Test report **2011-2912-4355-REN**

Date of issue: July 18, 2011
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Equipment under test:
Name: **IP-based duplex system**
Model: **Sidrofon**
Manufacturer: Barix GmbH

Date of tests: 05/25/2011

Test specifications:
Emission: EN 55022:2006-09+A1:2007-10 (Limit class: B)
Immunity: EN 55024:1998-09+A1:2001-10+A2:2003-10

Test summary:

Emission	**Tested port**	**Limit class**	**Result**
Conducted emissions at signal & telecommunication lines 150 kHz - 30 MHz	LAN	B	Passed
Radiated emissions - electromagnetic fields 30 MHz - 1000 MHz	Enclosure	B	Passed

Immunity to ...	**Tested port**	**Test level**	**Crit.**	**Result**
Electrostatic discharge (ESD)	Enclosure	Air: 8 kV Cont.: 4 kV	A A	Passed
Electromagnetic fields 80 MHz - 2700 MHz (AM)	Enclosure	10 V/m	A	Passed
Electrical fast transients (Burst)	LAN	2 kV	A	Passed
Surge	LAN	1 kV	A	Passed
Conducted RF disturbances 150 kHz - 80 MHz (AM)	See inside test report	3 V	A	Passed

Testing location:
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Boschstraße 2
D-71149 Bondorf

Phone: ++49(0)7457-9441-0
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WWW: http://www.elmac.de/
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DAkkS Deutsche Akkreditierungsstelle D-PL-12086-01-01

Tested by: July 18, 2011
C. Eisen Date

Verified by: July 18, 2011
J. Bühne Date

Content

2. Test specifications

Emission

Document No.	Title	Limit class
EN 55022:2006-09+A1:2007-10 IEC/CISPR 22:2005 DIN EN 55022:2008-05	Information technology equipment; Radio disturbance characteristics; Limits and methods of measurement	B

Immunity

Document No.	Title	Severity level
EN 55024:1998-09+A1:2001-10+A2:2003-10 IEC/CISPR 24:1997, modifiziert+A1:2001+A2:2002 DIN EN 55024:2003-10	Information technology equipment - Immunity characteristics - Limits and methods of measurement	

emvID: 3580

3. Equipment Under Test (EUT)

Name	**IP-based duplex system**	
Model	**Sidrofon**	
S/N	without	
Manufacturer	Barix GmbH	
Kind/Type of EUT	IP-based duplex system	
Day of receipt	05/25/2011	
Kind of EUT handling	Table top	During the tests: As table top equipment
Base unit covering the EUT	-	
Accessories (Part of the EUT)	-	
Support equipment (Not part of the EUT)	Laptop poe-switch router	
Connected cables and lines	LAN shielded 10m head set 2m	
Power supply	Other (see remarks)	
Class of protection against electrical shock	III (SELV)	
Remarks	poe	

eutID: 4355

Tested operation modes

Emission	**Immunity**	**Test criteria**
streaming external head set	streaming external head set	A: Unwanted changes: - interruption of stream
	streaming internal loud speaker	A: Unwanted changes: - interruption of stream
	streaming noise	A: - noise +max. 36dB
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

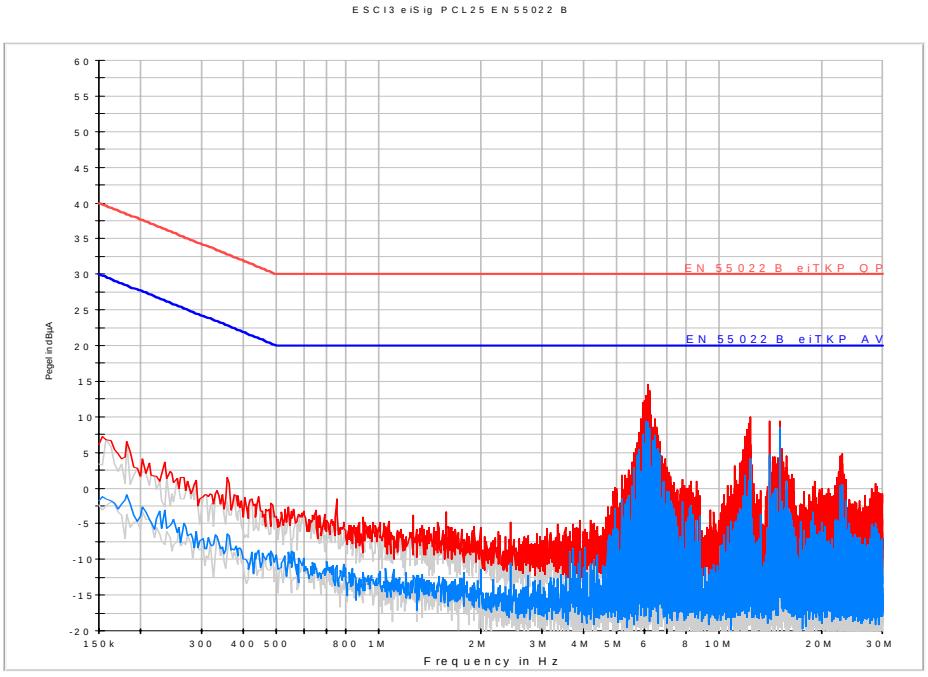
See next pages.

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

euSigID: 433

EUT:	IP-based duplex system Sidrofon	Kind of test:	Emission
		Basic standard:	EN 55022:2006-09+A1:2007-10
Operation mode:	streaming external head set	Measurement uncer-tainty:	2.3 dB
Port:	LAN		
Date of test:	05/25/2011		
Tested by:	CE	EUT modified:	No
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 TEST RECEIVER	ESCI3	R&S	101070	450	

ad 5.1.1 Conducted emissions at signal & telecommunication lines 150 kHz - 30 MHz

- Continuation -

euSigID: 433

EUT:	IP-based duplex system Sidrofon		
Operation mode:	streaming external head set		

QUASI-PEAK Detection - Interference current

No results above acceptance margin under limit.

