



## TEST REPORT

Test Report No.: 1-3371/11-04-02



### Testing Laboratory

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#### Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAKkS). The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01

### Applicant

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### Manufacturer

same as applicant

### Test Standard/s

47CFR15	2009-10	Subpart B - Unintentional Radiators
ICES-003, Issue 4	2004-02	Interference-Causing Equipment Standard Digital Apparatus

### Test Item

<b>Kind of test item:</b>	<b>DECT 6.0 basestation</b>
<b>Model name:</b>	<b>RFP 35 IP, RFP L35 IP</b>
FCC ID:	UOU68637RFP35U-01
IC:	1884E-68637001
S/N serial number:	B9 3000016261
HW hardware status:	Rev. 1   09/11
	MAC: 00:30:42:17:74:5B
SW software status:	3.0.x
Power Supply:	AC 100-240 V / 50-60 Hz



This test report is electronically signed and valid without handwritten signature. The public keys can be requested at the test laboratory to verify the electronic signatures.

### Test performed:

### Test Report authorised:

\_\_\_\_\_  
Jens Hennemann  
Testing Manager

\_\_\_\_\_  
Uli Kraus  
Senior Testing Manager



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## 2 General information

### 2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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In no case this test report can be considered as a Letter of Approval.

This test report is electronically signed and valid without handwritten signature. For verification of the electronical signatures, the public keys can be requested at the testing laboratory.

## 2.2 Application details

Date of receipt of order: 2011-12-12  
Date of receipt of test item: 2012-01-10  
Start of test: 2012-01-12  
End of test: 2012-01-12  
Person(s) present during the test: - / -

## 3 Test standard/s:

Test Standard	Version	Test Standard Description
47CFR15	2009-10	Subpart B - Unintentional Radiators
ICES-003, Issue 4	2004-02	Interference-Causing Equipment Standard Digital Aparatus

## 4 Test Environment

Temperature: 20°C – 25°C  
Relative humidity content: 30 % - 50 %  
Air pressure: 1020 hPa  
Power supply: 230 V / 50 Hz

## 5 Test Laboratories sub-contracted

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## 6 Information about Test Conditions

### 6.1 Test Item

Kind of test item	:	DECT 6.0 basestation		
Type identification	:	RFP 35 IP, RFP L35 IP		
Equipment classification:		Equipment for fixed use		
Environment classification:		Residential, commercial and light industry		
Supply voltage	:	AC 115 V / 60 Hz		
Ports : (maximum cable lengths declared by manufacturer)	Description		Direction	Length
	AC power port:		input	> 3m
	ETH-port (screened):		in- / output	> 3m
	USB port (USB A):		in- / output	> 3m
Is mounting position / usual operating position defined?			wall mounted	
Additional information:				
The built in radio parts (FCC ID: UOU68637RFP35U-01  IC ID: 1884E-68637001)are not part of this test report and they are already tested. A S/FTP cable was connected to the ETH port.				

## 6.2 EUT: Type, S/N etc. and Short Descriptions Used in this Test Report

short description*)	EUT	Type	S/N serial number	HW hardware status	SW software status
EUT A	DECT 6.0 basestation	Aastra RFP 35 IP, RFP L35 IP	B9 3000016261	Rev- 1   09/11   MAC: 00:30:42:17:74:5B:	3.0.x
EUT B	AC/DC power supply	GlobTek, Inc. GT-41080-1848	4011	unknown	unknown
EUT C	AC/DC power supply	Switching power supply PSAA20R-480	unknown	unknown	unknown

\*) EUT short description is used to simplify the identification of the EUT in this test report.

## 6.3 Auxiliary Equipment (AE): Type, S/N etc. and Short Descriptions

AE description*)	Auxiliary equipment	Type	S/N serial number	HW hardware status	SW software status
AE A	Notebook	Sony Personal Computer PCG-382	28206051 5002204	C3LPH13M	Microsoft Windows Vista Home Premium

\*) AE short description is used to simplify the identification of the auxiliary equipment in this test report.

## 6.4 EUT Set-up(s)

EUT set-up no.*)	Combination of EUT and AE	Remarks
set. 1	EUT A + EUT B + AE A	first setup
set. 2	EUT A + EUT C + AE A	second setup

\*) EUT set-up no. is used to simplify the identification of the EUT set-up in this test report.

## 6.5 EUT Operating Modes

EUT operating mode no.*)	Description of operating modes	Additional information
op. 1	DECT idle + ping on ETH + load at USB port	- / -

\*) EUT operating mode no. is used to simplify the test report.

## 7 Summary of Test Results

- ☒ No deviations from the technical specifications were ascertained  
☐ There were deviations from the technical specifications ascertained

### 7.1 Emission

#### 7.1.1 Enclosure

EMI Phenomenon	Frequency range	Basic standard	Result
Radiated Interference Field Strength	30 - 1000 MHz	FCC Part 15 Class B	passed
Radiated Interference Field Strength	> 1 GHz	FCC Part 15 Class B	passed

#### 7.1.2 AC Mains Power Input/Output Ports

EMI Phenomenon	Frequency range	Basic standard	Result
Conducted interference voltage	0,15– 30 MHz	FCC Part 15 Class B	passed

#### Remarks:

NA1	Not tested because not required by used standard
NA2	Test not applicable because port does not exists
NA3	Test not applicable because port only for services
NA4	Test not applicable because port lengths not longer than 3m
NA5	Not tested because not required by customer
NA6	Not tested because used frequency < 108 MHz

## 7.2 Measurement and Test Set-up

Note: The test configuration is in accordance with the requirements given in the standards in point 3

## 7.3 Measurement uncertainty

The uncertainty of the measurement equipment fulfils CISPR 16 and the related European and national standards.

The semi anechoic chamber fulfils the requirements of CISPR 16-1 (ANSI C63.4) for a test volume of 3m Ø.

The uncertainty of the measurement equipment fulfils CISPR 16 and the related European and national standards.

The semi anechoic chamber fulfils the requirements of CISPR 16-1 (ANSI C63.4) for a test volume of 3m Ø.

The table below shows the measurement uncertainties for each measurement method. The expended uncertainty (k=2 or 95%) was calculated with worst case values.

Measurement Method	Frequency area Impulse duration time	Description	Expanded uncertainty (k=2 or 95%)
Radiated Emission FCC part 15 B, ANSI C63.4	30 MHz – 18 GHz	- / -	± 4.28 dB
Conducted Emission FCC part 15 B, ANSI C63.4	9 kHz – 30 MHz	- / -	± 3.49 dB



## 8 Detailed test results - Emission

### 8.1 Conducted Emission

#### 8.1.1 Instrumentation for Test (see equipment list)

G 1	G 2	G 5	F 21								
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#### 8.1.2 Test Plan

EUT set-up	set. 1+ set. 2		
Operating mode	Port / Line	Limit	Result
op. 1 (set. 1)	AC power line	47CFR15: (FCC part 15 B) Class B	passed
op. 1 (set. 2)	AC power line	47CFR15: (FCC part 15 B) Class B	passed

**Remark :** Powered by external power supply (115V / 60Hz)

#### 8.1.3 Conducted Limits (Power-Line)

Frequency- range	FCC part 15 B Class B		FCC part 15 B Class A	
	Quasi-Peak (dBμV)	Average (dBμV)	Quasi-Peak (dBμV)	Average (dBμV)
0,15 MHz – 0,5 MHz	66-56	56-46	79	66
0,5 MHz -5 MHz	56	46	73	60
5 MHz -30 MHz	60	50	73	60

