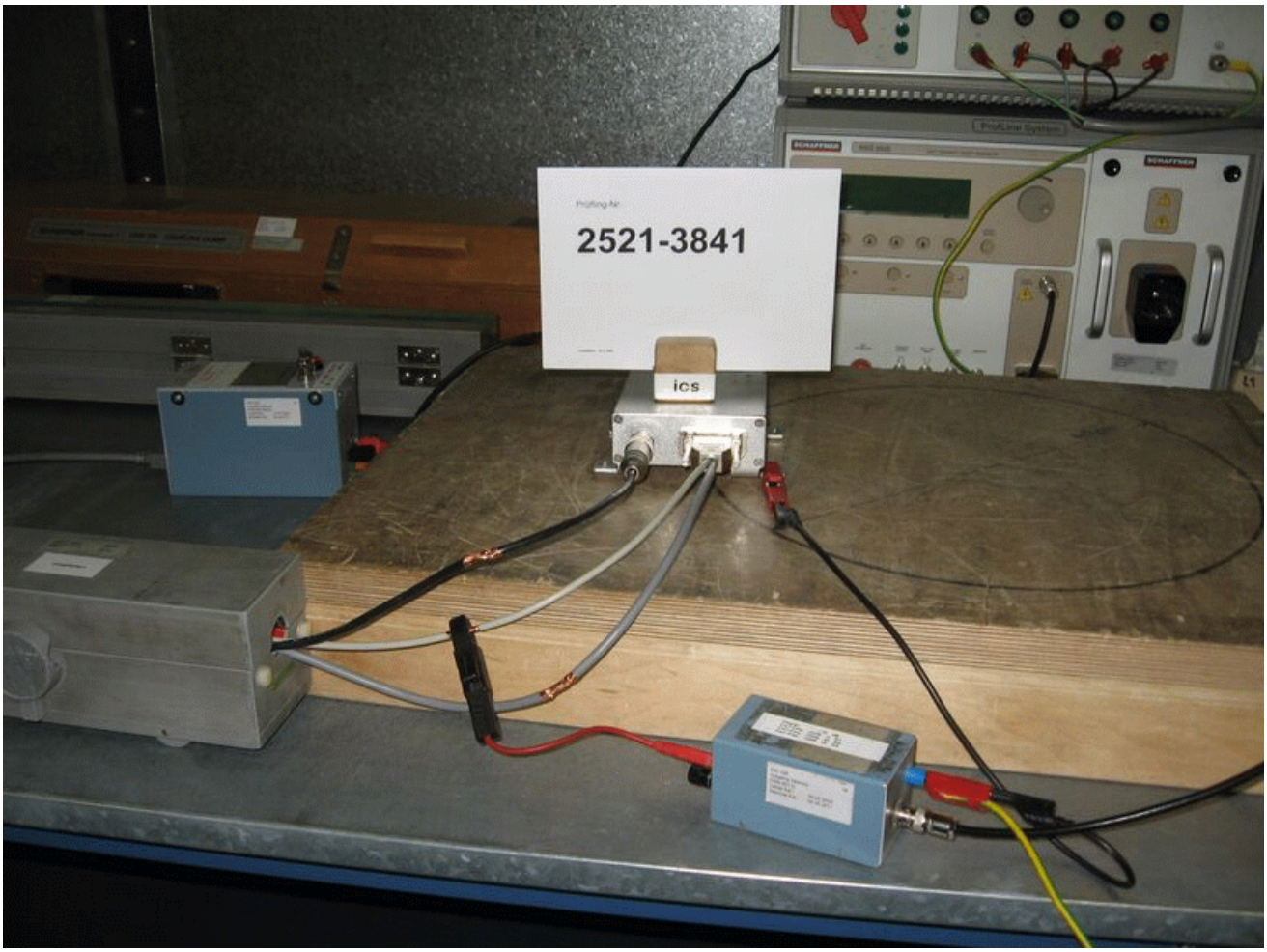
EUT:	Intercom device Annuncicom 155		

Ics-3.jpg

ad 5.9. Conducted disturbances, induced by radio-frequency fields 150 kHz - 80 MHz

