

EMC Test Report

E. u. T.: IR Illuminator Helios

Type: IR-294-M/90-850 220

S/N: 1404 NK 001012

Applicant: JSC Videocom
100/2 Dmitrovskoe Shosse,
Moscow 127591
Russia

Date of tests: 04 / 10 / 2014 to 04 / 24 / 2014

Place of tests: Perl - Sinz

Project No.: 50911_10042014_IR294_1

Date of Report 04 / 28 / 2014

Pages complete 44

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The test data of this test report relate only to the individual item which have been tested.

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1. Identification of test laboratory

Company name	SGS-TÜV Saarland Forster GmbH
Address	Saarbruecker Strasse 1 66706 Perl Germany
Laboratory accreditation	D-PL-12103-01-01 Registration FCC 90572 KBA-P-00029-98
Name for contact purposes	MR. Karl-Heinz Forster
Telephone	(+49)-6866-93200
Fax	(+49)-6866-93201
E-mail	emv-forster@t-online.de

Personel involved in this test report

Responsible for test report:	Mr K.-H. Forster
Responsible for testing:	Mr Dipl.-Ing. (FH) S.E. Weber Mr K.-H. Forster

Head of test laboratory: K.-H. Forster

Signature: _____



Stamp:



2. Standards and requirements

Tests and limits follow at:

DIN EN55015:2009
 DIN EN61547:2009

DIN EN61000-3-2:2006+A1:2009+ A2:2009
 DIN EN61000-3-3:2009

DIN EN61000-4-2:2009
 DIN EN61000-4-3:2006+A1:2008+A2:2010
 DIN EN61000-4-4:2012
 DIN EN61000-4-5:2006
 DIN EN61000-4-6:2009
 DIN EN61000-4-8:2010
 DIN EN61000-4-11:2004

Test environmental

Temperature	21,2° C
Rel. humidity	52 %
Air pressure	930-1060 hPa
Power Supply	85...265V AC

3. Interpretation and overview of test results

E. u. T.: IR Illuminator Helios
 Type.: IR294-M/90-850 220
 Date of tests: 04 / 10 / 2014 to 04 / 24 / 2014
 Power supply: 85...265V AC

Emissions:

	IR294-M/90-850 220
Conducted Emission EN 55015	Passed
Field Strength EN 55015	Passed
Harmonics EN 61000-3-2	Passed
Flicker EN 61000-3-3	Passed

Immunity:

Electrostatic Discharge EN 61000-4-2	Passed
RF electromagnetic fields EN61000-4-3	Passed
Fast transients (Burst) EN 61000-4-4	Passed
Surge EN 61000-4-5	Passed
Conducted RF disturbance EN 61000-4-6	Passed
Magnetic Fields EN 61000-4-8	N/A No sensitive Parts inside
Voltage dips and interruptions EN 61000-4-11	Passed

4. Test results Emissions

4.1. Test setup and results conducted emission

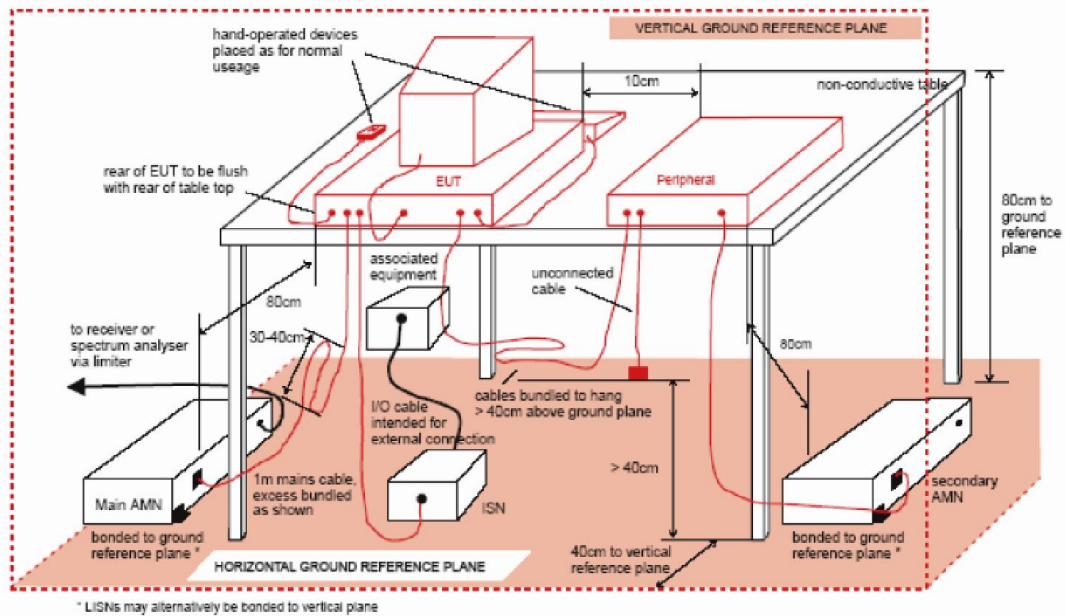


Photo test setup:



24 Apr 2014 07:32

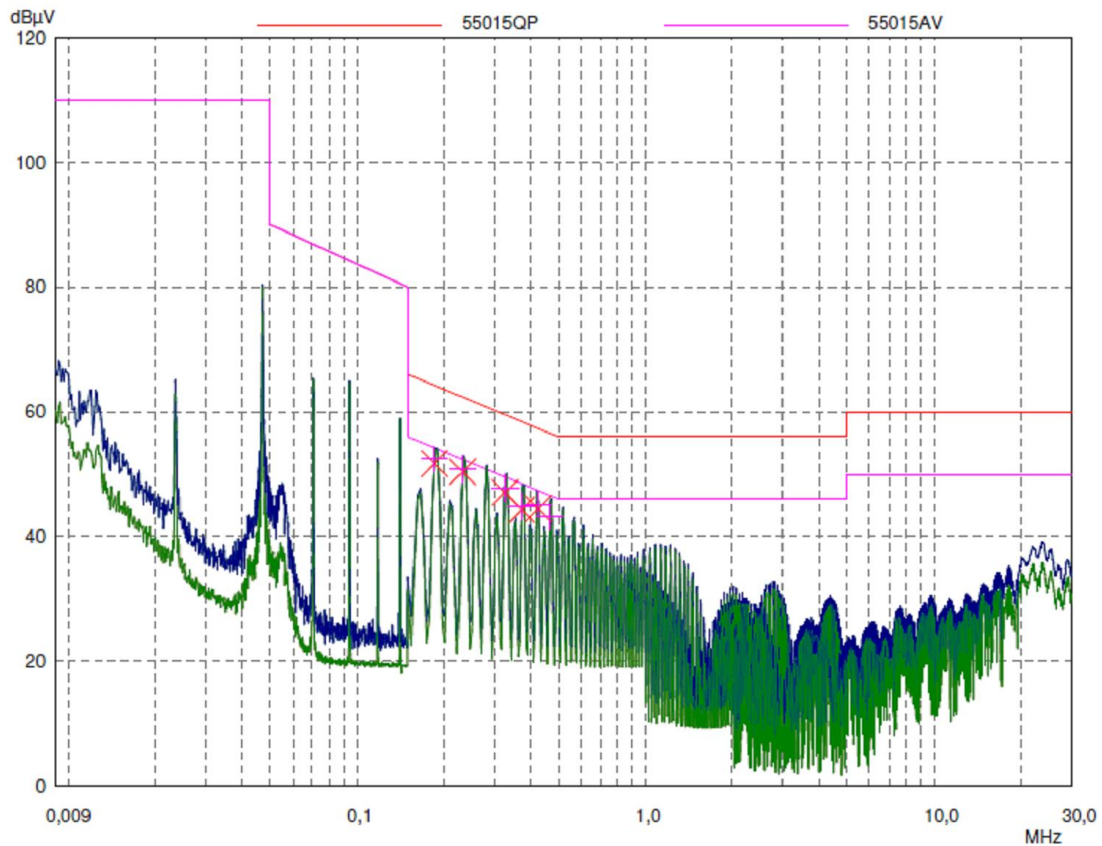
SGS-TÜV Saarland Forster GmbH
Conducted Emission on power-line

EUT: IR Illuminator Helios
 Manuf: Microlight Security UG
 Op Cond: IR light
 Operator: ST
 Test Spec: EN55015:2006+A1:2007+A2:2009
 Comment: Type: IR-294-M/90-850 220 ; S/N: 1404 NK 001012
 AC-Line (230V, 50 Hz) - Modified Sample
 File: ir294d.dat : Cond. Emission -EN55015 - Powerline (Modified)

Scan Settings (2 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
9kHz	150kHz	100Hz	200Hz	PK+AV	10msec	Auto	60dB
150kHz	30MHz	4kHz	10kHz	PK+AV	10msec	Auto	60dB

Final Measurement: X QP / + AV
 Meas Time: 2sec
 Subranges: 25
 Acc Margin: 10 dB



24 Apr 2014 07:32

SGS-TÜV Saarland Forster GmbH

Conducted Emission on power-line

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 Comment: Type: IR-294-M/90-850 220 ; S/N: 1404 NK 001012
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 File: ir294d.dat : Cond. Emission -EN55015 - Powerline (Modified)

Scan Settings (2 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	OpRge
9kHz	150kHz	100Hz	200Hz	PK+AV	10msec	Auto	60dB
150kHz	30MHz	4kHz	10kHz	PK+AV	10msec	Auto	60dB

Final Measurement: X QP / + AV
 Meas Time: 2sec
 Subranges: 25
 Acc Margin: 10 dB

Final Measurement Results:

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB	Ref. Offset dB	Phase	PE
0,1853	51,70	64,24	12,54	0,90	N	gnd
0,23256	50,36	62,36	12,00	0,32	L1	gnd
0,3263	47,04	59,54	12,50	0,98	L1	gnd
0,3726	44,30	58,44	14,14	0,88	L1	gnd
0,426	44,43	57,33	12,90	1,17	L1	gnd

Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB	Ref. Offset dB	Phase	PE
0,1853	52,44	54,24	1,80	-0,19	N	gnd
0,23256	50,81	52,36	1,55	-0,57	N	gnd
0,3263	47,71	49,54	1,83	0,00	L1	gnd
0,3726	44,87	48,44	3,57	-0,27	L1	gnd
0,426	45,15	47,33	2,18	0,01	L1	gnd
0,46716	43,10	46,56	3,46	-0,45	L1	gnd