AVERAGE Detection - Interference current

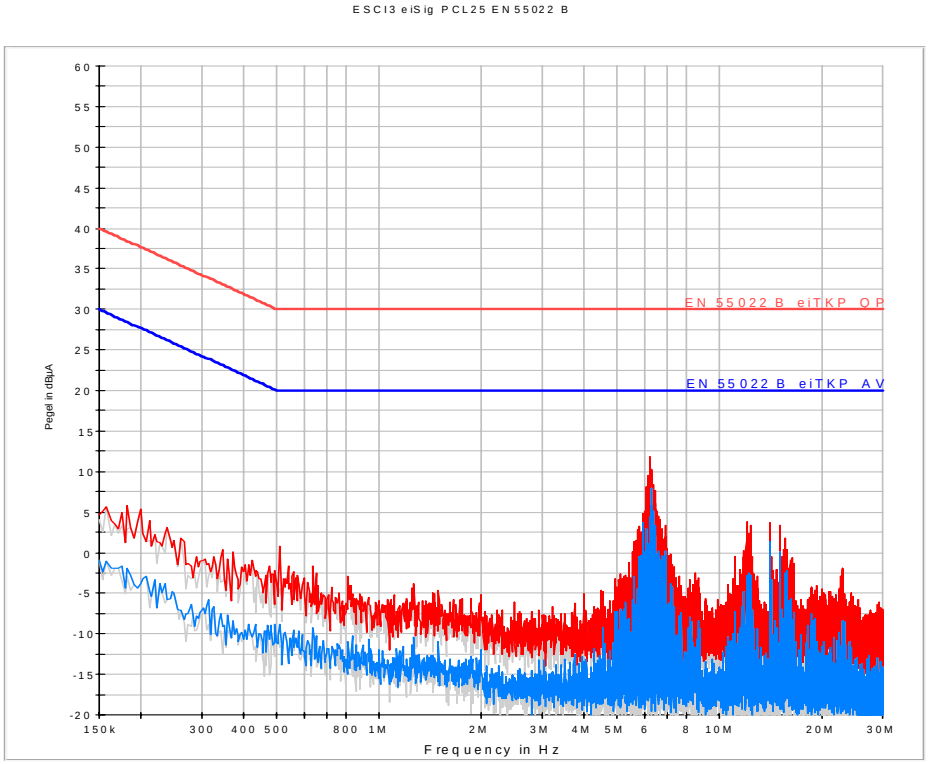
No results above acceptance margin under limit.

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

euSigID: 433

EUT:	IP-based duplex system Sidrofon	Kind of test:	Emission
		Basic standard:	EN 55022:2006-09+A1:2007-10
Operation mode:	streaming internal loud speaker	Measurement uncer-tainty:	2.3 dB
Port:	LAN		
Date of test:	05/25/2011		
Tested by:	CE	EUT modified:	No
Measured quantity:	Interference current	**Result:**	**Passed**
Limit class:	B		
Remarks:			

PEAK Detection - Interference current



ad 5.1.1 Conducted emissions at signal & telecommunication lines 150 kHz - 30 MHz

- Continuation -

euSigID: 433

EUT:	IP-based duplex system Sidrofon		
Operation mode:	streaming internal loud speaker		

QUASI-PEAK Detection - Interference current

No results above acceptance margin under limit.

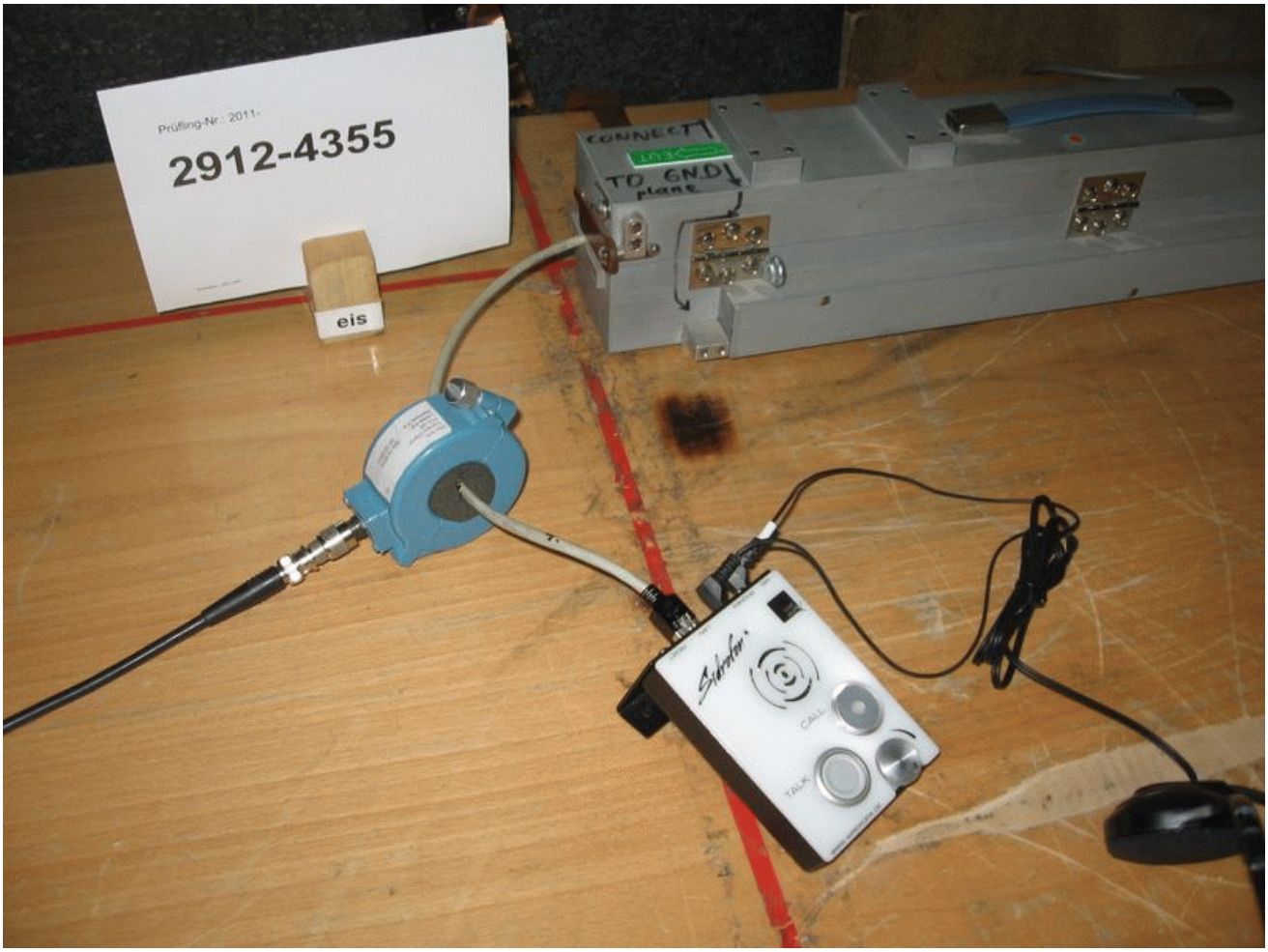
AVERAGE Detection - Interference current