icsID: 2248

EUT:	Intercom device Annuncicom 155		

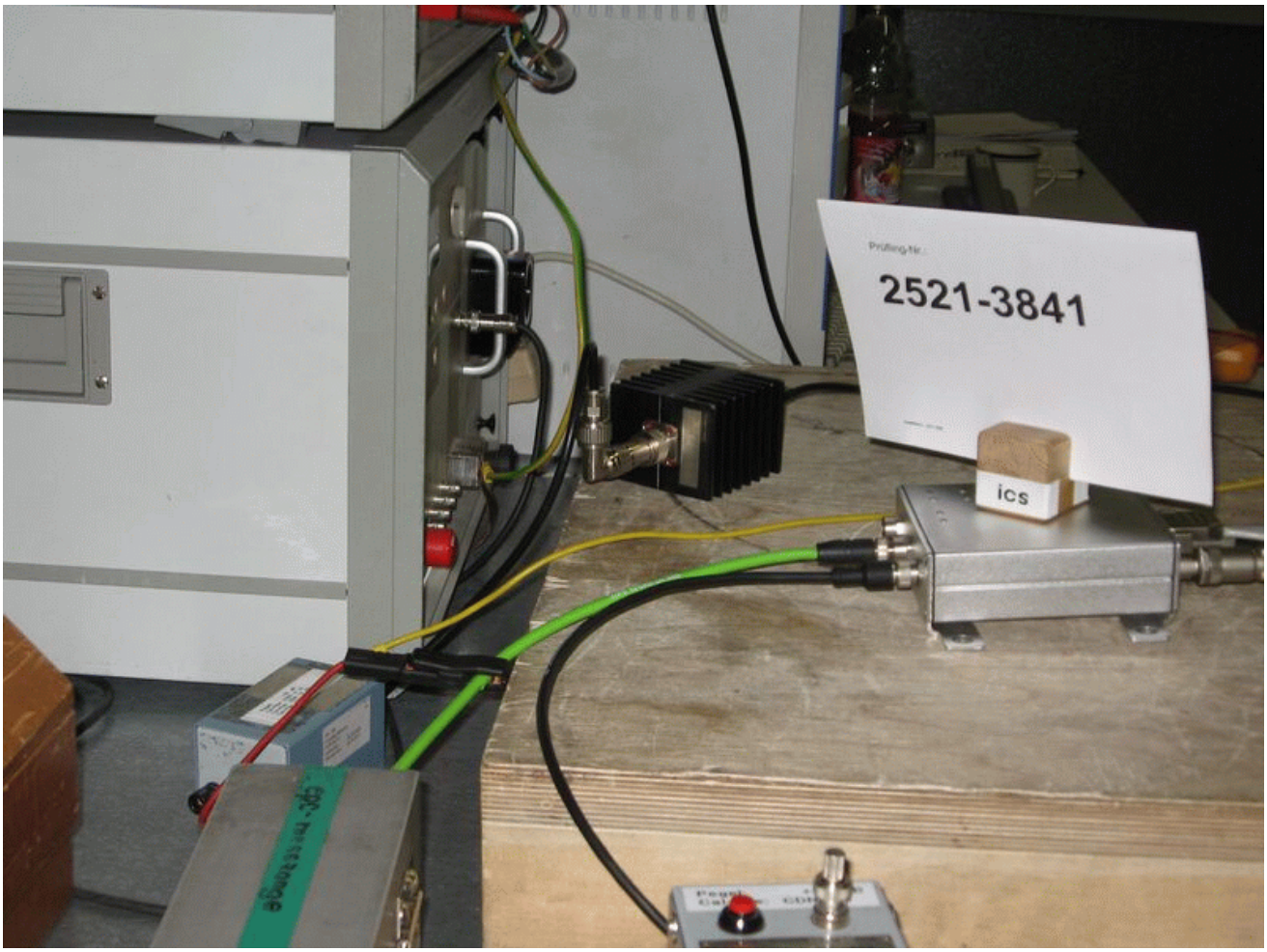


Ics-4.jpg

ad 5.9. Conducted disturbances, induced by radio-frequency fields 150 kHz - 80 MHz

icsID: 2248

EUT:	Intercom device Annuncicom 155		



Ics-5.jpg

5.10. Pulse magnetic field immunity test

ih50ID: 887

EUT:	Intercom device Annuncicom 155	Kind of test:	Immunity
		Basic standard:	EN 61000-4-9:1993 + A1:2001
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
Port:	Enclosure	Environment:	Temp. 24 °C
			Humidity 47 %
Date of test:	06/18/2010		Atm. press. 959 hPa
Tested by:	CE	EUT modified:	No
Required performance criterion:	A	**Result:**	**Passed**
Remarks:			

Test parameters	**Settings**
Test level (field strength)	300 A/m
Tested position(s) of the EUT	EUT oriented to two orthogonal directions
Test duration at each EUT position	10 pulses
Result	
Passed Performance criterion	A
Remarks	