4.2. Test setup and results field strength

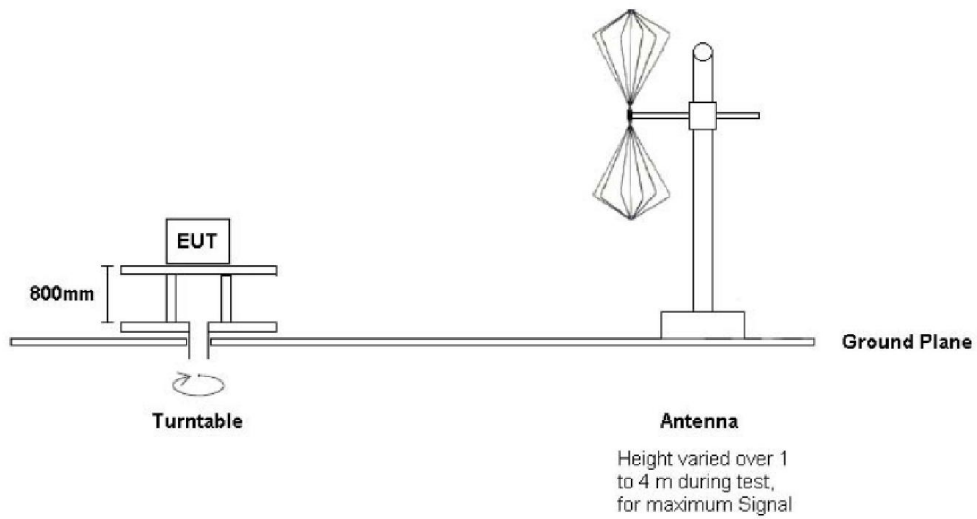
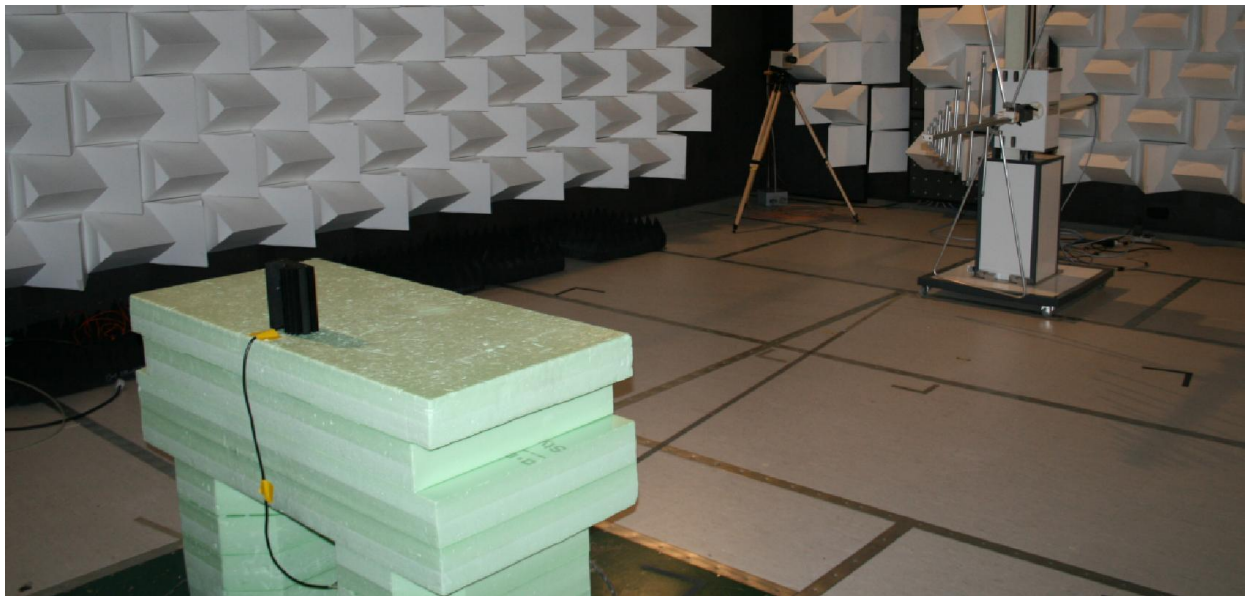


Photo test setup:



Test Report

EUT Information

EUT Name: IR Illuminator Helios
 Manufacturer: Microlight Security UG
 Type: IR294-M/90-850 220
 S/N: 1404NK001012
 HW.-Rev: 04/2014
 SW/FW Rev: None
 Operating cond.: Light-Mode (Full)
 Operator: Dipl. -Ing. (FH) Sven Eric Weber
 Test Spec.: EN55015:2006+A1:2007+A2:2009
 Test Side: SAC 1
 Supply: AC230V, 50Hz
 Polarisation: Vertical/Horizontal
 Project No.: 50911_10042014_IR294_1
 Connected Devices: None
 Comment: None

EMI Auto Test Template: EN55015 (30M-300M)

Hardware Setup: ElectricField Strength VULB
 Measurement Type: Open-Area-Test-Site
 Frequency Range: 30 MHz - 300 MHz
 Graphics Level Range: -10 dBµV/m - 70 dBµV/m

Preview Measurements:
 Graphics Display: Show separate traces for horizontal and vertical polarization
 Scan Test Template: Prescan Field Strength VULB

Data Reduction:
 Limit Line #1: EN 55015 Electric Field Strength 3 m QP
 Peak Search: 6 dB , Maximum Results: 15
 Subrange Maxima: 0 Subranges , Maxima per Subrange: 1
 Acceptance Offset: -10 dB
 Maximum Number of Results: 15
 After Data Reduction: Interactive data reduction
 Before the Final Meas.: Interactive data reduction

Maximization Measurements:
 Template for Single Meas.: Max Field Strength VULB

Adjustment:
 Template for Single Meas.: Max Field Strength VULB

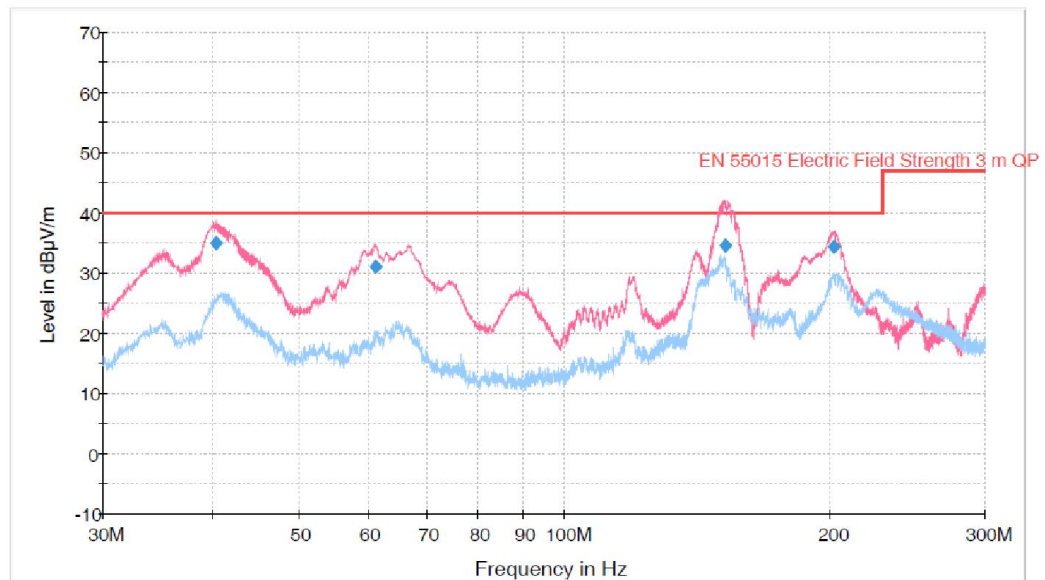
Final Measurements:
 Template for Single Meas.: Final Field Strength VULB

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 1 GHz	40 kHz	QPK	120 kHz	10 s	20 dB

Receiver: [ESU 26]

Report Settings:
 Report Template: SGS Auto Test Report
 Create Electronic Report: PDF
 Document Name: EMI Report

EN55015 (30M-300M)



— EN 55015 Electric Field Strength 3 m QP [..NEMI radiated] — Preview Result 1V-PK+ [Preview Result 1V.Result:1]
 — Preview Result 1H-PK+ [Preview Result 1H.Result:1] ◆ Final Result 1-QPK [Final Result 1.Result:1]

Final Result 1

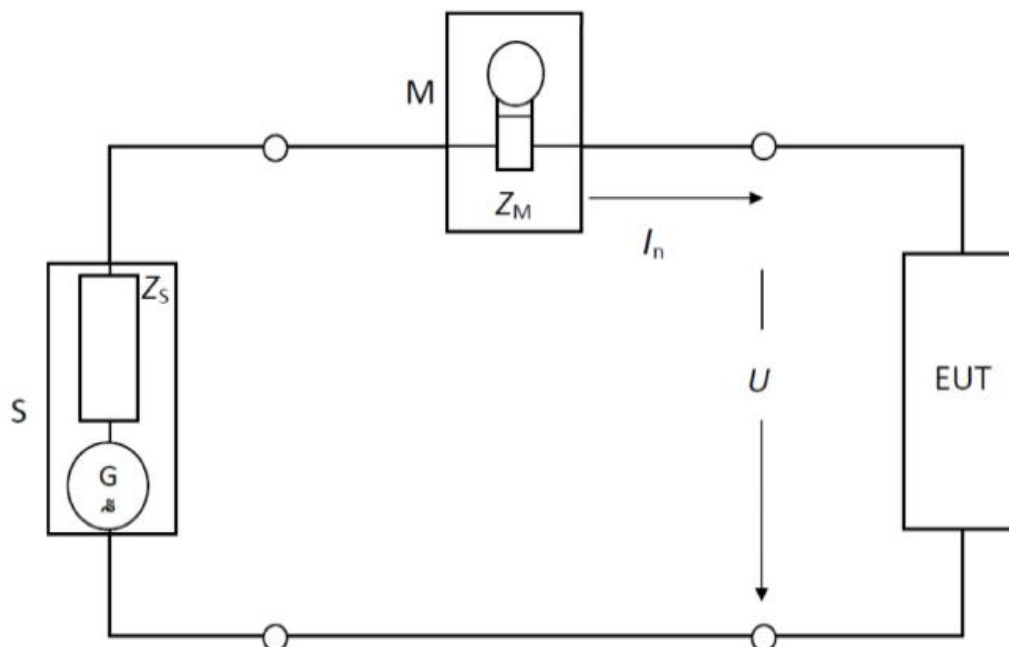
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)	Comment
40.280000	34.9	10000.0	120.000	100.0	V	185.0	12.5	5.1	40.0	
61.120000	31.0	10000.0	120.000	100.0	V	230.0	11.7	9.0	40.0	
152.280000	34.5	10000.0	120.000	141.0	V	175.0	14.0	5.5	40.0	
...

4.3. Test setup and results harmonics and flicker

Harmonics and Flicker Emission Test-setup

Emission measurement according EN61000-3-2 and EN61000-3-3

Schematic Test-setup:



Legende/ legend

- | | |
|-------|---|
| S | Versorgungsquelle/ supply source |
| M | Messeinrichtung/ test equipment |
| EUT | Prüfling/ test sample |
| U | Prüfspannung/ test voltage |
| Z_M | Eingangsimpedanz der Messeinrichtung/ input impedance of test equipment |
| Z_s | Innenimpedanz der Versorgungsquelle/ internal impedance of supply source |
| I_n | Oberschwingungsanteil der Ordnung n des Leiterstroms/ harmonic factor of n^{th} order of conductor current |
| G | Leerlaufspannung der Versorgungsquelle/ nominal voltage of supply source |

Photo test setup



Harmonics

Spitzenberger & Spies
Viechtach

Name: SEW Serial no: 1404NK001012
 Department: EMC Laboratory Operating modes: Light-Mode
 Company: SGS-TÜV Saarland Forster Comment1: ---
 Test report no: 50911_10042014_IR294_1 Comment2: ---
 Device: IR Illuminator Helios Comment3: ---
 Specimen: EN61000-3-2/-3 Comment4: ---
 Manufacturer: Microlight Security UG Date: 24.04.2014
 Type: IR294-M/90-850 220 Test date: 24.04.2014

Maximum RMS current and corresponding values in timewindow 729:

Voltage: 230.39 Vrms THD=0.01 % THV=0.022 V POHV=0.005 V PWHD=0.01 %
 Current: 0.158 Arms THD=83.15 % THC=0.101 A POHC=0.010 A PWHD=54.54 %
 Power: 13.6 W P1=13.6 W 36.3 VA
 Power factor: 0.376 CosPhi: 0.489

Test conditions: EN 61000-3-2:2006 + A1:2009 + A2:2009, f=50 Hz, Phase=L1, Range=0.16 A
 Time window=10/12 (200ms), Grouping (>2nd harm.)=on, Rated I1=3.0 A, Rated pf=1.0
 No Ztest selected
 harmonic currents < 0.6 % of I or < 5 mA are disregard for calc. of THD, THC, POHC, PWHD

HARMONIC ANALYSIS: Test PASS (if class C b) 2 waveform check is fulfilled)

Tobs = entire measurement; POHC: avg=0.01 A, limits=0.00 A
 Iavg=0.157 Arms; Rated I1/Pf exceeded, changed to 0.12 A/0.377