No results above acceptance margin under limit.

ad 5.1. Conducted emissions at signal & telecommunication lines 150 kHz - 30 MHz

euSigID: 433

EUT:	IP-based duplex system Sidrofon		



EuSig-1.jpg

ad 5.1. Conducted emissions at signal & telecommunication lines 150 kHz - 30 MHz

euSigID: 433

EUT:	IP-based duplex system Sidrofon		

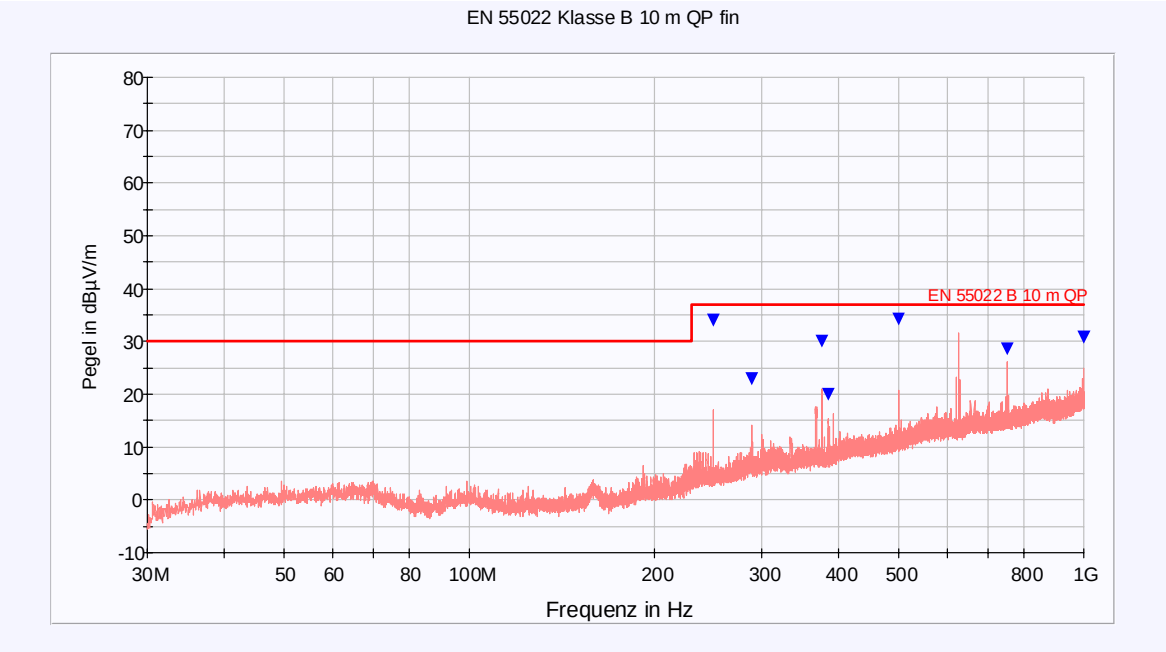
EuSig-2.jpg

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

eeID: 4612

EUT:	IP-based duplex system Sidrofon	Kind of test:	Emission
		Generic standard:	EN 55022:2006-09+A1:2007-10
Operation mode:	streaming external head set	Measurement uncer-tainty:	4.5 dB
Port:	Enclosure		
Date of test:	05/25/2011		
Tested by:	CE		
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 5.2. Radiated emissions - electromagn. fields 30 MHz - 1000 MHz

- Continuation -

eeID: 4612

EUT:	IP-based duplex system Sidrofon		
Operation mode:			

QUASI-PEAK Detection

Frequency(MHz)	QuasiPeak(dBµV/m)	Antenna(cm)	Polarisation	Table(deg)	Margin(dB)	Limit(dBµV/m)
250.000000	34.0	132.0	V	90.0	3.0	37.0
288.000000	23.0	102.0	V	135.0	14.0	37.0
375.000000	30.0	102.0	V	60.0	7.0	37.0
384.000000	20.0	258.0	V	0.0	17.0	37.0
500.000000	34.3	253.0	H	135.0	2.7	37.0
750.040000	28.6	102.0	H	315.0	8.4	37.0
1000.000000	30.8	102.0	H	90.0	6.2	37.0

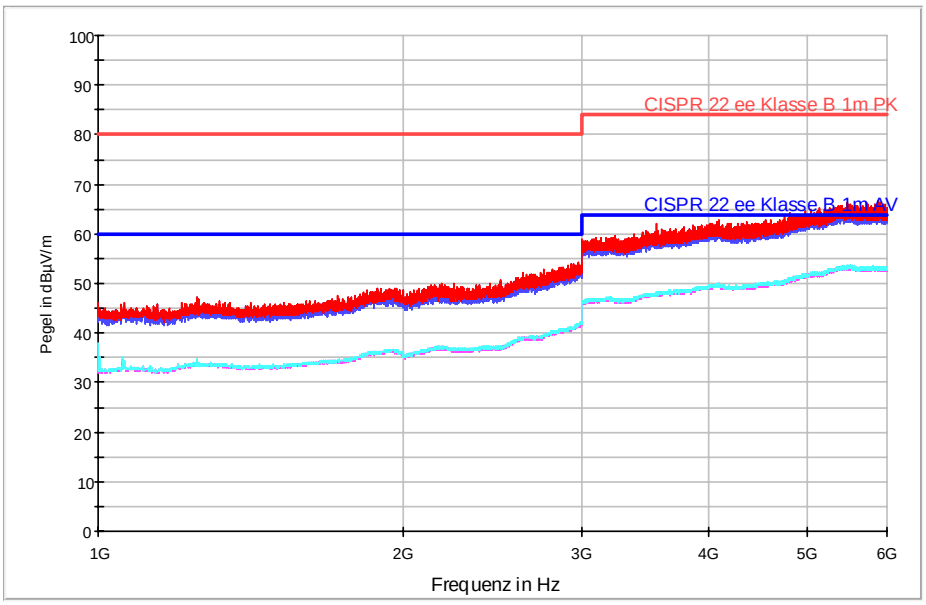
5.2.2 Radiated emissions - electromagn. fields 1000 MHz - 6000 MHz

eeID: 4612

EUT:	IP-based duplex system Sidrofon	Kind of test:	Emission
		Generic standard:	EN 55022:2006-09+A1:2007-10
Operation mode:	streaming external head set	Measurement uncer-tainty:	4.5 dB
Port:	Enclosure		
Date of test:	05/25/2011		
Tested by:	CE		
Prescan:	Done		
Final test:	Done		
Test site (final):	Semi Anechoic Chamber	EUT modified:	No
Antenna distance:	1 m	**Result:**	**Passed**
Limit class:	B		
Remarks:			