Test equipment used

Name	Model	Manufacturer	S/N	INV	Remarks
Immunity Loop	F-1000-4-...-1M	FCC	23	303	
Current Transformator	I-TR-ih50	ELMAC	001	25	
True RMS Clamp Meter	FLUKE 33	Fluke	7606 42659	81	

ad 5.10. Pulse magnetic field immunity test

ih50ID: 887

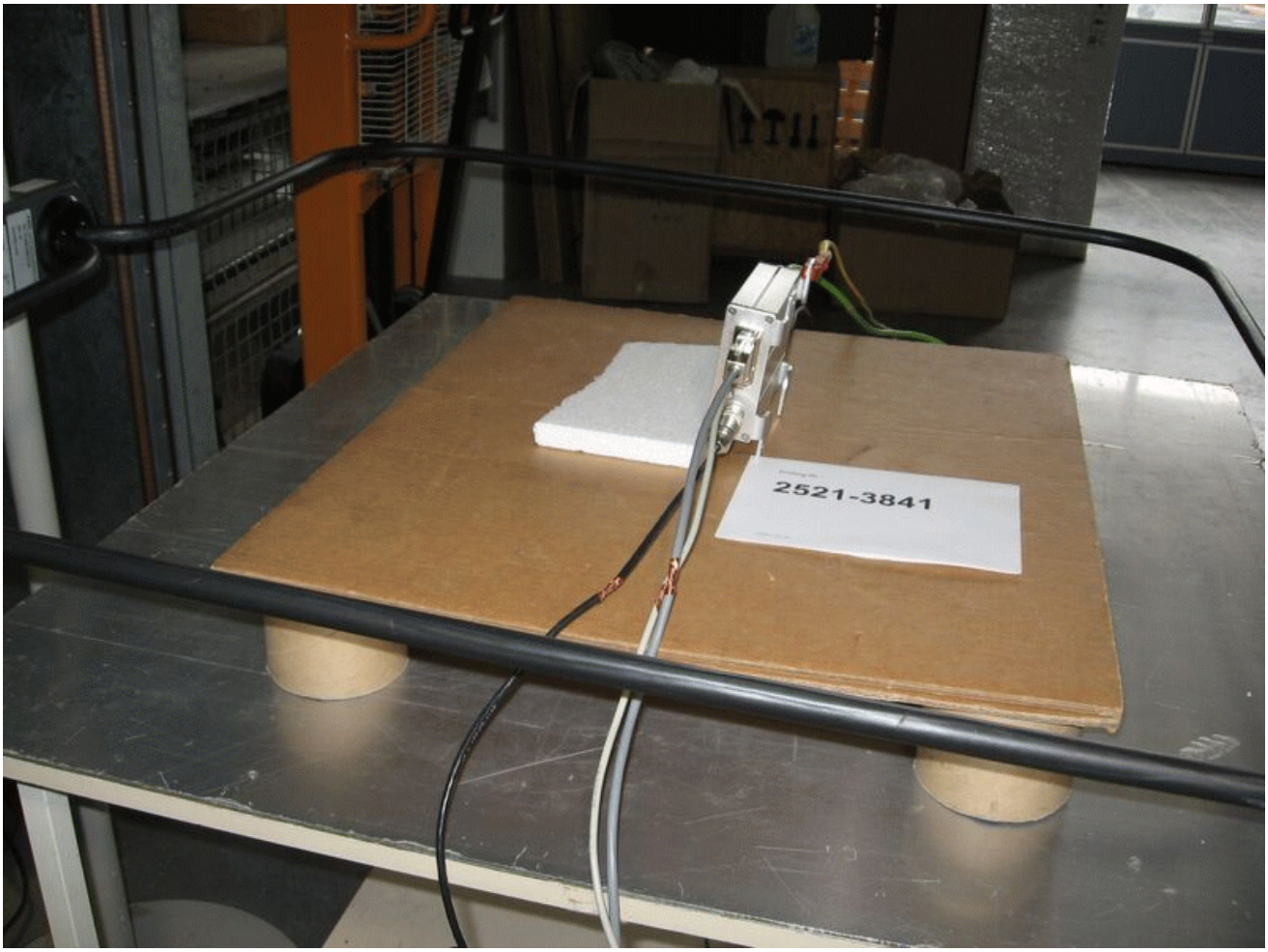
EUT:	Intercom device Annuncicom 155		

Ih50-1.jpg

ad 5.10. Pulse magnetic field immunity test

ih50ID: 887

EUT:	Intercom device Annuncicom 155		



Ih50-2.jpg

5.11. Power frequency magnetic field immunity test

ih50ID: 887

EUT:	Intercom device Annuncicom 155	Kind of test:	Immunity
		Basic standard:	EN 61000-4-9:1993 + A1:2001
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
Port:	Enclosure	Environment:	Temp. 28 °C
			Humidity 30 %
Date of test:	07/16/2010		Atm. press. 966 hPa
Tested by:	CE	EUT modified:	No
Required performance criterion:	A	**Result:**	**Passed**
Remarks:			