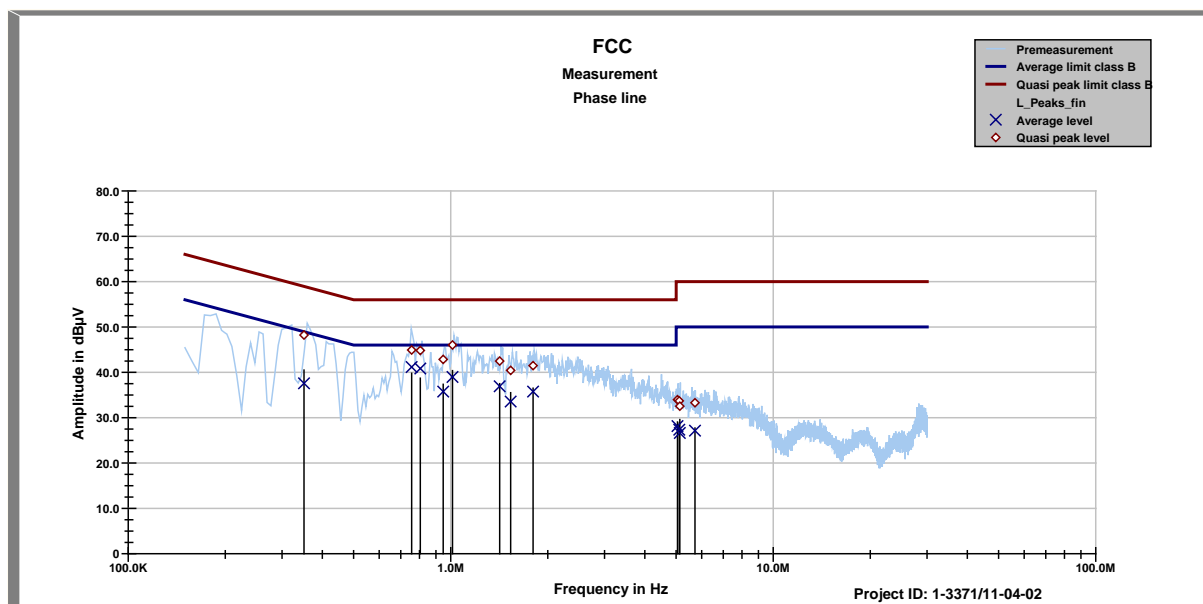
#### 8.1.4 Calibration Information

Device	Serial number	ICT Number	Calibration valid until	Calibration interval
HP 8542 EMI Receiver with RF Filter Unit	3617A00170	300000568	01 / 2013	12 month
VISN ESH 3-Z5	892475/017	300002209	01 / 2014	24 month

Remarks: All emission components and the shielded room were checked weekly  
Cable loss: 0.6 to 2.4 dB (150kHz to 30 MHz)

## 8.1.5 Test Results of Main

### set. 1



FCC

Phase line tbl

Project ID: 1-3371/11-04-02

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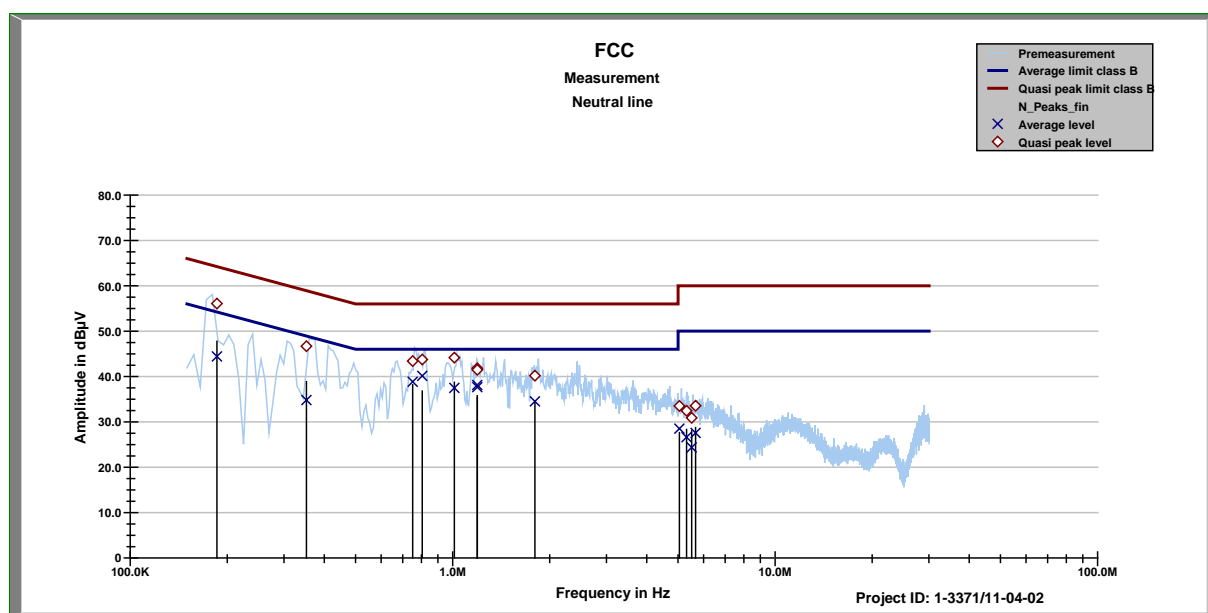
Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBμV	dBμV	dBμV	dBμV
0.35085	48.21	10.73	37.58	12.68
0.75666	44.91	11.09	41.15	4.85
0.8049	44.82	11.18	40.84	5.16
0.94752	42.85	13.15	35.74	10.26
1.01229	46.01	9.99	38.96	7.04
1.418	42.47	13.53	36.91	9.09
1.5334	40.42	15.58	33.55	12.45
1.7996	41.47	14.53	35.74	10.26
5.0466	33.95	26.05	28.14	21.86
5.1098	33.69	26.31	27.33	22.67
5.1291	32.51	27.49	26.62	23.38
5.7165	33.28	26.72	27.13	22.87