PEAK/AVERAGE Detection

ESPI7 ee HORN EN 55022 B PK_AV 1m



ad 5.2. Radiated emissions - electromagn. fields

eeID: 4612

EUT:	IP-based duplex system Sidrofon		

Ee-1.jpg

5.3. Electrostatic discharge (ESD)

idID: 2336

EUT:	IP-based duplex system Sidrofon	Kind of test: Basic standard:	Immunity EN 61000-4-2:2009
Operation mode:	All operation modes required for immunity testing (see clause 3)		
Tested Port:	Enclosure		
Date of test:	05/25/2011		
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	✔	all contactable non-conductive housing surfaces	8	A	
Contact	Direct	✔	all contactable conductive housing surfaces	4	A	
	Indirect	✔	HKP: ✔ VKP: ✔	4	A	

Notes:

HKP = Horizontal coupling plate
VKP = Vertical coupling plate

At each test voltage at least 50 positive test pulses with a time interval of 1 s and 50 negative test pulses with a time interval of 1 s were carried out.

Test equipment used

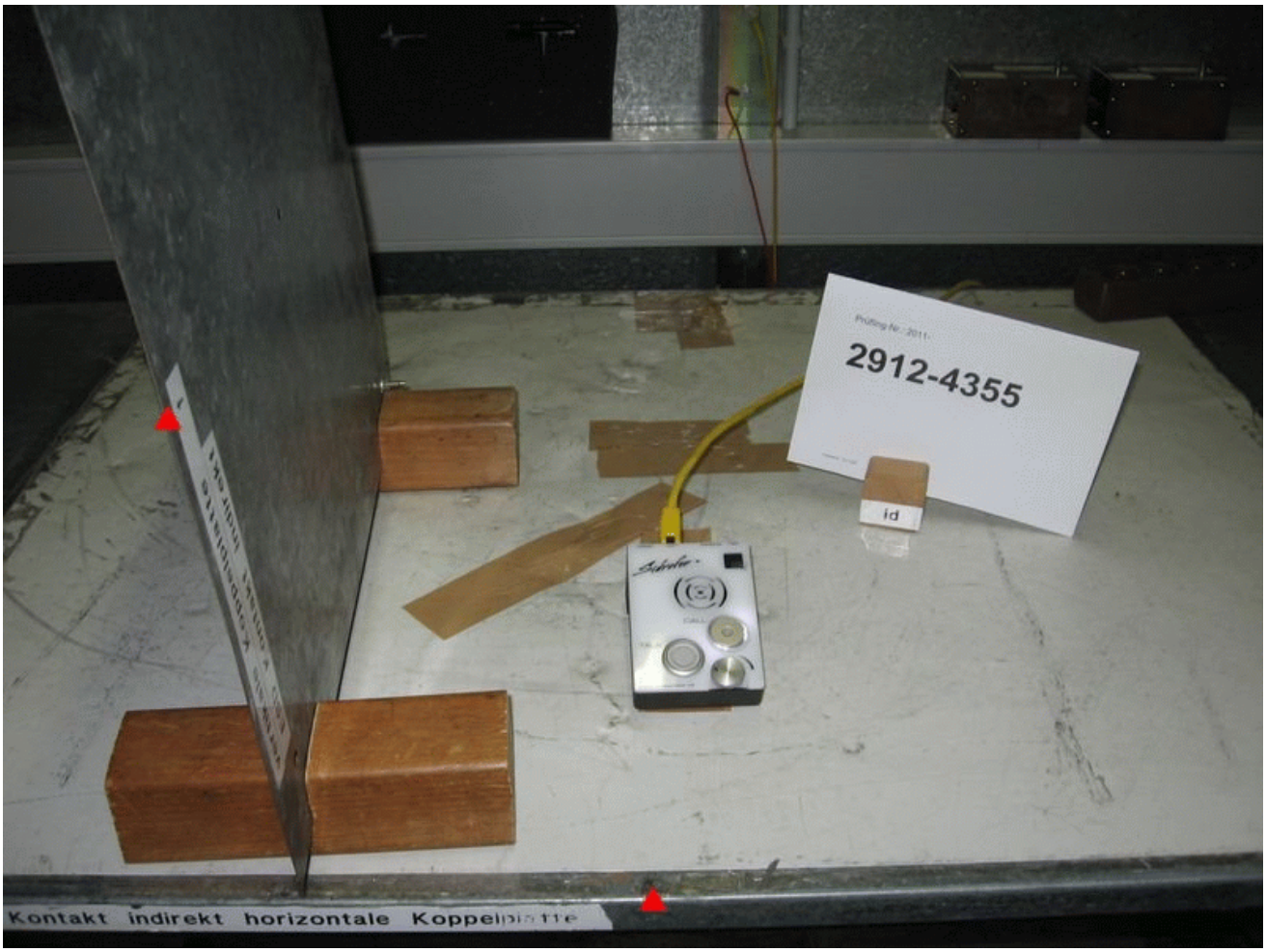
Name	Model	Manufacturer	S/N	INV	Remarks
ESD Generator	NSG 435	Schaffner	222	182	

ad 5.3. Electrostatic discharge (ESD)

idID: 2336

EUT:	IP-based duplex system Sidrofon		

● Air discharge ▲ Contact discharge



Id-1.jpg

ad 5.3. Electrostatic discharge (ESD)