Test parameters	**Settings**
Tested frequencies:	16.7 Hz, 50 Hz, 0 Hz
Test level (field strength)	300 A/m
Tested position(s) of the EUT	EUT oriented to two orthogonal directions
Test duration at each EUT position	1 min
Result	
Passed Performance criterion	A
Remarks	

ad 5.11. Power frequency magnetic field immunity test

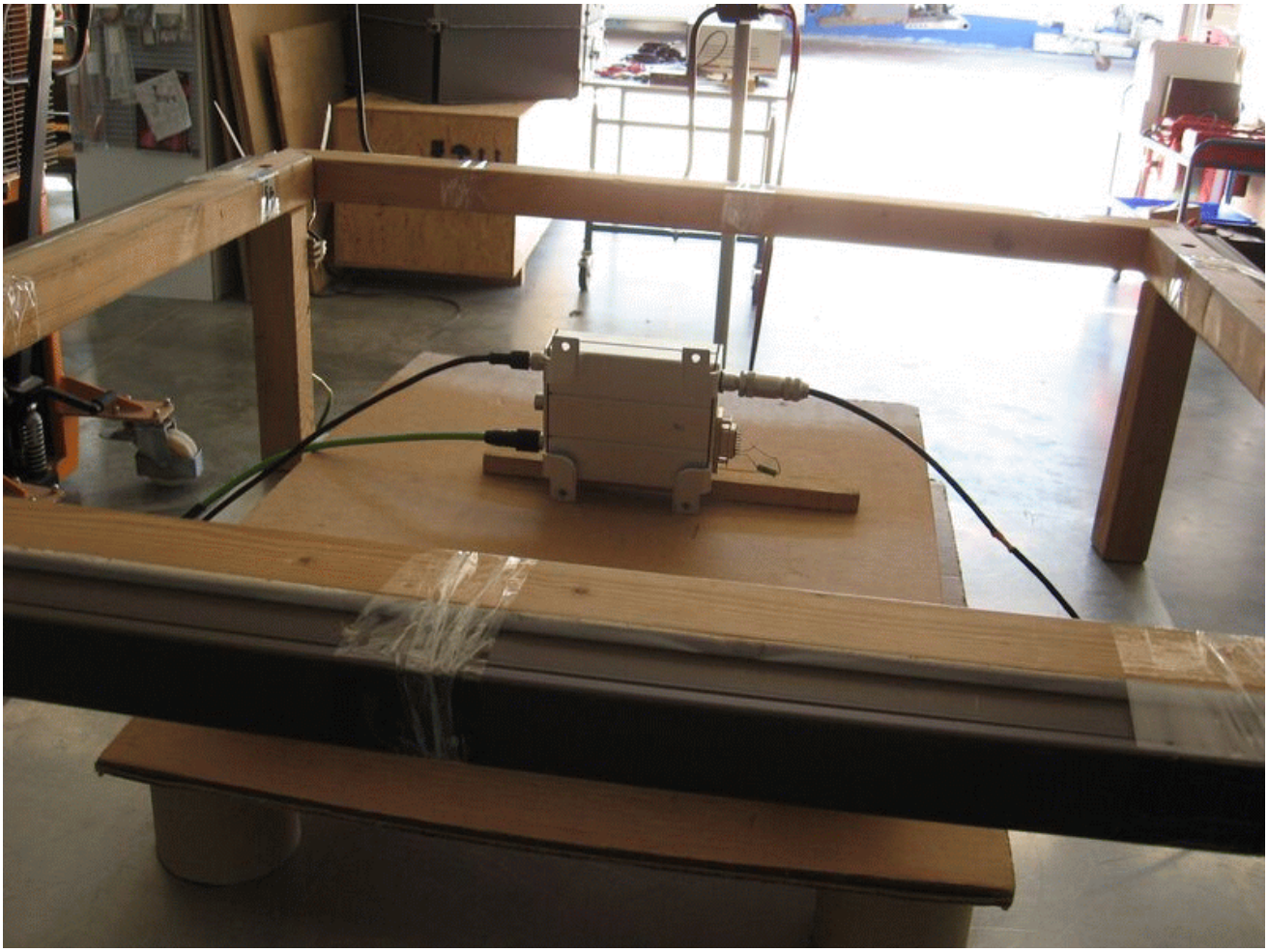
ih50ID: 887

EUT:	Intercom device Annuncicom 155	Kind of test:	Immunity
		Basic standard:	EN 61000-4-9:1993 + A1:2001