Ha	Entire measurement (2.5 min = 750 time windows)					Worst 2.5 min		Average		P A S S	F A I L
	Maximum	Window	EN61000-3-2 Class C b) 2	Margin in MaxWin	100 to 150%	Ex- ceeded	100 to 150%	Ex- ceeded	Value		
DC	0.0010 A	599	-----	-----	0	0	n.e.	n.e.	0.0009 A	0	X
1	0.1211 A	729	-----	-----	0	0	n.e.	n.e.	0.1210 A	0	X
2	0.0001 A	581	-----	-----	0	0	n.e.	n.e.	0.0001 A	0	X
3	0.0564 A	729	0.1042 A	-45.9 %	0	0	n.e.	n.e.	0.0563 A	0	X
4	0.0001 A	567	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
5	0.0511 A	729	0.0739 A	-30.8 %	0	0	n.e.	n.e.	0.0510 A	0	X
6	0.0001 A	618	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
7	0.0438 A	748	-----	-----	0	0	n.e.	n.e.	0.0436 A	0	X
8	0.0001 A	631	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
9	0.0352 A	748	-----	-----	0	0	n.e.	n.e.	0.0350 A	0	X
10	0.0000 A	609	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
11	0.0261 A	750	-----	-----	0	0	n.e.	n.e.	0.0259 A	0	X
12	0.0000 A	643	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
13	0.0174 A	750	-----	-----	0	0	n.e.	n.e.	0.0171 A	0	X
14	0.0000 A	635	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
15	0.0097 A	750	-----	-----	0	0	n.e.	n.e.	0.0095 A	0	X
16	0.0000 A	623	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
17	0.0038 A	743	-----	-----	0	0	n.e.	n.e.	0.0037 A	0	X
18	0.0000 A	599	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
19	0.0025 A	2	-----	-----	0	0	n.e.	n.e.	0.0024 A	0	X
20	0.0000 A	595	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
21	0.0045 A	1	-----	-----	0	0	n.e.	n.e.	0.0044 A	0	X
22	0.0000 A	631	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
23	0.0052 A	31	-----	-----	0	0	n.e.	n.e.	0.0052 A	0	X
24	0.0000 A	630	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
25	0.0049 A	738	-----	-----	0	0	n.e.	n.e.	0.0048 A	0	X
26	0.0000 A	640	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
27	0.0037 A	750	-----	-----	0	0	n.e.	n.e.	0.0036 A	0	X
28	0.0000 A	636	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
29	0.0021 A	750	-----	-----	0	0	n.e.	n.e.	0.0020 A	0	X
30	0.0000 A	1	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
31	0.0008 A	749	-----	-----	0	0	n.e.	n.e.	0.0008 A	0	X
32	0.0000 A	730	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
33	0.0014 A	2	-----	-----	0	0	n.e.	n.e.	0.0013 A	0	X
34	0.0000 A	600	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
35	0.0020 A	1	-----	-----	0	0	n.e.	n.e.	0.0019 A	0	X
36	0.0000 A	609	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
37	0.0021 A	746	-----	-----	0	0	n.e.	n.e.	0.0021 A	0	X
38	0.0000 A	641	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X
39	0.0019 A	739	-----	-----	0	0	n.e.	n.e.	0.0019 A	0	X
40	0.0000 A	630	-----	-----	0	0	n.e.	n.e.	0.0000 A	0	X

|| average value < 0.6 % of Iavg or < 5 mA n.e. = not evaluated

Flicker

Spitzenberger & Spies
 Viechtach

Name:	SEW	Serial no:	1404NK001012
Department:	EMC Laboratory	Operating modes:	Light-Mode
Company:	SGS-TÜV Saarland Forster	Comment1:	---
Test report no:	50911_10042014_IR294_1	Comment2:	---
Device:	IR Illuminator Helios	Comment3:	---
Specimen:	EN61000-3-2/-3	Comment4:	---
Manufacturer:	Microlight Security UG	Date:	24.04.2014
Type:	IR294-M/90-850 220	Test date:	24.04.2014

Test conditions: EN 61000-3-3:2008 / 230 V / 50 Hz / Phase L1
 EN 61000-4-15:2011 / Obs 1 x 10 min / Ztest (0.400+j0.250) Ohm
 Ra+jXa (0.2400+j0.1500) Ohm / Rn+jXn (0.1600+j0.1000) Ohm

FLICKER: Test PASS!

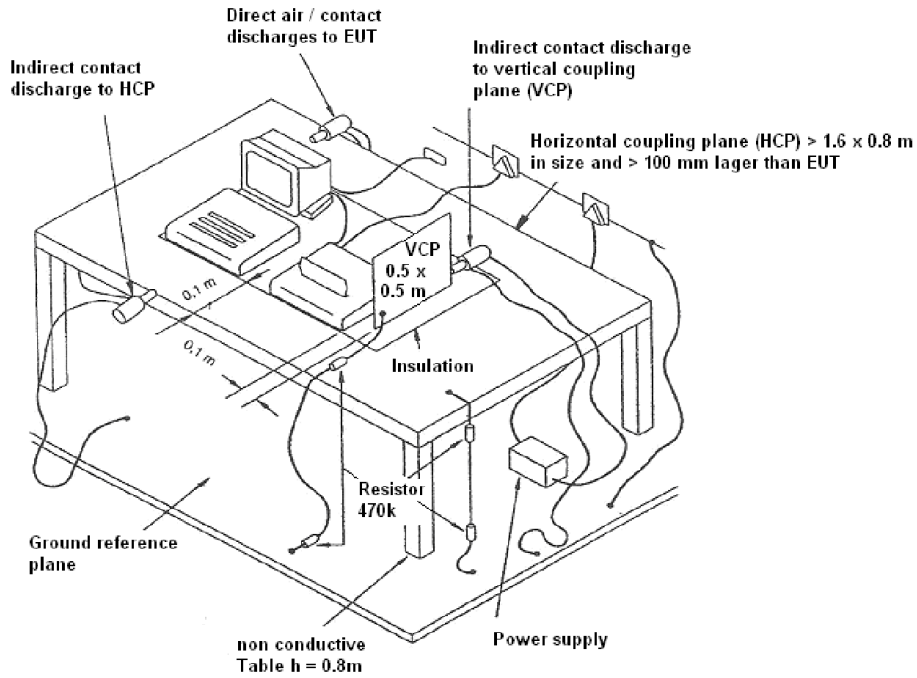
Time	Pmax	Pst	Sliding Plt	d(t)>3.30% [s]	dmax [%]	dc [%]	PASS	FAIL
16:08:53	0.000	0.0020	- . - - - -	0.000	+0.000	- . - - - -	X	
Limits:		1.000	0.650	0.500	4.000	3.300		
Plt: 0.000874 (calculated over 12 periods)								
Evaluated: PST, dc, dmax, d(t)								

FLICKER: Source test PASS!

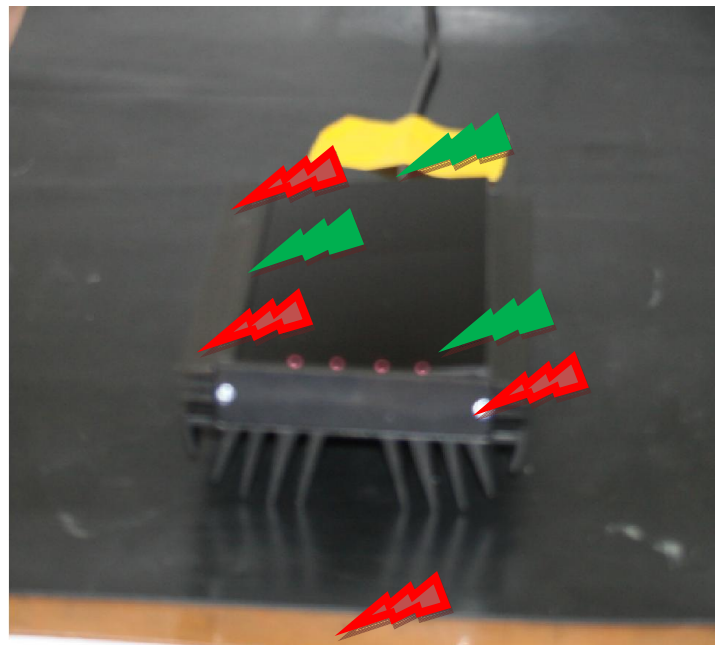
Time	Pmax	Pst	Sliding Plt	d(t)>3.30% [s]	dmax [%]	dc [%]	PASS	FAIL
16:08:53	0.000	0.0030	- . - - - -	0.000	+0.000	- . - - - -	X	
Plt: 0.001310 (calculated over 12 periods)								
Evaluated: PST <= 0.4 dmax < 20 % dmax1								

5. Test results Immunity

5.1. Test setup and results electrostatic discharge



Photos discharging-points



Contact discharge (CD)



Air discharge (AD)

E. u. T.: IR Illuminator Helios
 Model: IR-294-M/90-850 220
 Applicant: JSC Videocom
 Requirements: EN61000-4-2
 EN61547

Test Parameter	Required	Tested
Shape of Impulse	1/30 ns	1/30 ns
Amplitude	4kV CD / 8kV AD	4kV CD / 8kV AD
Polarity/ time	+/- /per 1s	+/-/per 1s
Number	10 CD 10 AD	25 CD 10 AD
Kind of discharge (contact/air)	CD/AD	CD/AD

Discharge points: Direct discharge Contact / Air (see picture)
 Indirect discharge on HCP (see picture)

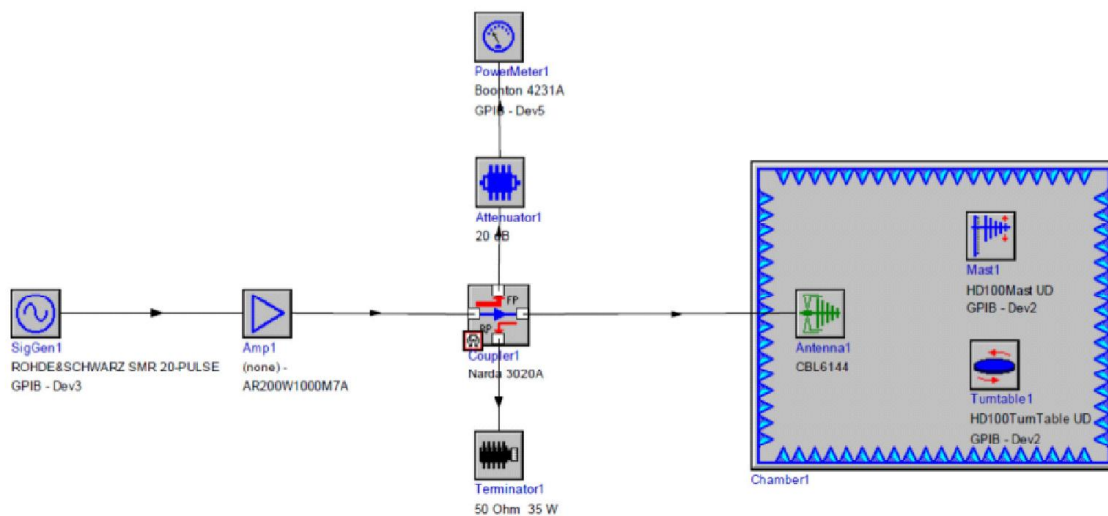
RESULTS: **Passed (Class "A")**
 No degradation of performance