idID: 2336

EUT:	IP-based duplex system Sidrofon		

● Air discharge ▲ Contact discharge

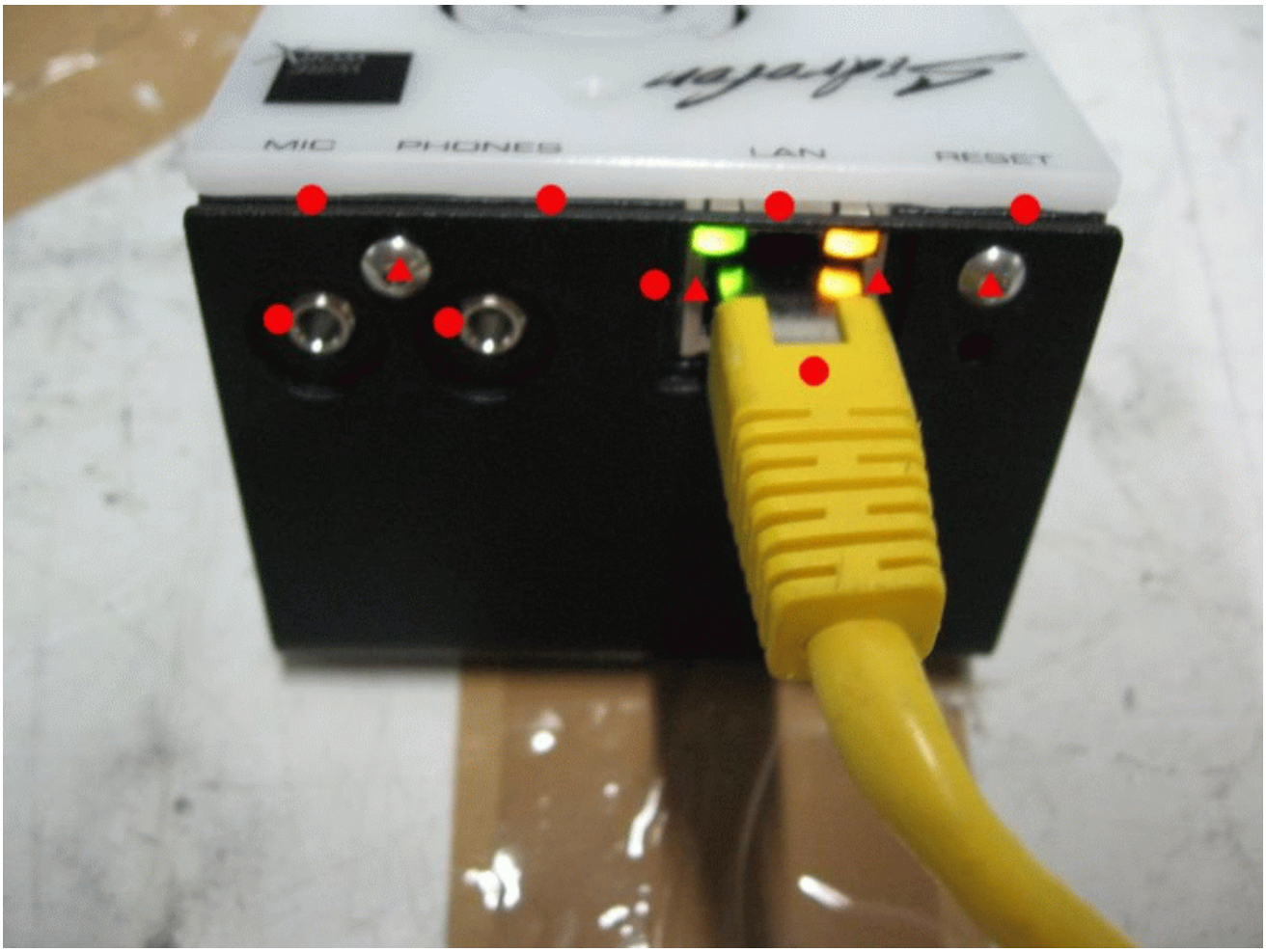
Id-2.jpg

ad 5.3. Electrostatic discharge (ESD)

idID: 2336

EUT:	IP-based duplex system Sidrofon		

● Air discharge ▲ Contact discharge



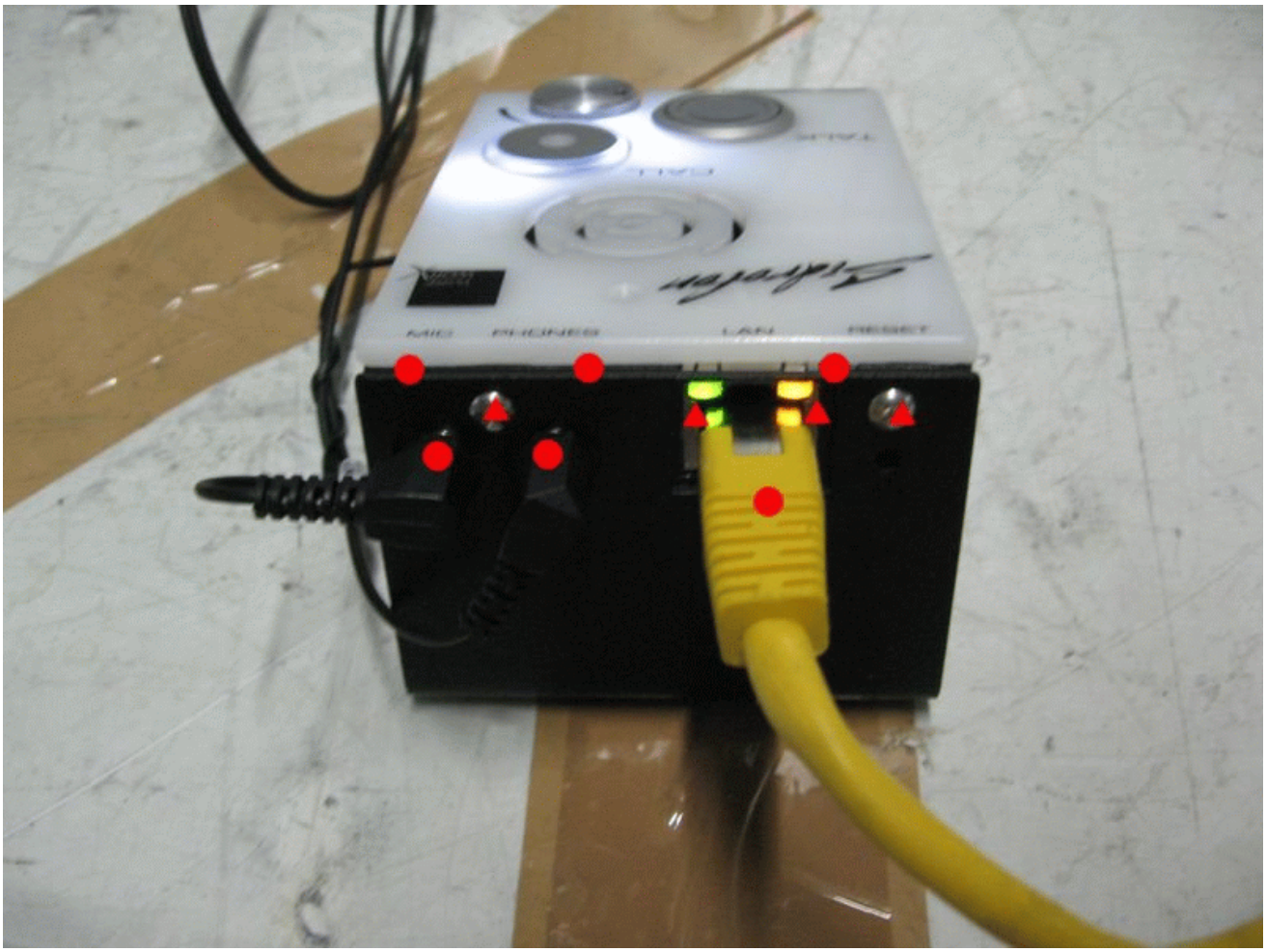
Id-3.jpg

ad 5.3. Electrostatic discharge (ESD)