Project ID - 1-3371/11-04-02

EUT - Aastra RFP 35 IP + GT-41080-1848

Serial Number - B9 3000016261 + 4011

Operating mode - DECT idle + ping on ETH



FCC

Neutral line tbl

Project ID: 1-3371/11-04-02

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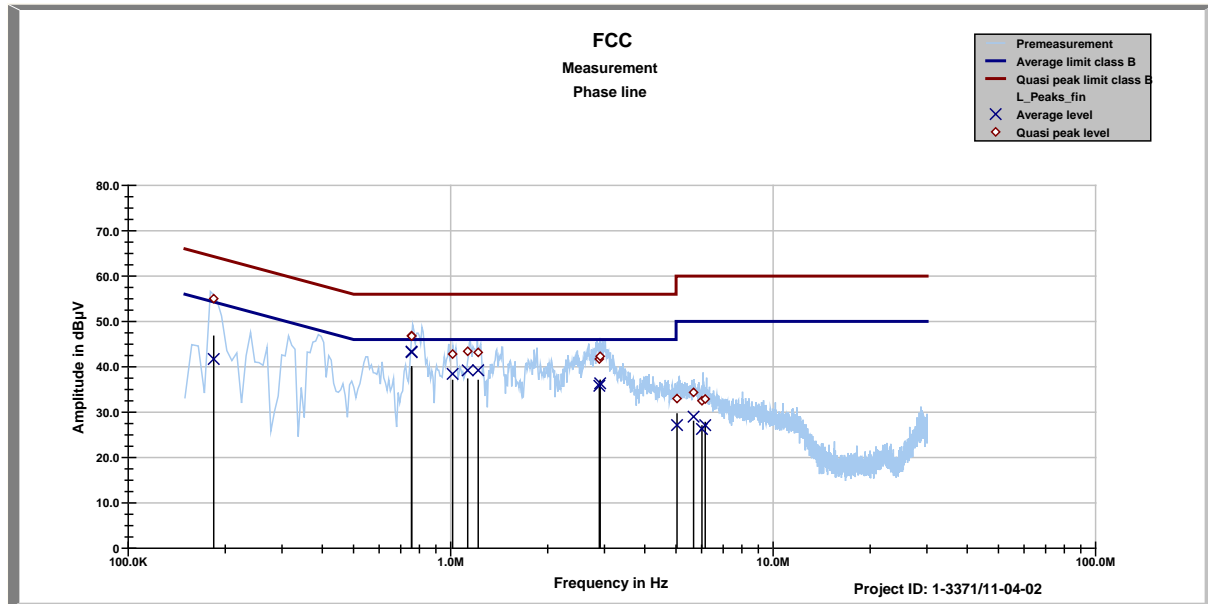
Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.18574	56.07	8.16	44.42	10.56
0.35193	46.67	12.25	34.81	15.42
0.75124	43.40	12.60	38.84	7.16
0.80473	43.74	12.26	40.13	5.87
1.01218	44.14	11.86	37.48	8.52
1.19132	41.82	14.18	38.13	7.87
1.19246	41.46	14.54	37.64	8.36
1.7989	40.18	15.82	34.52	11.48
5.0442	33.51	26.49	28.51	21.49
5.3098	32.45	27.55	26.61	23.39
5.5083	30.88	29.12	24.36	25.64
5.6631	33.54	26.46	27.56	22.44

Project ID - 1-3371/11-04-02

EUT - Aastra RFP 35 IP + GT-41080-1848

Serial Number - B9 3000016261 + 4011

Operating mode - DECT idle + ping on ETH

**set. 2**

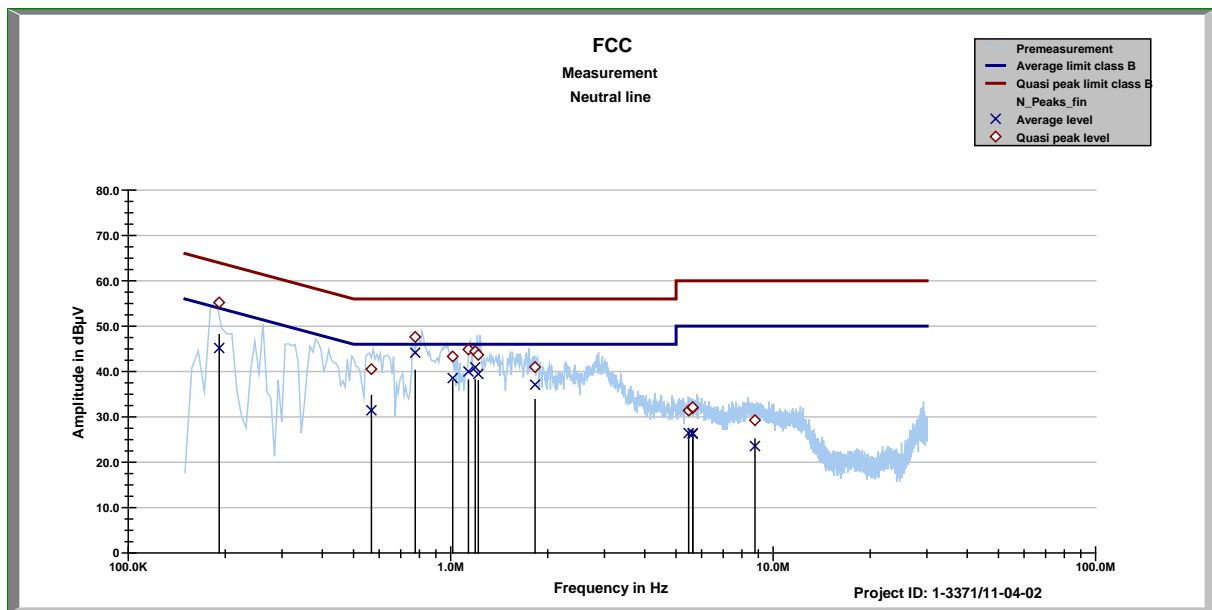
FCC  
Phase line tbl

Project ID: 1-3371/11-04-02

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Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.1842	55.02	9.28	41.71	13.31
0.75584	46.86	9.14	43.36	2.64
0.75722	46.76	9.24	43.21	2.79
1.01427	42.79	13.21	38.42	7.58
1.12885	43.41	12.59	39.21	6.79
1.21675	43.16	12.84	39.23	6.77
2.8894	41.72	14.28	35.81	10.19
2.9066	42.30	13.70	36.37	9.63
5.0321	32.99	27.01	27.14	22.86
5.6623	34.36	25.64	29.00	21.00
6.0145	32.51	27.49	26.29	23.71
6.1533	32.88	27.12	27.14	22.86

Project ID - 1-3371/11-04-02  
 EUT - Aastra RFP 35 IP + PSAA20R-480  
 Serial Number - B9 3000016261 + unknown  
 Operating mode - DECT idle + ping on ETH



FCC

Neutral line tbl

Project ID: 1-3371/11-04-02

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Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.19156	55.21	8.76	45.18	9.63
0.56765	40.52	15.48	31.44	14.56
0.7762	47.62	8.38	44.15	1.85
1.01463	43.30	12.70	38.56	7.44
1.13503	44.84	11.16	39.99	6.01
1.19164	44.45	11.55	40.94	5.06
1.21768	43.66	12.34	39.46	6.54
1.8264	40.97	15.03	37.10	8.90
5.467	31.39	28.61	26.41	23.59
5.629	31.96	28.04	26.41	23.59
5.6293	32.14	27.86	26.27	23.73
8.7819	29.27	30.73	23.55	26.45

Project ID - 1-3371/11-04-02

EUT - Aastra RFP 35 IP + PSAA20R-480

Serial Number - B9 3000016261 + unknown

Operating mode - DECT idle + ping on ETH

### 8.1.6 Signal strength calculation

Calculation formula:

$$SS = UR + CF + VC$$

List of abbreviations:

SS	▶	signal strength
UR	▶	voltage at the receiver
CF	▶	loss of the cable and filter (passband filter 130 kHz – 30 MHz)
VC	▶	correction factor of the ISN (ESH3-Z5)

List with correction factors:

Frequency [MHz]	CF [dB]	VC [dB]
0,150	9,80	1,42
1,000	9,80	0,41
5,000	9,90	0,32
10,000	9,90	0,23
15,000	10,00	0,39
20,000	10,00	1,19
25,000	10,20	1,55
30,000	10,30	1,31