5.2. Test setup and results electromagnetic Rf-fields

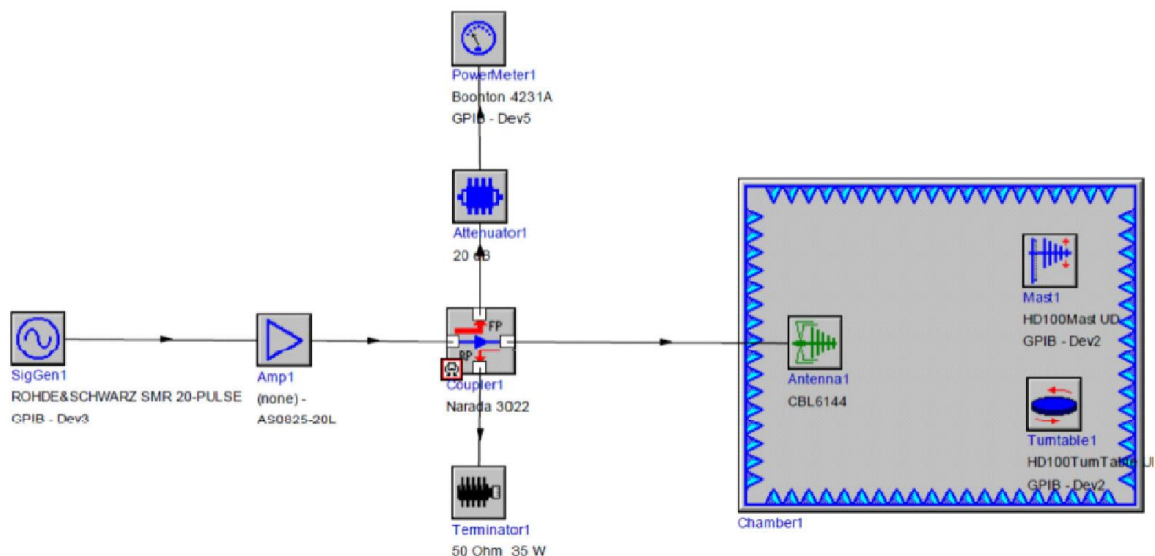
EN61000-4-3 (RF-Fields Immunity) Test-setup

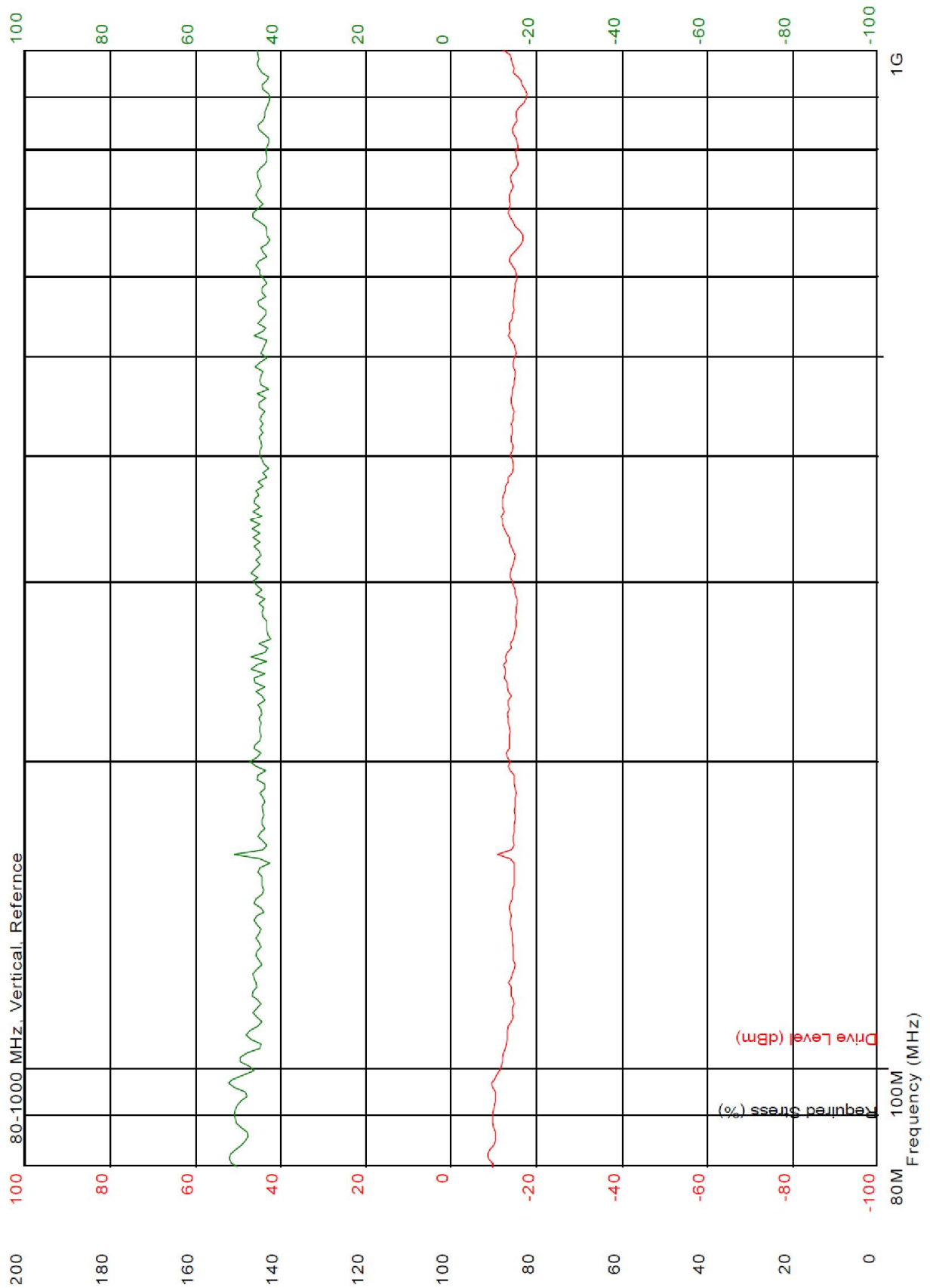
Frequency-range 80MHz - 2700MHz

1. Immunity against radiated electromagnetic RF-fields from 80MHz to 1000MHz



2. Immunity against radiated electromagnetic RF-fields from 1000MHz to 2700MHz





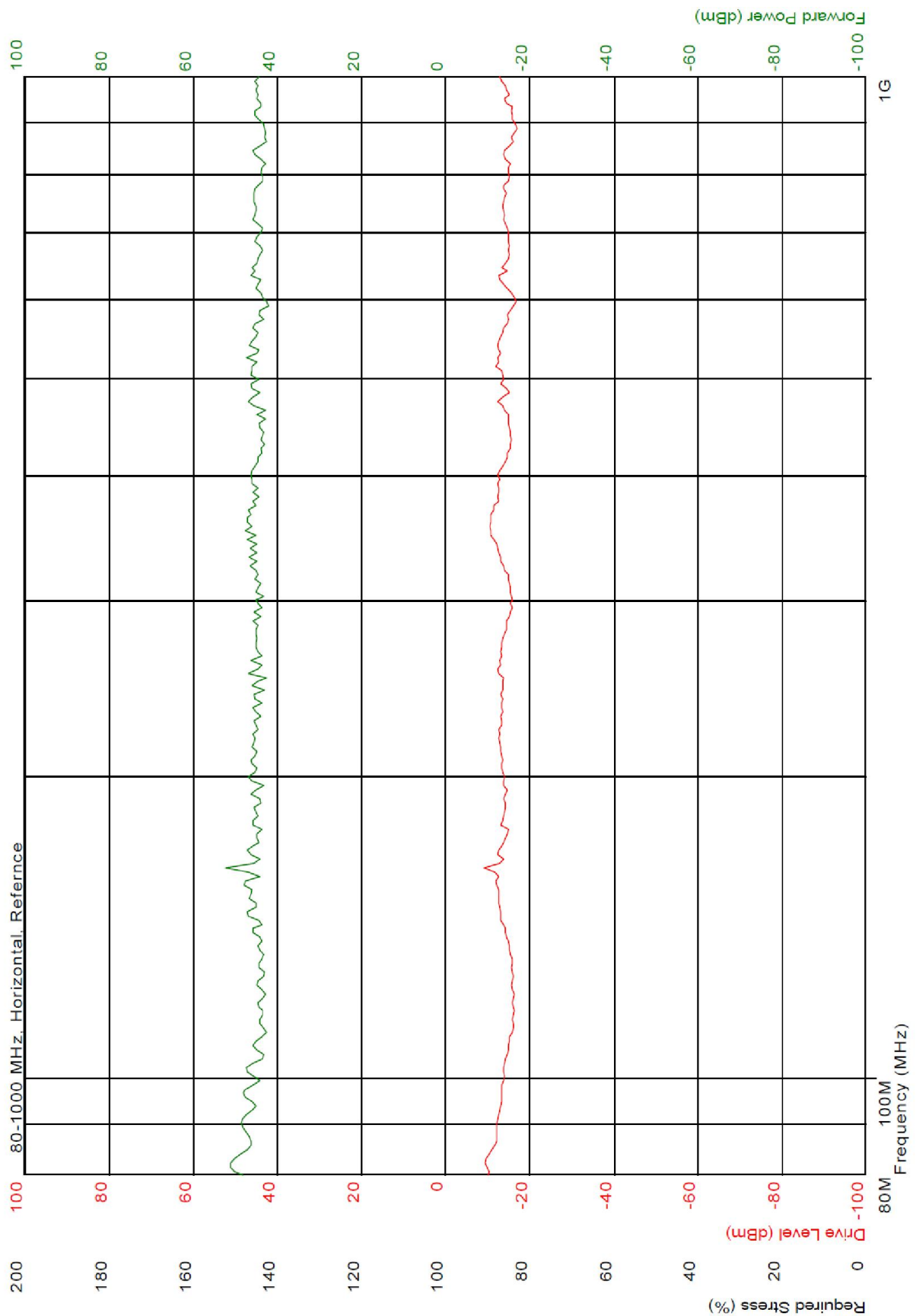


Photo test setup

Test setup 80-1000MHz:



E. u. T.: IR Illuminator Helios

 Model: IR-294-M/90-850 220

 Applicant: JSC Videocom

 Requirements: EN 61000-4-3

 EN 61547

System observed with CCD Camera

Test parameter	Required	Tested
Frequency	80-1000 MHz	80-1000 MHz
Test Amplitude	3 V/m	10 V/m
Modulation	AM, 1kHz/80%	AM, 1kHz/80%
Frequency step	1%/ 2s	1%/ 2s
Distance (EUT – Antenna)	1 to 3 meter	1,5 meter

Tested Side: Front-Side: Vertical and Horizontal (see picture)

TEST RESULT: **Passed** (Class “A”)

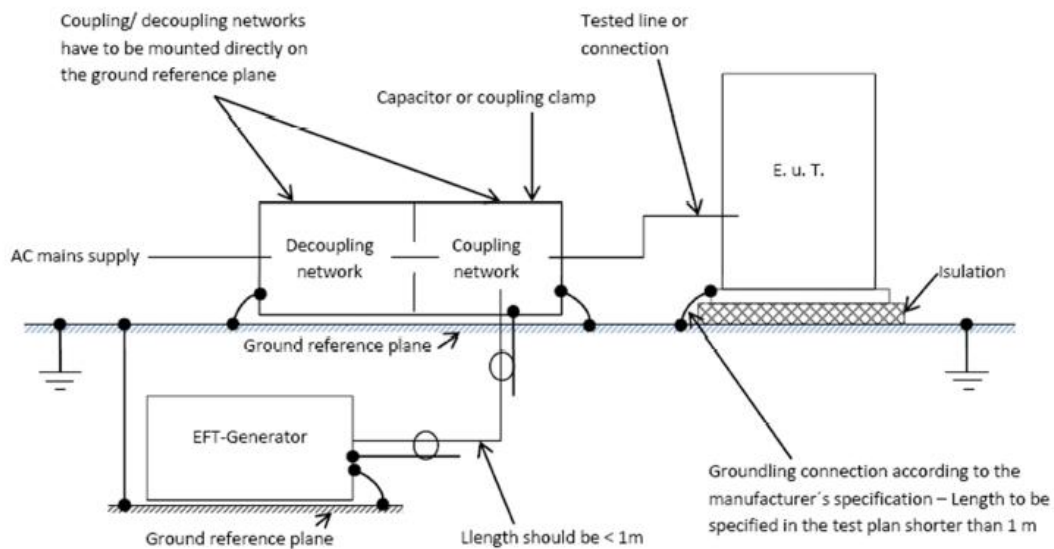
 No degradation of performance

5.3. Test setup and results fast transients (Burst)

EN61000-4-4 (Fast Transients) Test-setup

Coupling network / Coupling clamp

1. Schematic set-up for immunity using coupling/ decoupling networks



2. General principle of a test set-up using a capacitive coupling clamp

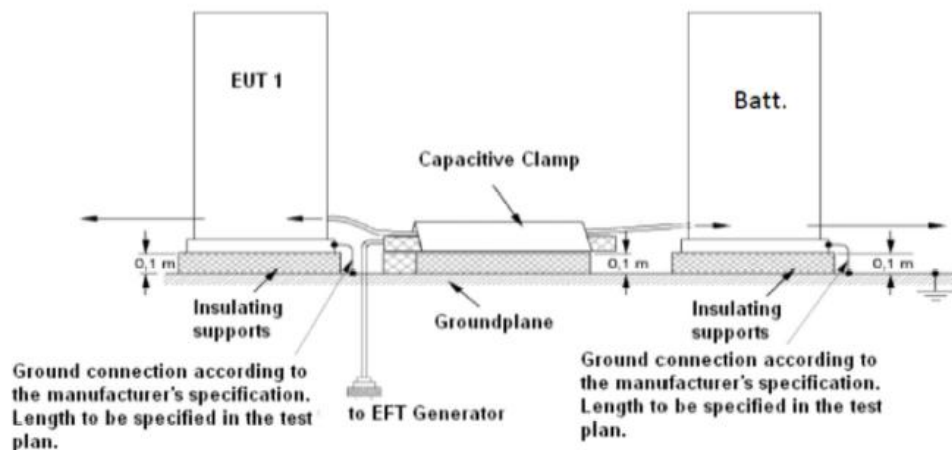


Photo test setup:

Coupling on AC-Line with direct coupling:



E. u. T.: IR Illuminator Helios
 Model: IR-294-M/90-850 220
 Applicant: JSC Videocom
 Requirements: EN61000-4-4
 EN61547

Test parameter	Required	Tested
Shape of Impulse	5/50ns	5/50ns
Test Amplitude	1 kV	2 kV
Polarity	+/-	+/-
Coupling	Direct	Direct
Duration Rep.rate	each 1 min. 5kHz	each 1 min 5kHz

Tested-Lines: AC-Line with 2kV, direct coupling

TEST RESULT: **Passed** (Class "A")
 No degradation of performance

5.4. Test setup and results surge

EN61000-4-5 (Surge) Test-setup

AC supply-lines / Shielded-lines

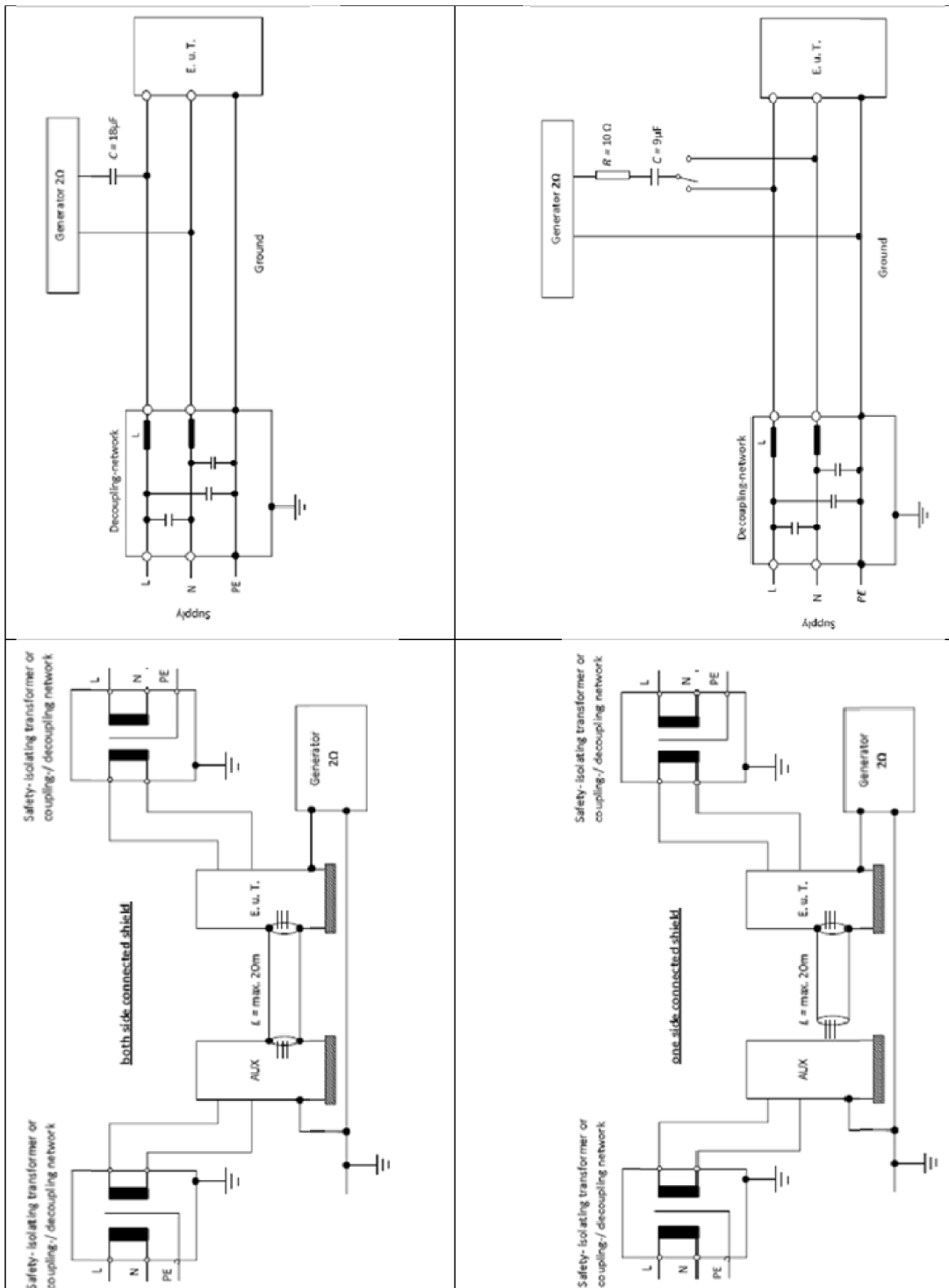
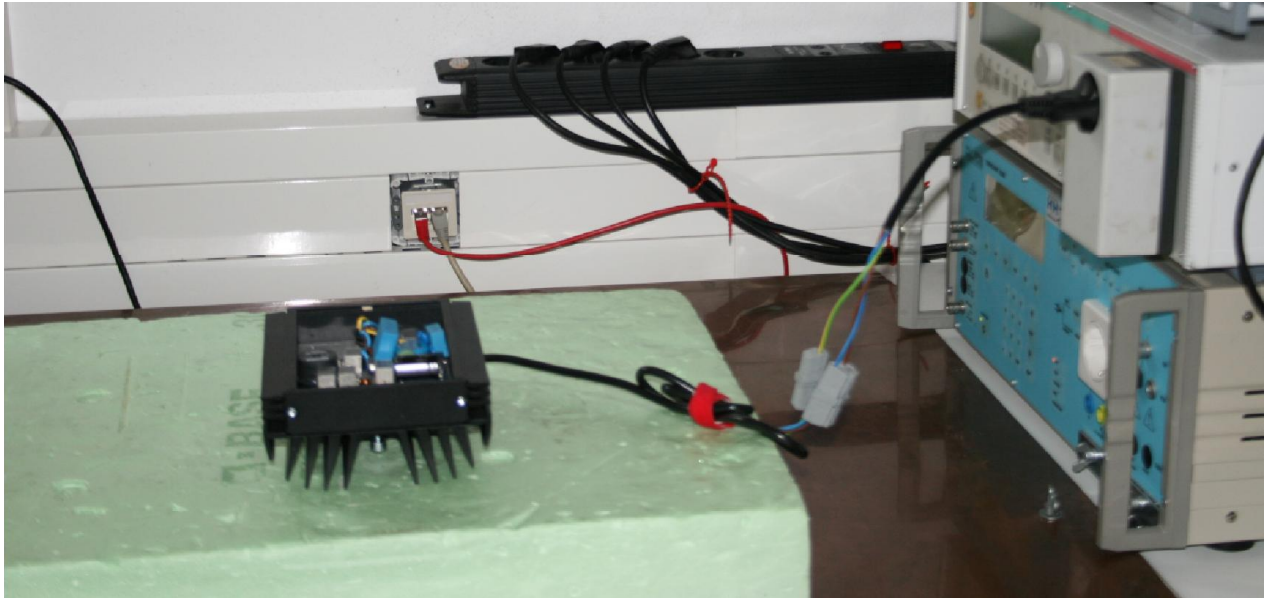


Photo test setup:

Coupling on AC-Line with direct coupling:



E. u. T.: IR Illuminator Helios

 Model: IR-294-M/90-850 220

 Applicant: JSC Videocom

 Requirements: EN61000-4-5

 EN61547

Test parameter	Required	Tested
Shape of impulse	1,2/ 50 (8/20) μ s	1,2/ 50(8/20) μ s
Test Amplitude	1,0kV L-N 2,0kV L-PE, N-PE	1,0kV L-N 1kV L-PE, N-PE
Polarity	+/-	+/-
Numbers/ Degrees	each 5 for 0°, 90°, 270°	each 5 for 0°, 90°, 270°
Duration	each 30 sec.	each 30 sec.

Tested- Line: AC with direct coupling

TEST RESULT: **Passed** (Class "A")