idID: 2336

EUT:	IP-based duplex system Sidrofon		

● Air discharge ▲ Contact discharge



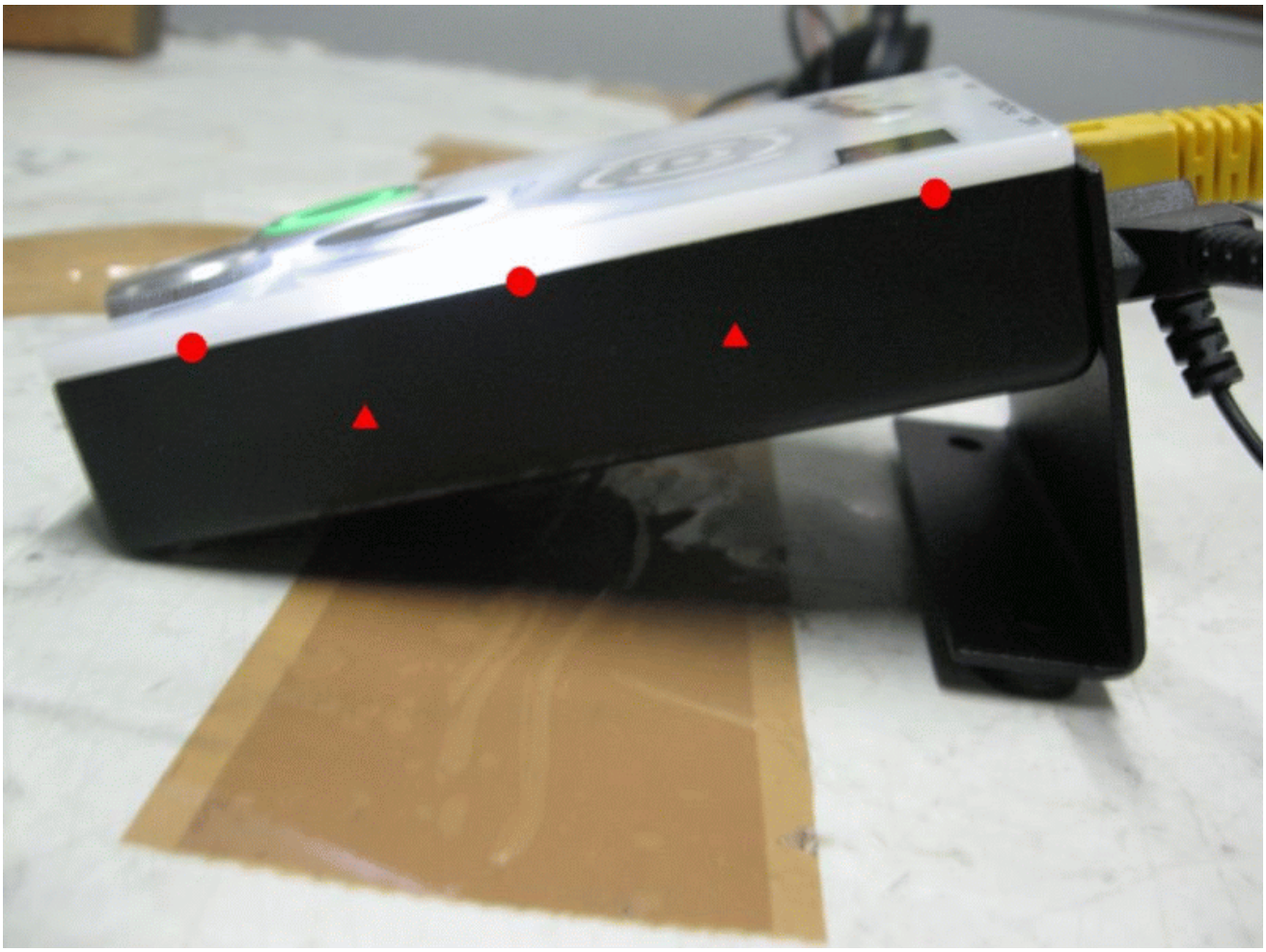
Id-4.jpg

ad 5.3. Electrostatic discharge (ESD)