ad 5.11. Power frequency magnetic field immunity test

ih50ID: 887

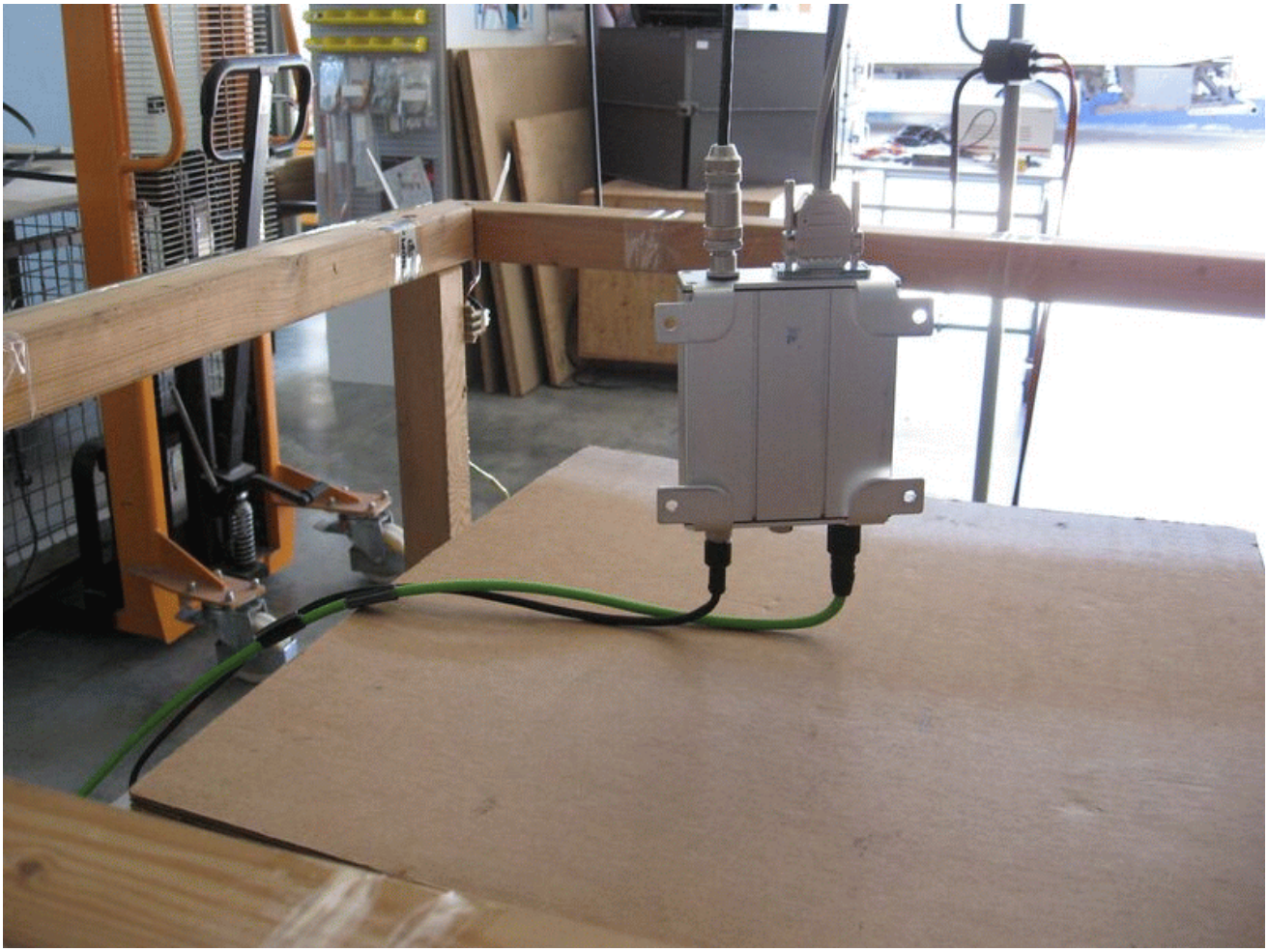
EUT:	Intercom device Annuncicom 155	Kind of test:	Immunity
		Basic standard:	EN 61000-4-9:1993 + A1:2001