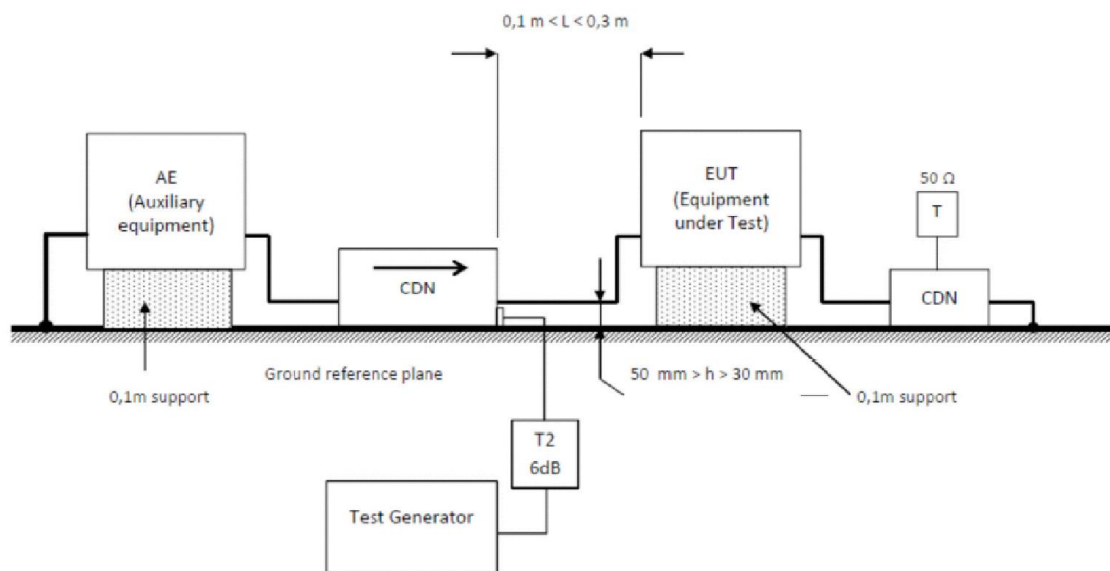
 No degradation of performance

5.5. Test setup and results conducted RF- disturbance

EN61000-4-6 (HF-disturbances) Test-setup

Coupling network / Injection clamp

1. Schematic set-up for immunity using coupling/ decoupling networks



2. General principle of a test set-up using injection clamps

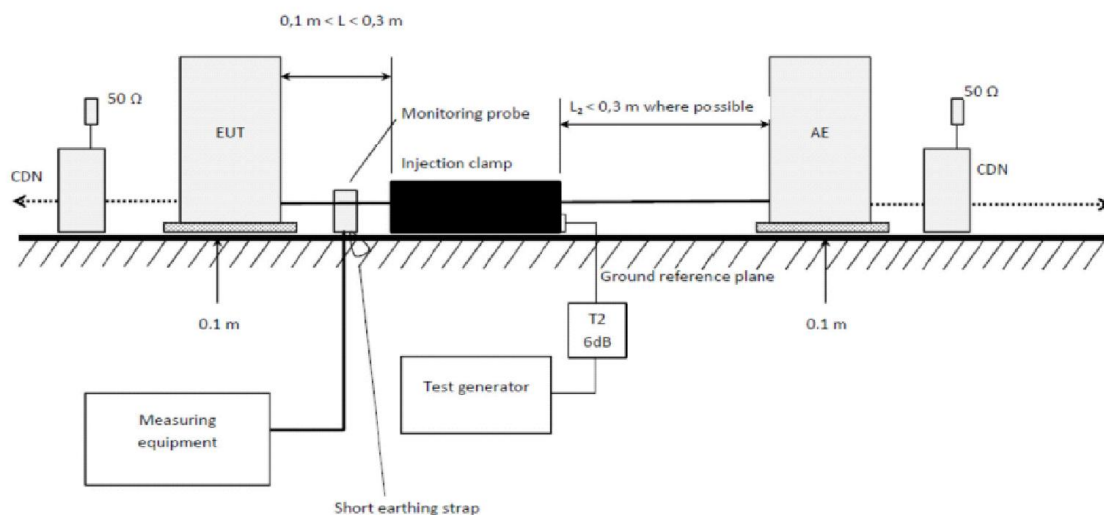
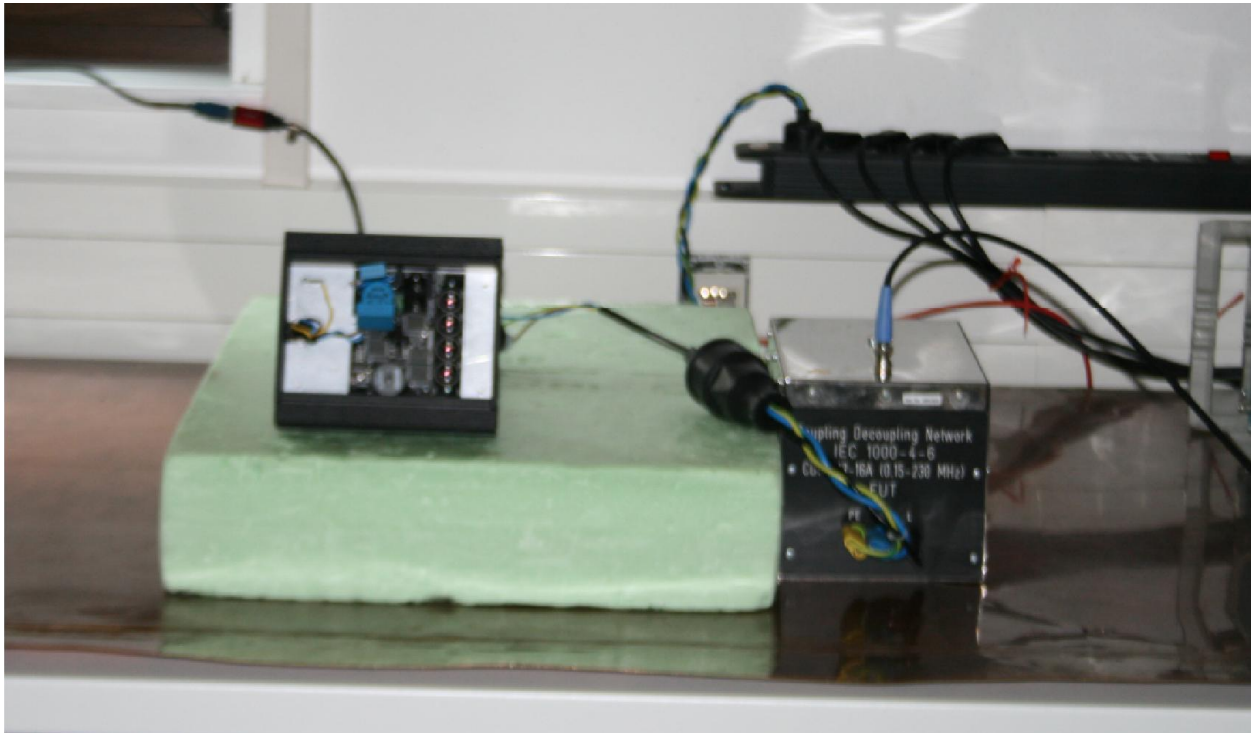


Photo test setup

Coupling on AC-Line with CDN-M3:



Test Report

EUT Information

Description:

EUT Name:	IR Illuminator Helios
Manufacturer:	Microlight Security UG
Typ:	IR294-M790-850220
S/N:	1404NK001012
HW Rev:	04/2014
SW/FW Rev:	None
Operating cond.:	Light-Mode
Operator:	SEW
Test Spec.:	EN61000-4-6:2009
Connected Line	AC-Power-Line (CDN-M3)
Supply:	AC230V, 50Hz
Ambient cond.	Temp: 21°C ; Humidity: 52% ; Pressure: 1020hPa
Project No.:	50911_10042014_IR294_1
Comment:	None
Result File Name:	AC-Line.res

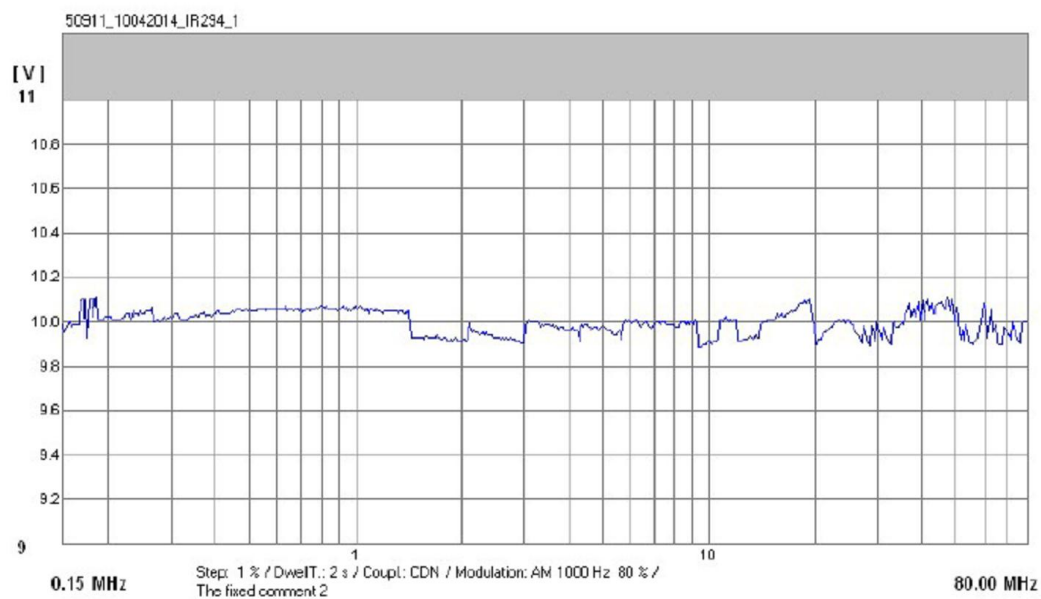
Setup: Conducted Disturbances

Hardware Setup: NSG 4070 - CDN / EM-CLAMP / CIP

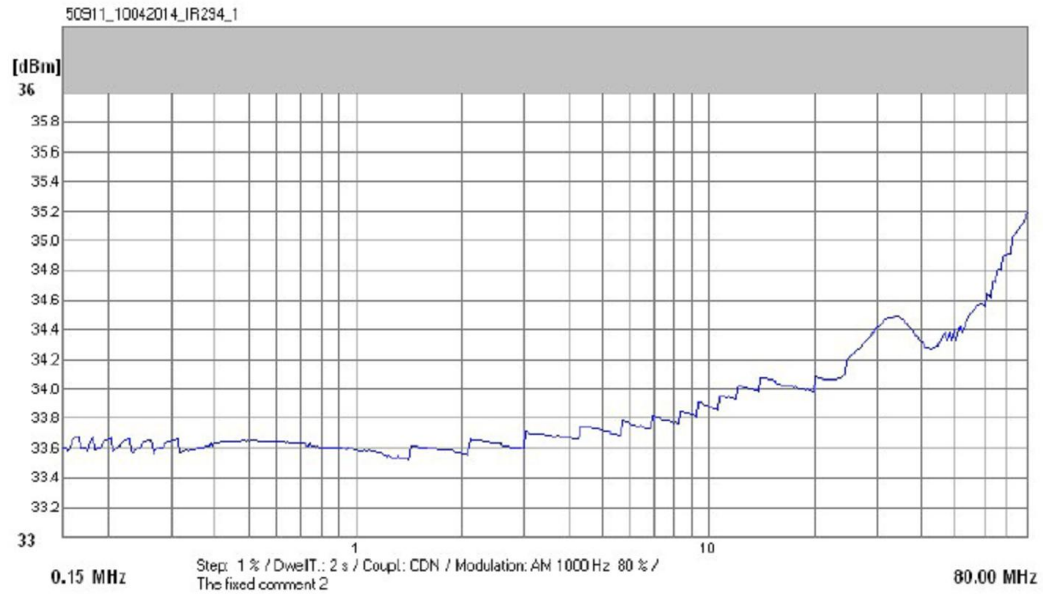
Subrange	Test Level	Freq. Step	Dwell Time	Coupling Device
0.15 - 80 MHz	10...10 V	1 %	2.000 ms	CDN