idID: 2336

EUT:	IP-based duplex system Sidrofon		

● Air discharge ▲ Contact discharge



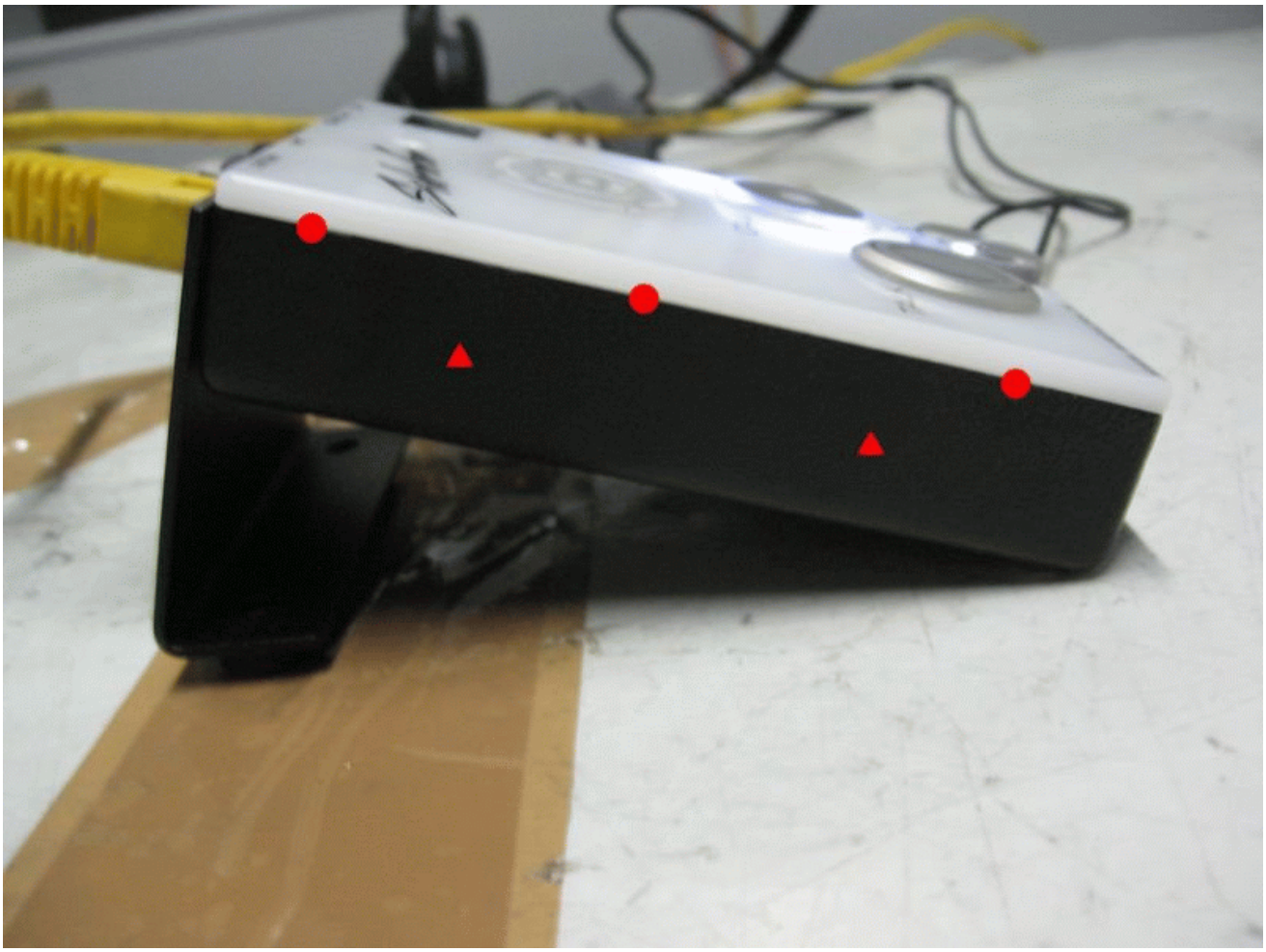
Id-5.jpg

ad 5.3. Electrostatic discharge (ESD)

idID: 2336

EUT:	IP-based duplex system Sidrofon		

● Air discharge ▲ Contact discharge



Id-6.jpg

5.4. Radio-frequency electromagnetic fields 80 MHz - 2700 MHz

ifID: 3847

EUT:	IP-based duplex system Sidrofon	Kind of test:	Immunity
		Basic standard:	EN 61000-4-3:2006+A1:2008
Operation mode:	streaming noise		
Port:	Enclosure		
Test site:	Fully Anechoic Chamber		
Date of test:	05/25/2011		
Tested by:	CE	EUT modified:	No
Required performance criterion:	A	**Result:**	**Passed**
Remarks:			

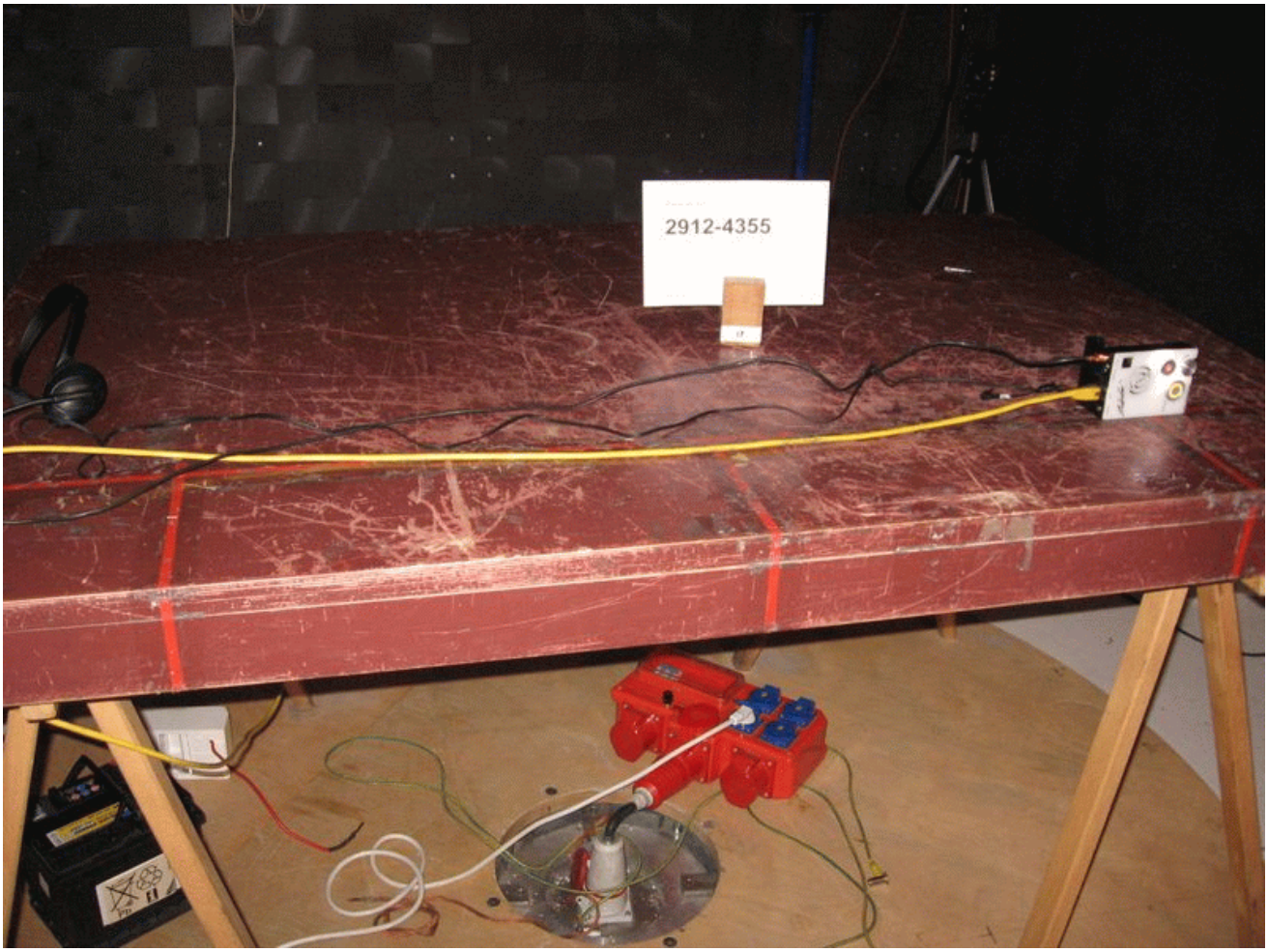
Test parameters	**Settings**	
	Amplitude-modulated Field	**Puls-modulated Field**
Frequency range	80 MHz - 2700 MHz	
Frequency step Dwell time	1 % 1 s	
Modulation	1 kHz/AM 80%	
Test level (field strength)	10 V/m	
Polarization	horizontal + vertical	
Distance transmitting antenna - EUT	3 m (> 1GHz 1m)	
Tested sides of the EUT	front, top	
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 5.4. Radio-frequency electromagnetic fields 80 MHz - 2700 MHz