ad 5.11. Power frequency magnetic field immunity test

ih50ID: 887

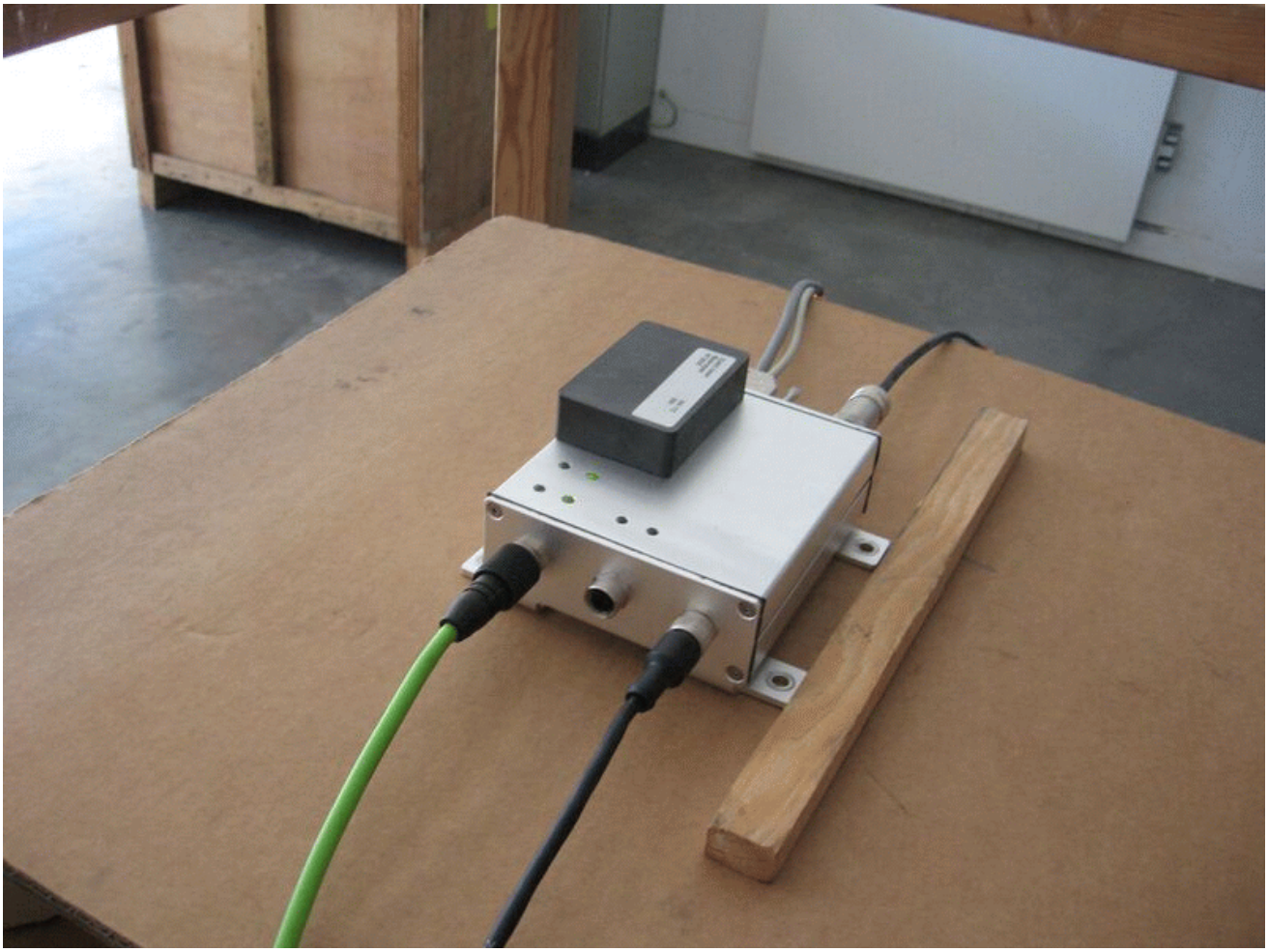
EUT:	Intercom device Annuncicom 155	Kind of test:	Immunity
		Basic standard:	EN 61000-4-9:1993 + A1:2001