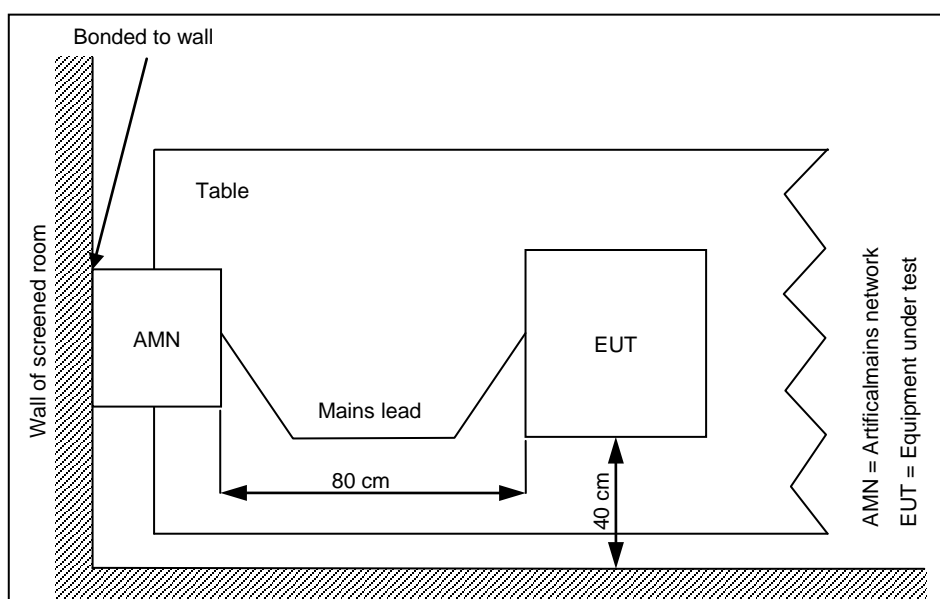
Example calculation:

For example at 10,000 000 MHz the measured Voltage (UR) is 37,62 dBμV, the loss of the cable and filter (CF) is 9,90 dB and the correction factor of the ISN (VC) is 0,23 dB the final result will be calculated:

$$SS \text{ [dB}\mu\text{V]} = 37,62 \text{ [dB}\mu\text{V]} + 9,90 \text{ [dB]} + 0,23 \text{ [dB]} = \underline{47,75 \text{ [dB}\mu\text{V]}} \text{ (244, 06 } \mu\text{V)}$$

### 8.1.7 Test Set-up

According to EMC basic standard **ANSI 63.4**



## 8.2 Electromagnetic Radiated Emissions (Distance 10 m)

### 8.2.1 Instrumentation for Test (see equipment list)

F 1	F 2	F 4b	F 5	F 6	F 7	F 8	F 21				
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### 8.2.2 Test Plan

EUT set-up	set. 1 + set. 2		
Operating mode	Application	Limit	Result
op. 1 (set. 1)	Enclosure	FCC part 15 B Class B	passed
op. 1 (set. 2)	Enclosure	FCC part 15 B Class B	passed

**Remarks:** Powered by external power supply (115V / 60Hz)

### 8.2.3 Radiated Limits

Frequency- range	FCC part 15 B Class B	FCC part 15 B Class A
30 MHz – 88 MHz	30 dB $\mu$ V/m	39,1 dB $\mu$ V/m
88 MHz – 216 MHz	33,5 dB $\mu$ V/m	43,5 dB $\mu$ V/m
216 MHz – 960 MHz	36 dB $\mu$ V/m	46,4 dB $\mu$ V/m
960 MHz – 1000 MHz	44 dB $\mu$ V/m	49,5 dB $\mu$ V/m
	* This values are recalculated from the class B limits at 3 m antenna distance in §15.109 (g 2) of the FCC rules	

### 8.2.4 Calibration Information

Device	Serial number	ICT Number	Calibration valid until	Calibration interval
ESCI 3 Receiver	100083/003	300003312	03/2013	12 month
Trilog Antenna	9163-295	300003787	04/2012	24 month

Remarks:

System check of all relevant devices and the chamber (weekly)

Cable loss: 0.5 to 4.2 dB (30 MHz to 2 GHz); the cable and connectors loss is re-measured every 3 month

## 8.2.5 Test Results

### set. 1

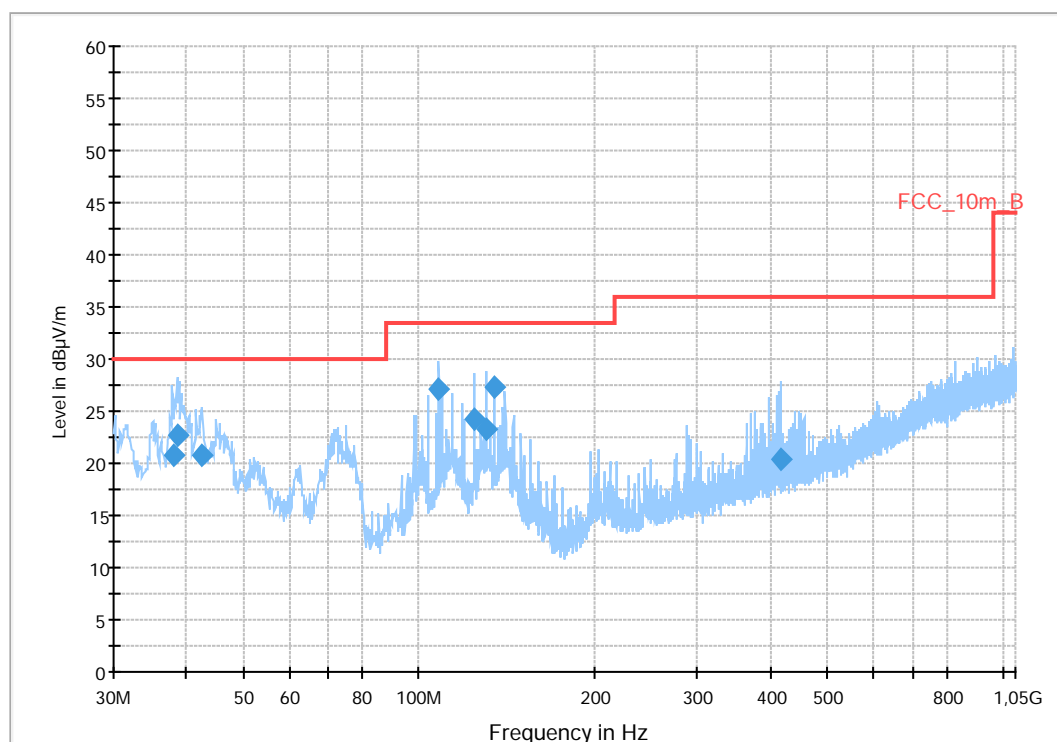
#### Common Information

EUT: Aastra RFP 35 IP + GT-41080-1848  
 Serial Number: B9 3000016261 + 4011  
 Test Description: FCC part 15 B class B @ 10 m  
 Operating Conditions: DECT idle + ping on ETH  
 Operator Name: Hennemann  
 Comment: AC: 115 V / 60 Hz | ETH-cable: S/FTP

#### Scan Setup: STAN\_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)  
 Receiver: [ESCI 3]  
 Level Unit: dB $\mu$ V/m  
**Subrange** **Step Size** **Detectors** **IF BW** **Meas. Time** **Preamp**  
 30 MHz - 2 GHz 60 kHz QPK 120 kHz 1 s 20 dB

FCC\_10m(B)



#### Final Result 1

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth h (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
37.942950	20.7	1000.0	120.000	126.0	V	136.0	13.3	9.3	30.0	
38.724450	22.8	1000.0	120.000	100.0	V	3.0	13.3	7.2	30.0	
42.372300	20.7	1000.0	120.000	100.0	V	48.0	13.4	9.3	30.0	
108.258000	27.1	1000.0	120.000	179.0	V	84.0	11.2	6.4	33.5	
124.494450	24.3	1000.0	120.000	200.0	V	3.0	9.9	9.2	33.5	
130.307100	23.2	1000.0	120.000	200.0	V	281.0	9.4	10.3	33.5	
134.800800	27.4	1000.0	120.000	135.0	V	273.0	9.0	6.1	33.5	
416.994750	20.4	1000.0	120.000	100.0	V	16.0	17.2	15.6	36.0	