Modulation	Amplifier int./ext.	Nr. of Steps
AM 1000 Hz 80 %	internal	633

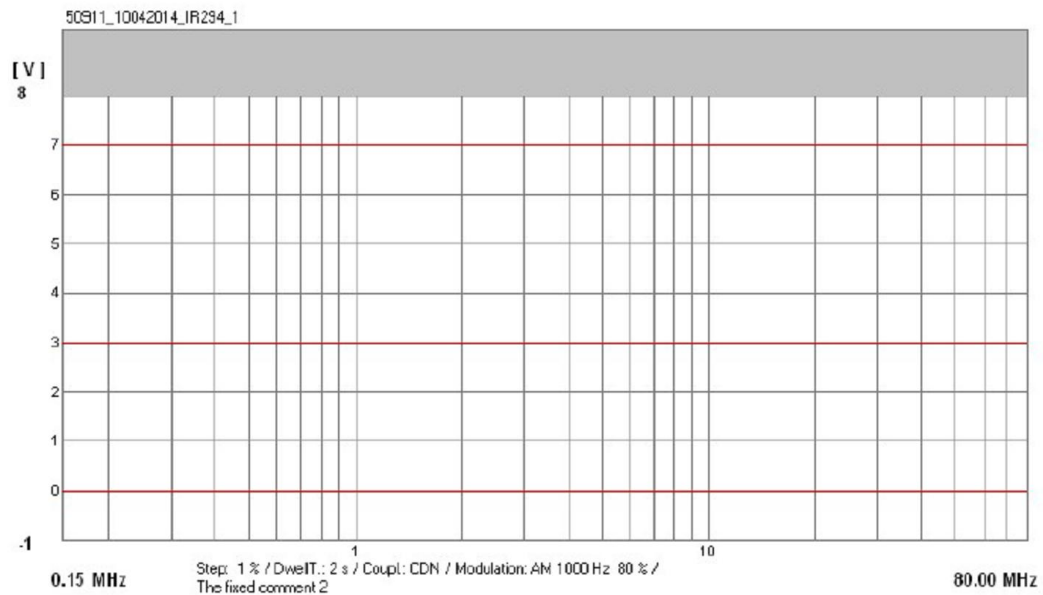
Test Level



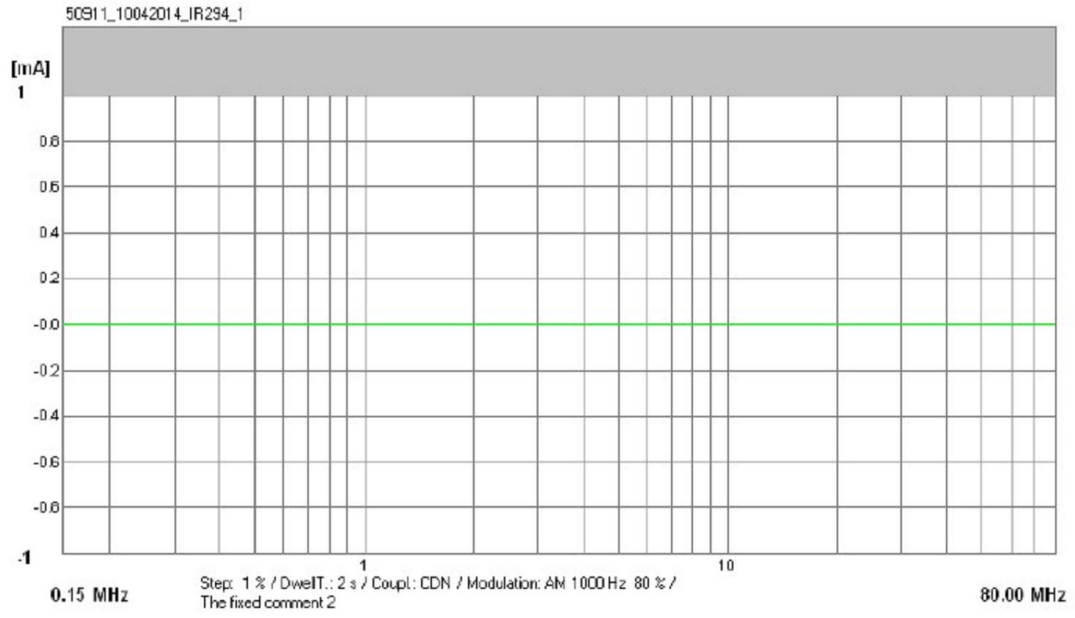
Forward Power



Analog Input Monitoring Port



Monitoring Probe Current



TEST RESULT:

Passed (Class "A")
No degradation of performance

5.6. Test setup and results voltage dips and interrupts

EN61000-4-11 (Voltage fluctuations) Test-setup

Voltage dips, short interruptions, voltage variations immunity test

Schematic-Test Setup

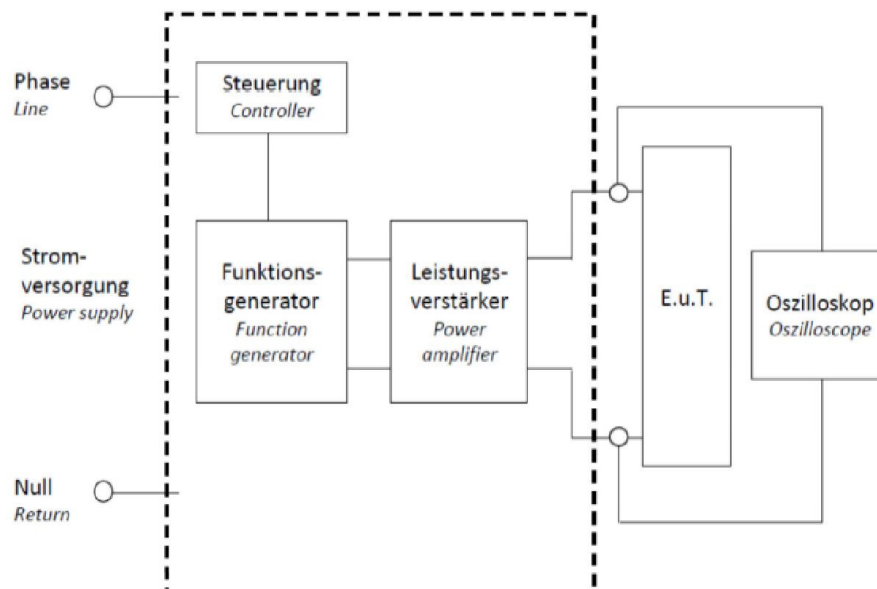
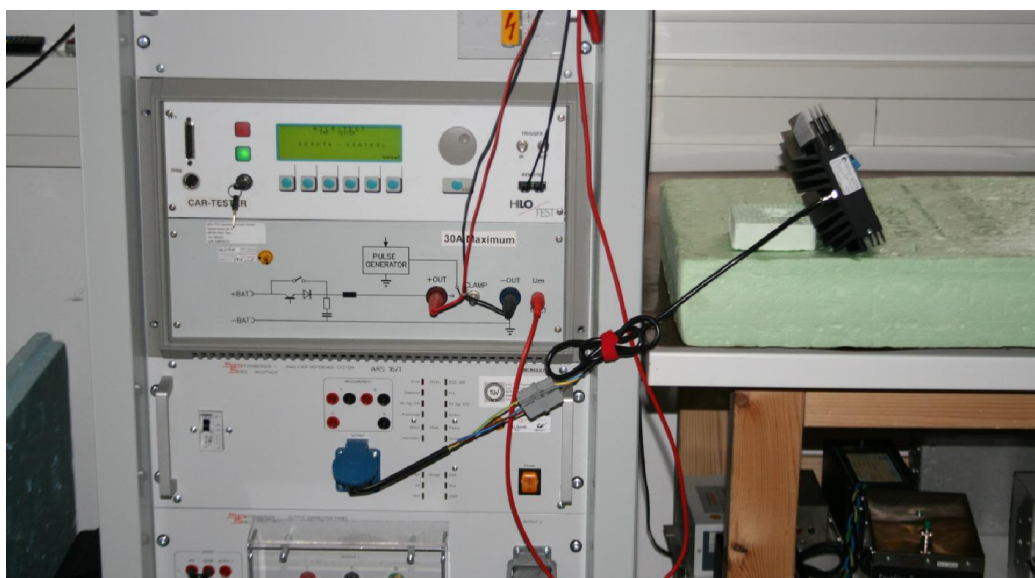


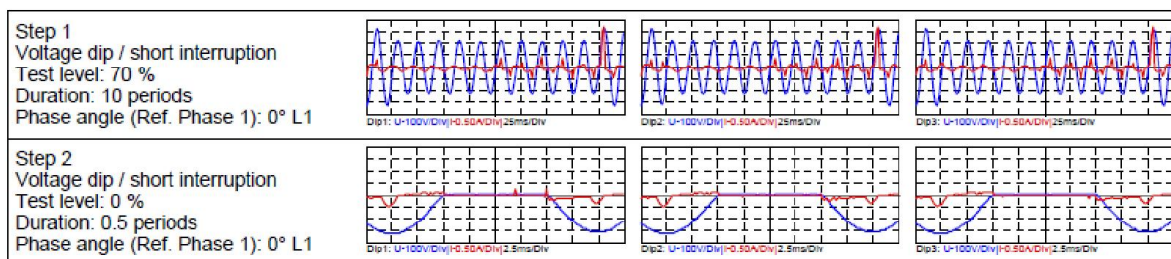
Photo test setup



Spitzenberger & Spies
 Viechtach

Name:	SEW	Serial no:	1404NK001012
Department:	EMC Laboratory	Operating modes:	Light-Mode
Company:	SGS-TÜV Saarland Forster	Comment1:	---
Test report no:	50911_10042014_IR294_1	Comment2:	---
Device:	IR Illuminator Heliös	Comment3:	---
Specimen:	EN61000-4-11	Comment4:	---
Manufacturer:	Microlight Security UG	Date:	24.04.2014
Type:	IR294-M/90-850 220	Test date:	24.04.2014

Test conditions: EN 61000-4-11 voltage dips, short interruptions and variations test
 Voltage / frequency: 230.0 V / 50.0 Hz
 Test phase: Single phase / L1-N
 Executed test: EN61547:2009
 Test description: --
 Disturbances per step: 3 (per phase angle) / 10.5 sec delay between



Test results:

- Normal performance within limits specified by manufacturer, requestor or purchaser
- Temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention
- Temporary loss of function or degradation of performance, the correction of which requires operator intervention
- Loss of function or degradation of performance which is not recoverable, owing to damage to hardware or software, or loss of data

Comments:

6. List of test instruments

Conducted Emission

INV #	Test equipment	Type	Manufacturer	S/N #
# A 1	Test receiver with Opt. B 2 und ESK 1	ESPC	Rhode & Schwarz	843820/014
# A 5	LISN	ESH 2-Z5	Rhode & Schwarz	843285/008
# A 19	Coax cable 2 x 5m	BNC/50 Ω	Suhner	001-002
# A 20	Coax cable 2 x 2m	BNC/50 Ω	Suhner	001-002
# A 39	Handnachbildung	HNB	Fo	001
# A 95	Impulsbegrenzer	ESH3-Z2	Rhode & Schwarz	357.8810.52
# A 139	Microwave cable	AK9515H	Schwarzbeck	9515200
# S 1	Software	ESPC-K1 V2.02.06C	Rhode & Schwarz	-

Field Strength (30MHz to 18GHz)

INV #	Test equipment	Type	Manufacturer	S/N #
# A 10	Antenna Mast	HD	Deisel	-
# A 12	Turntable	DS 420	Deisel	-
# A 13	Controller	MCU	Maturo GmbH	1131108
#A83	EMI Test Receiver	ESU26	Rohde & Schwarz	100325
# A 99	Coax cable SAC	Sucoflex 106	Sucoflex	MFR65474
# A 100	Coax cable SAC	Sucoflex 106	Sucoflex	MFR65474
# A 138	Double Ridge Horn Antenna	BBHA9120D	Schwarzbeck	9120D-374
# A 196	Biko Log Per Antenna	VULB 9160	Schwarzbeck	-
# S 137	Software	EMC 32 V8.51.0 mit USB- Dongle	Rhode & Schwarz	-

Electro static discharge

INV #	Test equipment	Type	Manufacturer	S/N #
# A 27	ESD Resistors	HTE 102	Powertron	Keine
# A 40	Coupling Plate	VCP	Eigen	Keine
# A 164	ESD Generator	SESD30000	Schlöder	507146
# S 164	ESD-Software	SESD30000 V5.01	Schlöder	-

Electromagnetic RF-field 80MHz – 8GHz

INV #	Test equipment	Type	Manufacturer	S/N #
# A 10	Antenna Mast	HD	Deisel	-
# A 12	Turntable	DS 420	Deisel	-
# A 13	Controller	MCU	Maturo GmbH	1131108
# A 37	Electrical Field Probe	EMC 300	NARDA	W-0032/ C0013
# A 52	Bidirectional Coupler	3020A	NARDA	36045
# A 58	RF Power Amplifier	AS0820-100	MILMEGA	973029
# A 99	Coax cable SAC	Sucoflex 106	Sucoflex	MFR65474
# A 100	Coax cable SAC	Sucoflex 106	Sucoflex	MFR65474
# A 103	CCD- Camera	Pontis Imago	Pontis	1
# A 138	Double Ridge Horn Antenna	BBHA9120D	Schwarzbeck	9120D-374
# A 144	Power Amplifier	AS0825-20L	MILMEGA	1005708
# A 177	Attenuator	20dB-10W	Schaffner	001-002
# A186	Power Amplifier	AR1000M7A	AR	23666
# A 209	Power Amplifier	VZS6951K1	VARIAN	6030
# A 216	BiLog Antenna	CBL6144	TESEQ	28099
# A 217	Bidirectional Coupler	3022	NARDA	50171
# A 218	Bidirectional Coupler	3004-20	NARDA	3086
# A 220	Signal Generator	SMR20	Rhode & Schwarz	834671/004
# A 221	Power Meter	4231A-30	Boonton	40101
# A 221-1	Power Sensor + Sensor Data Adapter	51013-4E	Boonton	20984
# A 222	Power Amplifier	CR601-1	AIKEN-KELTEC	4976-002
# S 0	Software	Compliance 3 Immunity V4.01.0 mit USB-Dongle	Teseq	-