ad 5.11. Power frequency magnetic field immunity test

ih50ID: 887

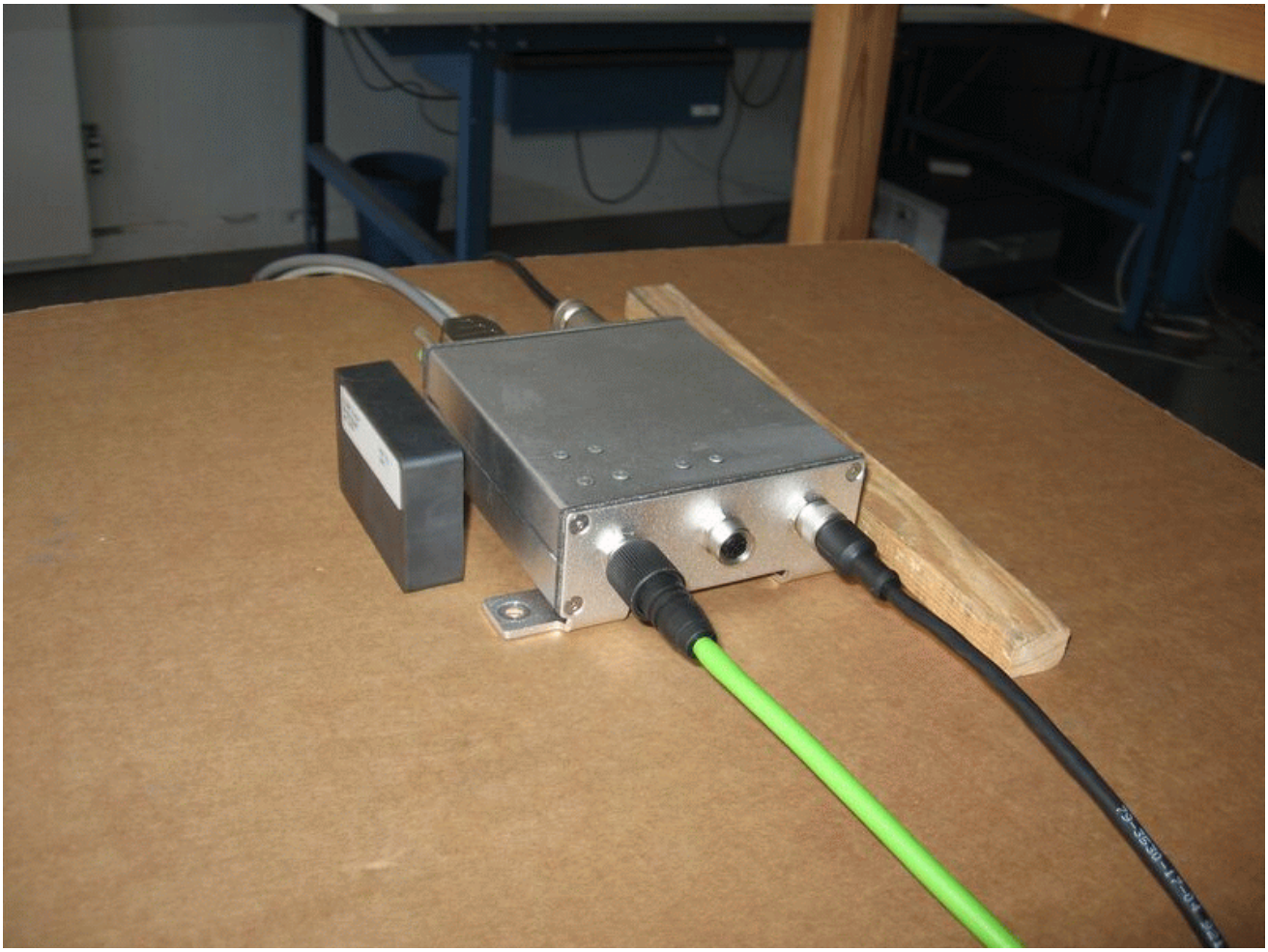
EUT:	Intercom device Annuncicom 155	Kind of test:	Immunity
		Basic standard:	EN 61000-4-9:1993 + A1:2001



ad 5.11. Power frequency magnetic field immunity test

ih50ID: 887

EUT:	Intercom device Annuncicom 155	Kind of test:	Immunity
		Basic standard:	EN 61000-4-9:1993 + A1:2001



5.12.1 Voltage Variations

ih50ID: 887

EUT:	Intercom device Annuncicom 155	Kind of test: Basic standard:	Immunity EN 50155:2007 § 5.1.1.1
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
Port:	DC-mains	Environment:	Temp. 28 °C Humidity 30 % Atm. press. 966 hPa
Date of test:	09/30/2010		
Tested by:	CE	EUT modified:	No
Required performance criterion:	A	**Result:**	**Passed**
Remarks:			

U_N	0.7U_N	1.25U_N	Passed performance criterion
24 VDC	16.8 VDC	30 VDC	A
48 VDC	33.6 VDC	60 VDC	A
Remarks			

Test equipment used

Name	Model	Manufacturer	S/N	INV	Remarks
Arbitrary Power Supply	TOE 8815-32	Toellner	24743	383	
System Power Supply	HP 4034A	HP	2349A-02064	-	

5.12.2 Voltage Variations

ih50ID: 887

EUT:	Intercom device Annuncicom 155	Kind of test: Basic standard:	Immunity EN 50155:2007 § 5.1.1.1 & 5.1.2
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
Port:	DC-mains	Environment:	Temp. 28 °C Humidity 30 %
			Atm. press. 966 hPa
Date of test:	09/30/2010		
Tested by:	CE	EUT modified:	Yes
Required performance criterion:	A	**Result:**	**Passed**
Remarks:			

U_N	$0.6U_N$	$1.4U_N$	td	repetition	Passed performance criterion
24 VDC	14.4 VDC	33.6 VDC	0.1s	5	A
48 VDC	28.8 VDC	68 VDC	0.1s	5	A
Remarks					

U_N	$1.25U_N$	$1.4U_N$	td	repetition	Passed performance criterion
48 VDC	60 VDC	68 VDC	1s	5	A
Remarks					