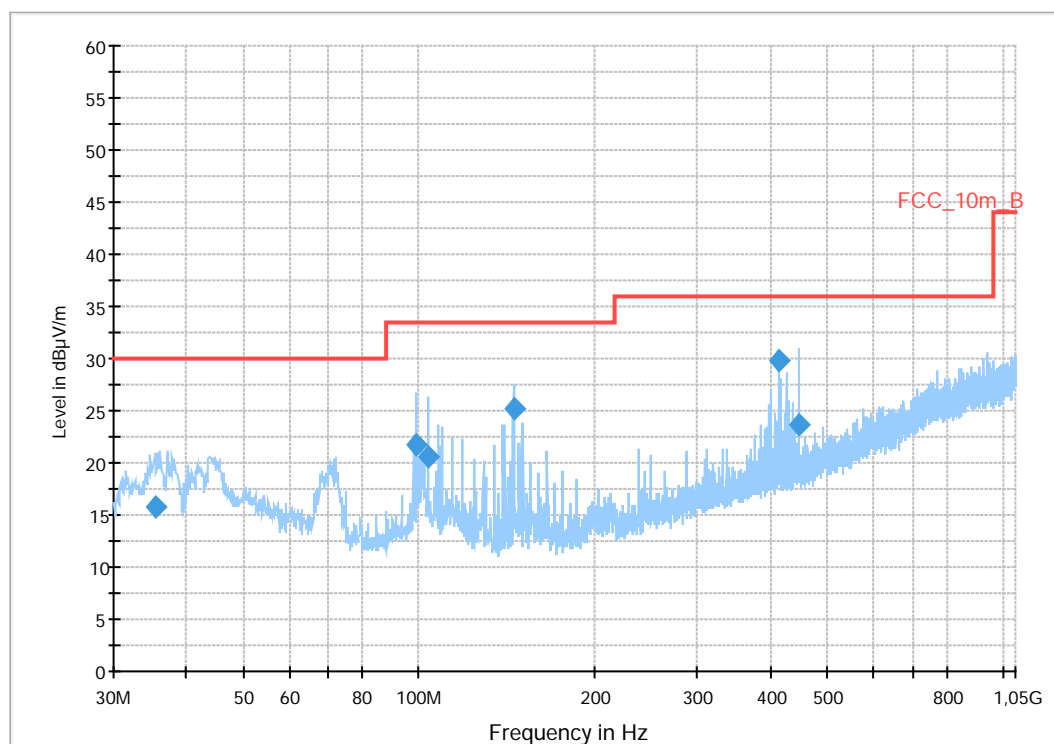
**set. 2****Common Information**

EUT: Aastra RFP 35 IP + PSAA20R-480  
 Serial Number: B9 3000016261 + unknown  
 Test Description: FCC part 15 B class B @ 10 m  
 Operating Conditions: DECT idle + ping on ETH  
 Operator Name: Hennemann  
 Comment: AC: 115 V / 60 Hz | ETH-cable: S/FTP

**Scan Setup: STAN\_Fin [EMI radiated]**

Hardware Setup: Electric Field (NOS)  
 Receiver: [ESCI 3]  
 Level Unit: dB $\mu$ V/m  
**Subrange**                      **Step Size**                      **Detectors**                      **IF BW**                      **Meas. Time**                      **Preamp**  
 30 MHz - 2 GHz                      60 kHz                      QPK                      120 kHz                      1 s                      20 dB

FCC\_10m(B)

**Final Result 1**

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)	Comment
35.521950	15.7	1000.0	120.000	100.0	V	342.0	13.1	14.3	30.0	
99.168450	21.7	1000.0	120.000	100.0	V	317.0	11.8	11.8	33.5	
103.662450	20.6	1000.0	120.000	106.0	V	173.0	11.6	12.9	33.5	
145.205100	25.2	1000.0	120.000	100.0	V	90.0	8.8	8.3	33.5	
414.830700	29.8	1000.0	120.000	100.0	V	147.0	17.1	6.2	36.0	
445.896300	23.6	1000.0	120.000	107.0	V	176.0	17.6	12.4	36.0	

## 8.2.6 Hardware Set-up

Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.42
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table (vertical): Cable_EN_1GHz (1005) Correction Table (horizontal): Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12
Software-version:	EMC 32 Version 8.50.00

## 8.2.7 Signal strength calculation

### Calculation formula:

$$SS = U_R + CL + AF$$

### List of abbreviations:

SS	▶	signal strength
$U_R$	▶	voltage at the receiver
CL	▶	loss of the cable
AF	▶	antenna factor

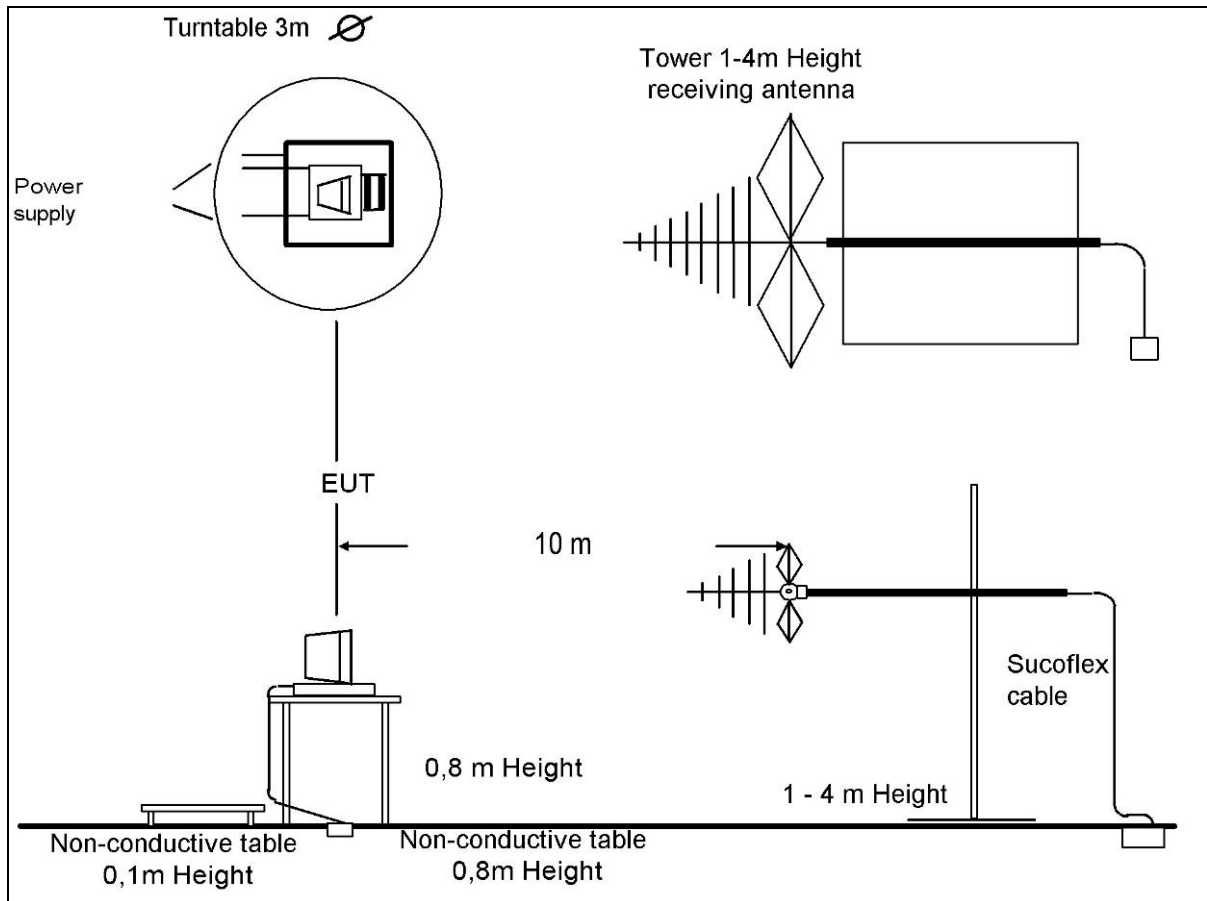
### List with correction factors:

Frequency [MHz]	CL [dB]	AF [dB $\mu$ V/m]
30,000	0,20	12,30
100,000	0,60	11,30
200,000	1,10	10,60
300,000	1,30	13,20
400,000	1,60	15,30
500,000	1,90	16,80
600,000	2,00	18,80
700,000	2,20	20,30
800,000	2,30	21,50
900,000	2,40	22,80
1000,000	2,50	23,30

### Example calculation:

For example at 500,000 000 MHz the measured Voltage ( $U_R$ ) is 12,35 dB $\mu$ V/m, the loss of the cable (CL) is 1,90 dB and the antenna factor (AF) is 16,80 dB $\mu$ V/m the final result will be calculated:

$$SS \text{ [dB}\mu\text{V]} = 12,35 \text{ [dB}\mu\text{V/m]} + 1,90 \text{ [dB]} + 16,80 \text{ [dB}\mu\text{V/m]} = \underline{31,05 \text{ [dB}\mu\text{V/m]}} \text{ (35,69 } \mu\text{V/m)}$$

**8.2.8 Test Set-up**

### 8.3 Electromagnetic Radiated Emissions (Distance 5 m)

#### 8.3.1 Instrumentation for Test (see equipment list)

F 1	F 6	F 21	F 29	F 30	F 33						
-----	-----	------	------	------	------	--	--	--	--	--	--

#### 8.3.2 Test Plan

EUT set-up	set. 1 + set. 2		
Operating mode	Application	Limit	Result
op. 1 (set. 1)	Enclosure	47CFR15: (FCC part 15 B) Class B	passed
op. 1 (set. 2)	Enclosure	47CFR15: (FCC part 15 B) Class B	passed

<b>Remarks:</b>	The measured values are recalculated from 5m to 3m distance Powered by external power supply (115V / 60Hz)
-----------------	---

#### 8.3.3 Radiated Limits

Frequency- range	47CFR15: (FCC part 15 B) Class B	47CFR15: (FCC part 15 B) Class A
1000 MHz – 6000 MHz	54 dB $\mu$ V/m	59,5 dB $\mu$ V/m

#### 8.3.4 Calibration Information

Device	Serial number	ICT Number	Calibration valid until	Calibration interval
ESU 26	100037	300003555	01/2013	12 month
Horn Antenna	9120B188	300003896	04/2012	24 month

Remarks:  
System check of all relevant devices and the chamber (weekly)  
Cable loss: 0.5 to 4.2 dB (30 MHz to 2 GHz); the cable and connectors loss is re-measured every 3 month

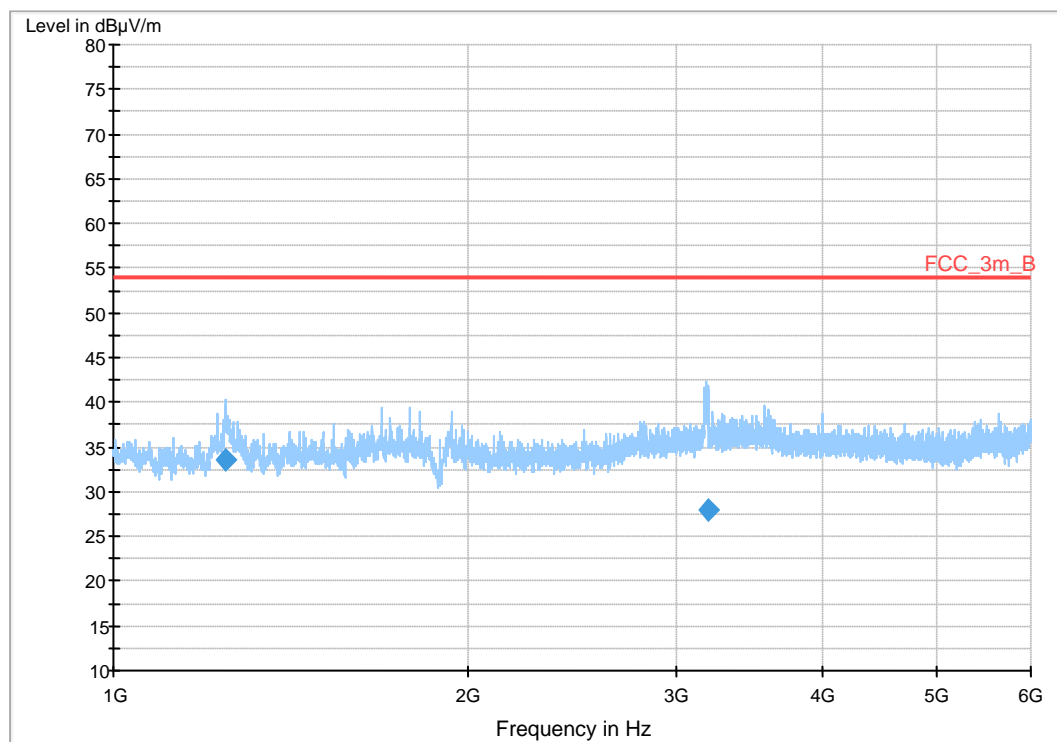
### 8.3.5 Test Results

#### set. 1

#### Common Information

EUT:	Aastra RFP 35 IP + GT-41080-1848
Serial Number:	B9 3000016261 + 4011
Test Description:	FCC part 15 B class B
Operating Conditions:	DECT idle + ping on ETH
Operator Name:	Hennemann
Comment:	AC: 115 V / 60 Hz   ETH-cable: S/FTP