ifID: 3847

EUT:	IP-based duplex system Sidrofon		

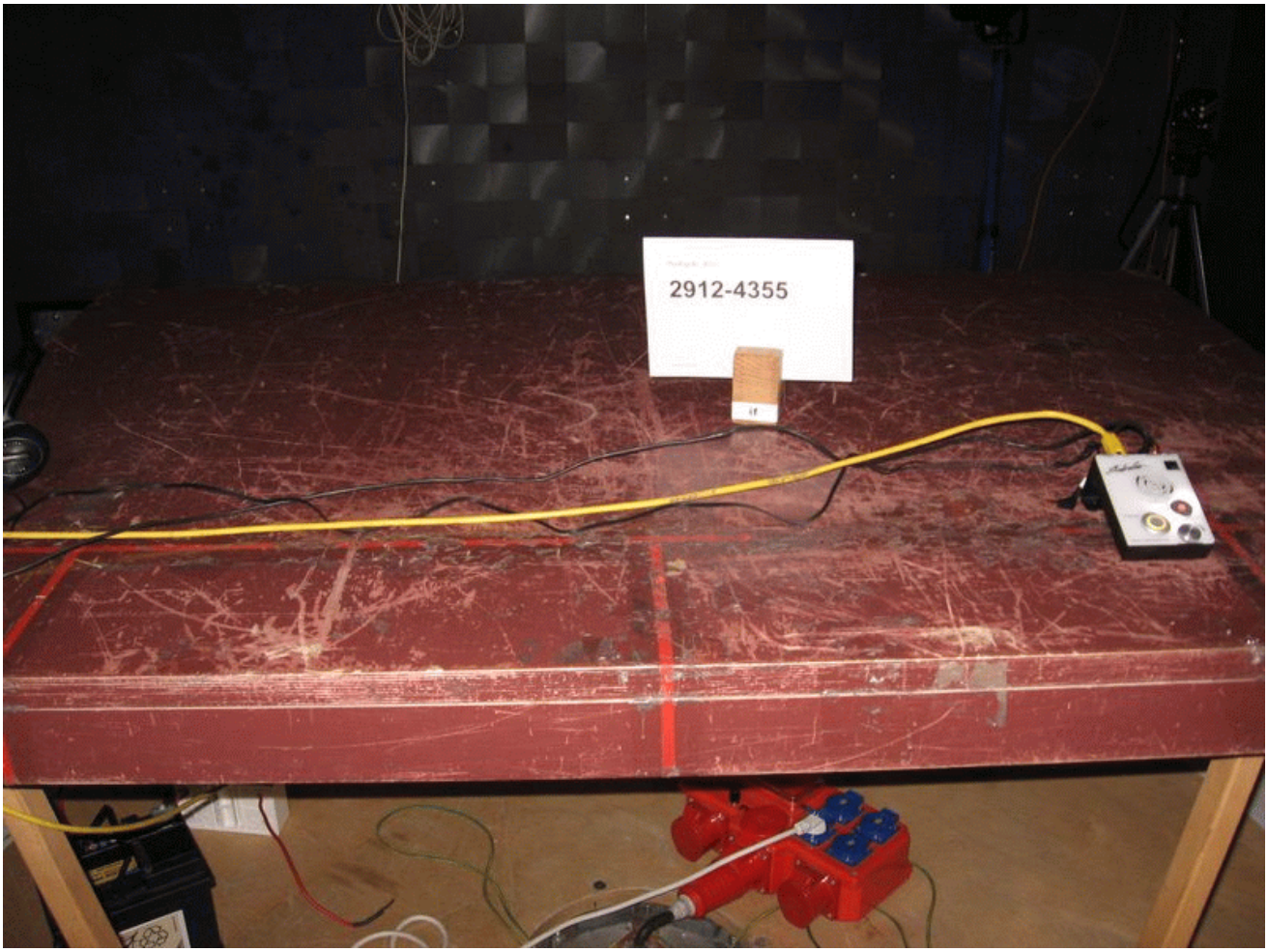


If-1.jpg

ad 5.4. Radio-frequency electromagnetic fields 80 MHz - 2700 MHz

ifID: 3847

EUT:	IP-based duplex system Sidrofon		



If-2.jpg

5.5. Electrical fast transients (Burst)

ibID: 2360

EUT:	IP-based duplex system Sidrofon	Kind of test: Basic standard:	Immunity EN 61000-4-4:2004
Operation mode:	streaming external head set		
Date of test:	05/25/2011		
Tested by:	ME	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)				
Capacitive coupling clamp (asymmetrically)	LAN	2	A	

Notes:

Tested polarization: Positive + Negative (at each kind of coupling)
Duration of test: 60 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 5.5. Electrical fast transients (Burst)

ibID: 2360

EUT:	IP-based duplex system Sidrofon		

Ib-1.jpg

5.6. Surge

isID: 2141

EUT:	IP-based duplex system Sidrofon	Kind of test: Basic standard:	Immunity EN 61000-4-5:2006
Operation mode:	streaming internal loud speaker		
Date of test:	05/25/2011		
Tested by:	ME	EUT modified:	No
Required performance criterion:	B	**Result:**	**Passed**
Remarks:			

Tested port	Lines	Kind of coupling	Coupling impedance	Max. test voltage (kV)	Passed Performance criterion	Remarks
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	

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

icsID: 2474

EUT:	IP-based duplex system Sidrofon	Kind of test: Basic standard:	Immunity EN 61000-4-6:2009
Operation mode:	streaming noise		
Date of test:	05/25/2011		
Tested by:	ME	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	3 V

Tested cables/lines	**Cable/line/port of the EUT**	**Coupling device used**
	LAN	CDN 801 S INV 198

Result	
Passed Performance criterion	A
Remarks	all other lines <3m; max. +36dB at 15MHz

Test equipment used

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

ad 5.7. Conducted disturbances, induced by radio-frequency fields 150 kHz - 80 MHz

icsID: 2474

EUT:	IP-based duplex system Sidrofon		

Ics-1.jpg