U_N	$0.7U_N$	$1.25U_N$	td	repetition	Passed performance criterion
24 VDC	16.8 VDC	30 VDC	1s	5	A
48 VDC	33.6 VDC	60 VDC	1s	5	A
Remarks					

Test equipment used

Name	Model	Manufacturer	S/N	INV	Remarks
Arbitrary Power Supply	TOE 8815-32	Toellner	24743	383	
System Power Supply	HP 4034A	HP	2349A-02064	-	

5.13.1 Voltage Dips

ih50ID: 887

EUT:	Intercom device Annuncicom 155	Kind of test: Basic standard:	Immunity EN 50155:2007 § 5.1.1.2
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
Port:	DC-mains	Environment:	Temp. 28 °C Humidity 30 %
			Atm. press. 966 hPa
Date of test:	10/06/2010		
Tested by:	CE	EUT modified:	No
Required performance criterion:	Class S2	**Result:**	**Passed**
Remarks:			

U_N	Voltage dip	td	repetition	Passed performance criterion
24 VDC	0 VDC	10ms	10	Class S2
Remarks	Unit does not exit operaton mode. Sound level decreases.			

Test equipment used

Name	Model	Manufacturer	S/N	INV	Remarks
Arbitrary Power Supply	TOE 8815-32	Toellner	24743	383	
System Power Supply	HP 4034A	HP	2349A-02064	-	

5.13.2 Voltage Dips

ih50ID: 887

EUT:	Intercom device Annuncicom 155	Kind of test: Basic standard:	Immunity EN 50155:2007 § 5.1.3
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
Port:	DC-mains	Environment:	Temp. 28 °C Humidity 30 %
Date of test:	09/30/2010		Atm. press. 966 hPa
Tested by:	CE	EUT modified:	No
Required performance criterion:	Class C1	**Result:**	**Passed**
Remarks:			

U_N	Voltage dip (0.6U_N)	td	repetition	Passed performance criterion
24 VDC	14.4 VDC	100ms	10	Class C1
Remarks	Unit does not exit operaton mode. Sound level decreases.			

Test equipment used

Name	Model	Manufacturer	S/N	INV	Remarks
Arbitrary Power Supply	TOE 8815-32	Toellner	24743	383	
System Power Supply	HP 4034A	HP	2349A-02064	-	

5.14. Overvoltage

ih50ID: 887

EUT:	Intercom device Annuncicom 155	Kind of test: Basic standard:	Immunity EN 50155:2007 § 12.2.6
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
Port:	DC-mains	Environment:	Temp. 28 °C Humidity 30 %
			Atm. press. 966 hPa
Date of test:	09/30/2010		
Tested by:	CE	EUT modified:	No
Required performance criterion:	A	**Result:**	**Passed**
Remarks:			

U_N	1.4U_N	d d	D	repetition	Passed performance criterion
48 VDC	68 VDC	0.1s	1s	5	A
Remarks					

Test equipment used

Name	Model	Manufacturer	S/N	INV	Remarks
Arbitrary Power Supply	TOE 8815-32	Toellner	24743	383	
System Power Supply	HP 4034A	HP	2349A-02064	-	

5.15.1 High Voltage

ih50ID: 887

EUT:	Intercom device Annuncicom 155	Kind of test: Basic standard:	Immunity EN 50155:2007
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
		Environment:	Temp. 28 °C
			Humidity 30 %
Date of test:	09/30/2010		Atm. press. 966 hPa
Tested by:	CE	EUT modified:	No
Required performance criterion:	A	**Result:**	**Failed**
Remarks:			

Tested Port	Test Voltage	Test Result
DC-in to Enclosure	500V	Failed, because connected to Enclosure via VDR

5.15.2 High Voltage

ih50ID: 887

EUT:	Intercom device Annuncicom 155	Kind of test: Basic standard:	Immunity EN 50155:2007
Operation mode:	Audiostreaming, Pmax(5W), sin(1kHz)		
		Environment:	Temp. 28 °C
			Humidity 30 %
Date of test:	09/30/2010		Atm. press. 966 hPa
Tested by:	TB	EUT modified:	Yes
Required performance criterion:	A	**Result:**	**Passed**
Remarks:			

Tested Port	Test Voltage	Test Result
DC-in to Electronic (without Ethernet)	500 VAC (eff:)	Passed
Line out to Enclosure	500 VAC (eff:)	Passed
Line out to Electronic (without Ethernet)	500 VAC (eff:)	Passed
Electronic to Enclosure	500 VAC (eff:)	Passed
Ethernet to Enclosure	1500 VAC (eff.)	Passed
Ethernet to Electronic	1500 VAC (eff.)	Passed