FCC\_1\_10\_B



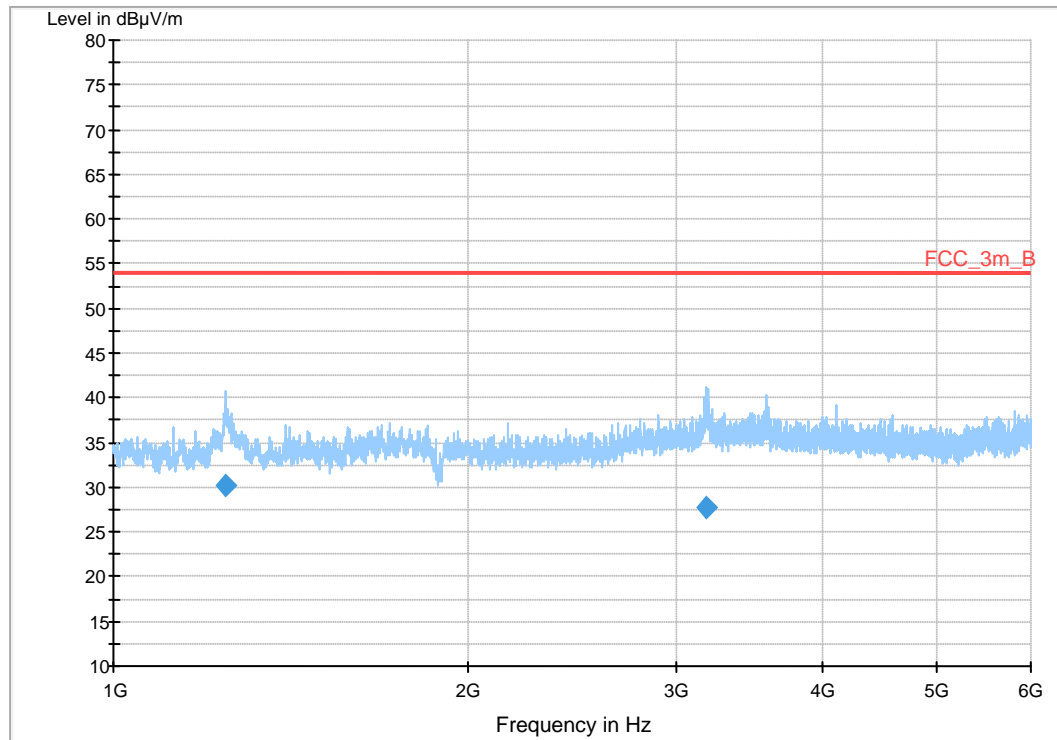
#### Final Result 1

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1244.754486	33.5	100.0	1000.000	100.0	V	102.0	-2.5	20.5	54.0	
3194.574372	27.9	100.0	1000.000	100.0	H	261.0	-2.1	26.1	54.0	

**set. 2****Common Information**

EUT: Aastra RFP 35 IP + PSAA20R-480  
Serial Number: B9 3000016261 + unknown  
Test Description: FCC part 15 B class B  
Operating Conditions: DECT idle + ping on ETH  
Operator Name: Hennemann  
Comment: AC: 115 V / 60 Hz | ETH-cable: S/FTP

FCC\_1\_10\_B

**Final Result 1**

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1246.279746	30.1	100.0	1000.000	100.0	V	213.0	-2.4	23.9	54.0	
3182.889876	27.7	100.0	1000.000	100.0	H	253.0	-2.2	26.3	54.0	

### 8.3.6 Hardware Set-up

Subrange 1	
Frequency Range:	1 GHz - 10 GHz
Receiver:	FSU 26 [FSU 26] @ GPIB0 (ADR 17), SN 200809/026, FW 4.41
Signal Path:	1_6_EN FW 1.0 Correction Table: 3_5m Correction Table: LNA_EN (matix)
Antenna:	BBHA 9120 B Correction Table (vertical): BBHA9120 Correction Table (horizontal): BBHA9120 Correction Table (vertical): Cable_Horn_EN (1103) Correction Table (horizontal): Cable_Horn_EN (1103)
Antenna Tower:	Generic Tripod [Generic Tripod] @ GPIB0 (ADR 19), SN ?
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

### 8.3.7 Signal strength calculation

#### Calculation formula:

$$SS = U_R + CL + AF + PA + DC$$

#### List of abbreviations:

SS	▶	signal strength
$U_R$	▶	voltage at the receiver
CL	▶	loss of the cable and gain of the preamp
AF	▶	antenna factor
DC	▶	distance correction (results measured on 5 m calculated to 3 m)

#### List with correction factors:

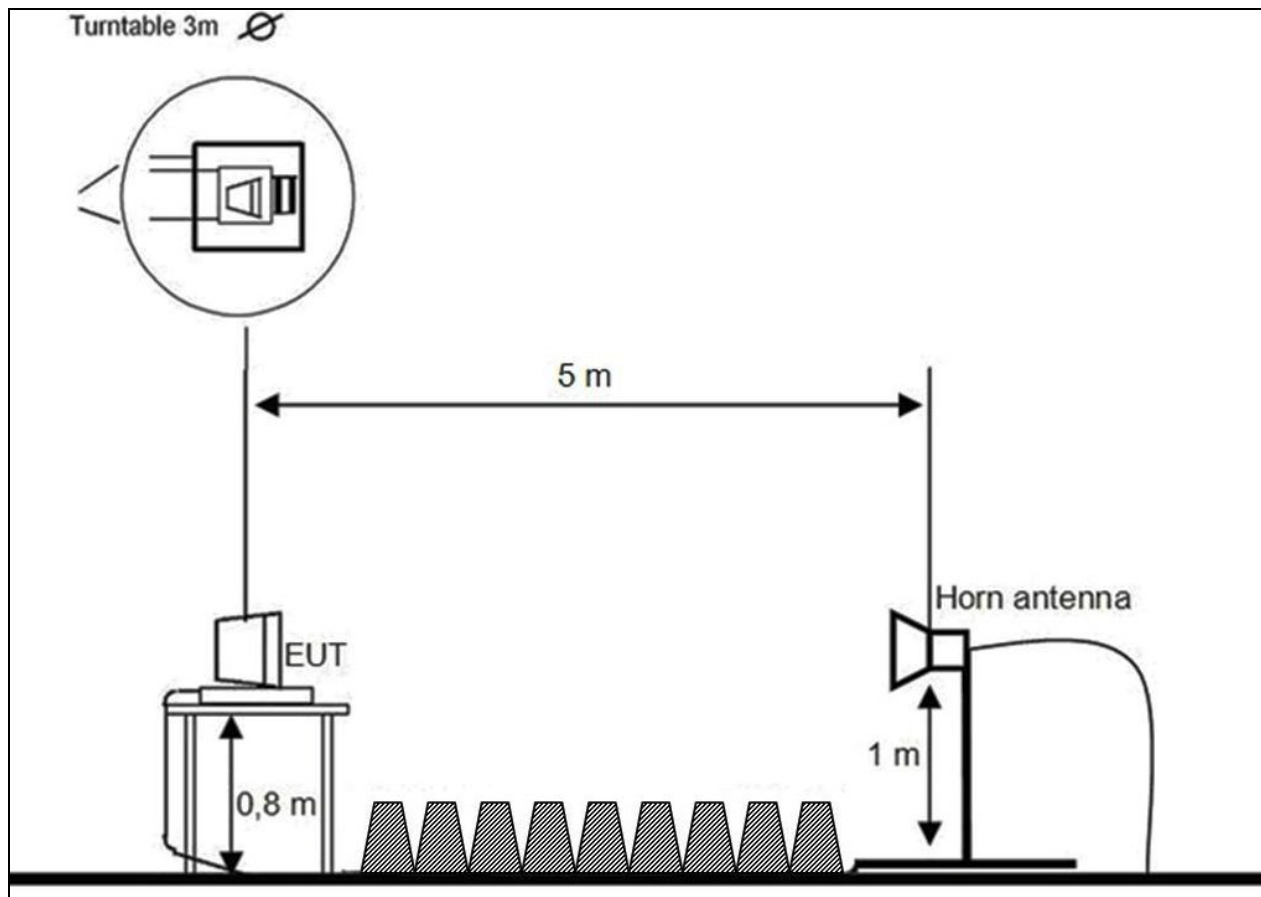
Frequency [GHz]	CL [dB]	AF [dB $\mu$ V/m]	DC [dB]
1,000	-35,50	26,20	4,40
1,500	-35,20	26,10	4,40
2,000	-35,10	26,70	4,40
2,500	-35,00	26,50	4,40
3,000	-34,70	27,60	4,40
3,500	-34,80	28,40	4,40
4,000	-35,00	28,60	4,40
4,500	-34,90	28,90	4,40
5,000	-34,80	29,30	4,40
5,500	-34,35	29,80	4,40
6,000	-34,00	30,30	4,40
6,500	-33,50	31,20	4,40
7,000	-33,10	31,20	4,40
7,500	-33,40	31,70	4,40
8,000	-33,80	32,10	4,40
8,500	-33,75	32,30	4,40
9,000	-33,70	31,70	4,40
9,500	-33,50	29,40	4,40
10,000	-33,40	33,00	4,40