Burst (5kHz, 100kHz)

INV #	Test equipment	Type	Manufacturer	S/N #
# A 24	Immunity Test System	UCS500	EM-Test	A446801
# A 30	1-phase coupling-network	CNI	EM- Test	-
# A 61	Cap. Coupling Clamp	HFK	EM- Test	-
# A 62	Cap. Coupling Clamp	TRA2000 CC	H + H	-
# A 170	Cap. Coupling Clamp	HFK	EM- Test	1
# A 198	Burst Generator	TRA2000	H + H	665
# S 62	Generator Controlling Software	TRA2000	EMC-Partner AG	-

Surge

INV #	Test equipment	Type	Manufacturer	S/N #
# A 24	Immunity Test System	UCS500	EM-Test	A446801
# A 30	1-phase coupling-network	CNI	EM- Test	-

Conducted RF Disturbance (150kHz – 80MHz)

INV #	Test equipment	Type	Manufacturer	S/N #
# A 26	Immunity Test System	NSG4070	TESEQ	24433
# A 28	Attenuator	ATT6/75W	EM- Test	0206-23
# A 29	Coupling Network	CDN-M2	EM- Test	9605005B
# A 31	Coupling Network	CDN-AF4	EM- Test	9607009B
# A 32	Coupling Clamp	EM101	EM- Test	35352
# A 33	Attenuator	ATT6/75	EM- Test	9606009A
# A 41	R.F. current probe	6741-1	Solar Electronics	839708
# A 53	Current Probe – Clamp-on	CIP9136	Schaffner	
# A 63	Coupling Network	CDN-M1	Schlöder	A3001029
# A 84	Coupling Network	CDN-M3	Fiedler	06K003
# S 26	Control Program	NSG 4070 V1.1.2	TESEQ	

Voltage Dips and Interrupts

INV #	Test equipment	Type	Manufacturer	S/N #
# A 22	EMV E5000/PAS/Kfz System	PAS5000	Spitzenberger & Spies	A446801
# A 165	Dig. Stor. Osc.	TDS3052	Tektronix	B018118
# A 207	Analyser Reference System	ARS16/1	Spitzenberger & Spies	Uo345
# S 22	EMC Test Software	V2.41C+ V3.9	Spitzenberger & Spies	-

7. Antenna and correction factors

Antenna Factor

Schwarzbeck VULB 9160 TRILOG Broad Band Antenna
 S/N.: 9160-3023 with cable AK 9513

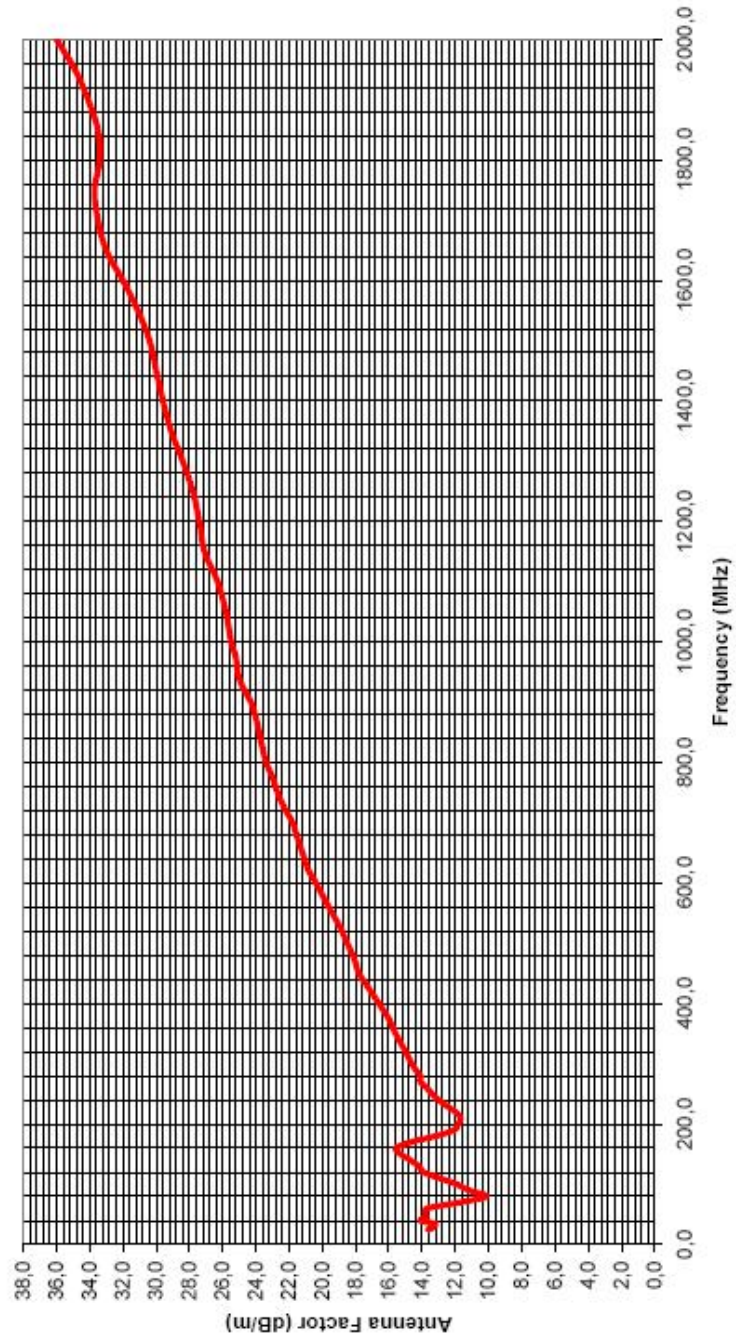
Frequency	AF	Distance
MHz	dB/m	m
25,0	13,7	3
27,0	13,4	3
30,0	13,3	3
35,0	13,2	3
40,0	14,1	3
45,0	13,8	3
50,0	13,8	3
60,0	13,7	3
70,0	11,7	3
80,0	10,1	3
90,0	11,2	3
100,0	11,9	3
110,0	12,9	3
120,0	13,9	3
130,0	14,2	3
140,0	14,7	3
150,0	15,3	3
160,0	15,6	3
170,0	14,7	3
180,0	13,2	3
190,0	12,1	3
200,0	11,8	3
210,0	11,7	3
220,0	12,0	3
230,0	12,5	3
240,0	13,0	3
250,0	13,4	3
260,0	13,7	3
270,0	14,1	3
280,0	14,1	3
290,0	14,4	3
300,0	14,6	3
325,0	15,1	3
350,0	15,6	3
375,0	16,0	3
400,0	16,6	3
425,0	17,2	3
450,0	17,8	3
475,0	18,1	3
500,0	18,5	3

Frequency	AF	Distance
MHz	dB/m	m
525,0	18,9	3
550,0	19,4	3
575,0	19,9	3
600,0	20,4	3
625,0	20,9	3
650,0	21,2	3
675,0	21,5	3
700,0	21,8	3
725,0	22,3	3
750,0	22,7	3
775,0	23,0	3
800,0	23,4	3
825,0	23,6	3
850,0	23,8	3
875,0	24,0	3
900,0	24,3	3
925,0	24,8	3
950,0	25,1	3
975,0	25,2	3
1000,0	25,5	3
1050,0	25,8	3
1100,0	26,3	3
1150,0	27,1	3
1200,0	27,4	3
1250,0	27,8	3
1300,0	28,4	3
1350,0	29,1	3
1400,0	29,6	3
1450,0	30,0	3
1500,0	30,4	3
1550,0	31,1	3
1600,0	32,0	3
1650,0	33,0	3
1700,0	33,5	3
1750,0	33,5	3
1800,0	33,4	3
1850,0	33,5	3
1900,0	34,1	3
1950,0	34,9	3
2000,0	36,0	3

Antenna factor at 3m distance
 Schwarzbeck VULB 9160 Broad Band Antenna
 S/N: 9160-3023 with Cable AK 9513



— AF dB/m



03.02.2009 Version 1.0 Dipl.-Ing. (FH) Sven Eric Weber

8. Measurement uncertainty

Übersicht der Messunsicherheiten

Nach CISPR 16-4, Teil 4 „Uncertainty in EMC measurements“ und
 "ISO Guide to the Expression of uncertainty in Measurements"
 Stand: 09/2010, Dipl.-Ing. (FH) Sven Eric Weber

Störaussendungen/Emission:				
Prüfung	Norm	Details	Betrag	Bemerkung
Messung der Störspannung	CISPR16/11/22	9kHz-150MHz (Band A)	3,32dB	Netznachbildung ESH3-2Z5 + ESPC
Messung der Störleistung	CISPR16/11/22	150kHz-30MHz (Band B)	3,35dB	Netznachbildung ESH3-2Z5 + ESPC
Messung der Störleistung	CISPR16/13/14	30MHz-300MHz (Band C)	3,74dB	MDS21 + ESPC
Messung der Störleistung (SAC)	CISPR16/11/22	30MHz-1000MHz (Band C/D)	4,05dB	VULB9160 + ESBI
Messung von magnetischen Feldern	EN62233	10Hz bis 120kHz	6,04%	ELT-400
Messung von Oberschwingungen	EN61000-3-2	AC-Einphasig, 110-230V, 50Hz	4,65%	PASS5000 + ARS 16/1
Messung von Flicker	EN61000-3-3	AC-Einphasig, 110-230V, 50Hz	4,69%	PASS5000 + ARS 16/1

Störfestigkeit/Immunity:				
Prüfung	Norm	Details	Betrag	Bemerkung
Elektrostatistische Entladung	EN61000-4-2	150pF, 3300hm	6% I _{peak} ; 2,5% U	SESD3000
Einstrahlung elektromagnetisches Feld	EN61000-4-3	80MHz-6000MHz	2,44dB	SAC-Halle (0-6dB Feldhomogenität)
Schnelle Transienten	EN61000-4-4	5kHz Wiederholrate	10% U _{pk}	Kompaktgenerator UCS 500
Schnelle Transienten	EN61000-4-4	100kHz Wiederholrate	10% U _{pk}	Kompaktgenerator TRA 2000
Stoßspannungen	EN61000-4-5	HV Out, AC-Coupling	10% U _J	Kompaktgenerator UCS 500
Geleitete Hochfrequenz	EN61000-4-6:2009	150kHz bis 80MHz	1,16dB	CDN + NSG4070
Geleitete Hochfrequenz	EN61000-4-6:2009	150kHz bis 80MHz	3,11dB	EM101 + NSG4070
Geleitete Hochfrequenz	EN61000-4-6:2009	150kHz bis 80MHz	3,26dB	CIP + NSG4070
Immunität gegenüber Magnetfeldern	EN61000-4-8	50Hz, 60Hz	6,10%	Rahmen: d=1m
Netzunterbrechungen	EN61000-4-11	50Hz, 60Hz	3%-U; 5µs-T	PASS5000

Die Ermittlung der Gesamtunsicherheit wurde nach der „Ermittlungsmethode B“ vorgenommen. Die ausführlichen Abschätzungen und Berechnungen wurden in einem gesonderten Dokument aufgestellt. Dieses kann beim Labor eingesehen werden.

Es wird angenommen, dass der Prüfling die Prüfung bestanden hat, wenn er die angegebenen Bewertungskriterien bei festgelegtem oder einem höherem Schärfegrad erfüllt. Die in den Grundnormen aufgeführte Messunsicherheit bei den Kalibrierverfahren wurde berücksichtigt.

Für die Konformitätsbewertung kommt der in der Norm beschriebene Grenzwert ohne die Einhaltung eines Sicherheitsabstandes zur Anwendung. Danach hat der Prüfling bestanden, wenn der Messwert kleiner oder gleich dem Grenzwert ist.

9. Photo of E. u. T.