#### Example calculation:

For example at 4,000 000 000 GHz the measured Voltage ( $U_R$ ) is 46,13 dB $\mu$ V/m, the loss of the cable (CL) is -35,00 dB, the antenna factor (AF) is 28,60 dB $\mu$ V/m and the distance correction (DC) is 4,40 dB the final result will be calculated:

$$SS \text{ [dB}\mu\text{V]} = 46,13 \text{ [dB}\mu\text{V/m]} + (-35,00) \text{ [dB]} + 28,60 \text{ [dB}\mu\text{V/m]} + 4,4 \text{ [dB]} = \underline{44,13 \text{ [dB}\mu\text{V/m]}} \text{ (160,88 } \mu\text{V/m)}$$

### 8.3.8 Test Set-up





## 9 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal identification
<b>Radiated emission in chamber F</b>					
F-1	Control Computer	F+W		FW0502032	300003303
F-2	Trilog-Antenna	Schwarzbeck	VULB 9163	9163-295	---
F-3a	Amplifier	Veritech Microwave Inc.	0518C-138	- / -	- / -
F-4b	Switch	HP	3488A	- / -	300000368
F-5	EMI Test receiver	R&S	ESCI	100083	300003312
F-6	Turntable Interface-Box	EMCO / ETS-LINDGREN	Model 105637	44583	300003747
F-7	Tower/Turntable Controller	EMCO / ETS-LINDGREN	Model 2090	64672	300003746
F-8	Tower	EMCO / ETS-LINDGREN	Model 2175	64762	300003745
F-9	Ultra Notch-Filter Rejected band Ch. 62	WRCD		9	
<b>Radiated immunity in chamber F</b>					
F-10	Control Computer	F+W		FW0502032	300003303
F-11	Signal Generator	HP	8665A	2833A00112	300001373
F-12	RF-Amplifier	ar	100W1000 M1	12951	300000529
F-13	Directional Coupler	ar	DC 3010	12708	300001428
F-14	Stacked Logper Antenna	Schwarzbeck	STLP9128 E	9128 E 013	300003408
F-15	RF-Amplifier	ar	60S1G3	313649	300003410
F-15b	RF-Amplifier 0.8 – 4 GHz	BONN	BLMA 0840-2000/100D	076820B	300003783
F-16	Directional Coupler	ar	DC7144A	312786	300003411
F-17	Horn Antenna	ar	AT 4002	19739	300000633
F-18	Power Meter	R&S	NRV	860327/024	F033
F-19	Power sensor	R&S	URV5-Z2	839080/005	300002844.02
F-20	Power sensor	R&S	URV5-Z2	830755/057	F032
<b>Harmonics and flicker in front of chamber F</b>					
F-21	Flicker and Harmonics Test System	Spitzenberger & Spies	PHE4500/B I PHE4500/B II	B5983 B5984	300000210
F-28	Power Supply	Hewlett Packard	6032 A	2920 A 04466	300000580
<b>Radiated emission in chamber F &gt; 1GHz</b>					
F-29	Horn antenna	Schwarzbeck	BBHA 9120 B	9120B188	300003896
F-30	Amplifier	ProNova	0518C-138	005	F 024
F-31	Amplifier	Miteq	42-00502650-28-5A	1103782	300003379
F-32	Horn antenna	Emco	3115	9709-5289	300000213
F-33	Spectrum Analyzer	R&S	ESU26	100037	300003555
F-34	Loop antenna	EMCO	6502	8905-2342	300000256

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal identification
<b>Conducted emission in chamber G</b>					
G-1	EMI Receiver	Hewlett Packard	8542 E	3617A00170	300000568
G-2	V-ISO	Rohde & Schwarz	ESH 3-Z5	892475/017	300002209
G-2a	V-ISO	Rohde & Schwarz	ESH 2-Z5	892602/024	300000587
G-3	2-Wire ISO	Schaffner	ISO T200	19075	300003422
G-4	4-Wire ISO	Schaffner	ISO T400	22325	300003423
G-5	Shielded wire ISO	Schaffner	ISO ST08	22583	300003433
G-6	Unshielded 8 wire ISO	Teseq	ISO T800	26113	300003833
G-7	Unshielded 8 wire ISO	Teseq	ISO T8-Cat. 6	26374	300003851
G-8	RF Current probe	FCC	F-33-4	46	300003257
G-9	V-ISO	Schaffner	ISO PLC-150	21579	300003318
G-10	V-ISO	Schaffner	ISO PLC-25-30	21584	300003319
G-10a	PLC Filter	TESEQ	Filter PLC	23436	300003598
G-10b	Coupling unit 75 Ohm	Fiedler	AC	----	300003272.04
<b>Conducted immunity in chamber G</b>					
G-11	Signal generator	R&S	SMG	8610647025	300000204.01
G-12	RF-Amplifier	BONN	BSA 0125-75	066502-01	300003545
G-13	Power Meter	R&S	URV 5	837723/025	300002844.01
G-14	Power Sensor	R&S	URV 5-Z2	832874/021	300002239
G-15	Directional coupler	emv	DC 2000	9401-1677	300000592
G-16	Attenuator 6dB	Alan	50HP6-100 N	121048 0348	300003148
G-17	EM-Injection Clamp	FCC	203i	232	300000626
G-18	CDN	FCC	FCC-801-M3-16	237	300000627
G-19	CDN	FCC	FCC-801-T2	78	300000629
G-20	CDN	FCC	FCC-801-AF 2	62	300000630
G-21	CDN	FCC	FCC-801-AF 4	61	300000631
G-22	CDN	FCC	FCC-801-M1	2027	300002761
G-23	CDN	Lüthi	CDN 801-M2/M3	9350105	300000534
G-24	Transformer for 50Hz Loop Antenna	EM-Test	MC2630	0200-10	300002659.01
G-25	50Hz Loop Antenna	EM-Test	MS 100	none	300002659
<b>Surge, Burst, Dips and Interruptions in chamber G</b>					
G-26	Hybrid-Generator	EM-Test	UCS 500N5	V112711033	
G-27	Motor Variac	EM-Test	MV 2616	0600-01	300002658
G-28	Capacitive Coupling Clamp	MWB	KKS 100	---	300000589
G-29a	Coupling Decoupling Network	EMC-Partner	CDN-2000-06-32	158	300004108
G-29	Coupling Decoupling Network	EMC-Partner	CDN-UTP	00014	300003226
<b>ESD in chamber G</b>					
G-30	ESD generator	Schaffner	NSG 435	308	300002249
<b>Emission on bench in chamber G</b>					
G-31	Absorbing Clamp	R&S	MDS-21	832 231/006	300000527

## 10 Observations

No observations, exceeding those reported with the single test cases, have been made.

## Annex A: Photographs of the test set-up

Photo 1: setup of conducted emission on AC (with PS 1 / set. 1)



Photo 2: setup of conducted emission on AC (with PS 2 / set. 2)

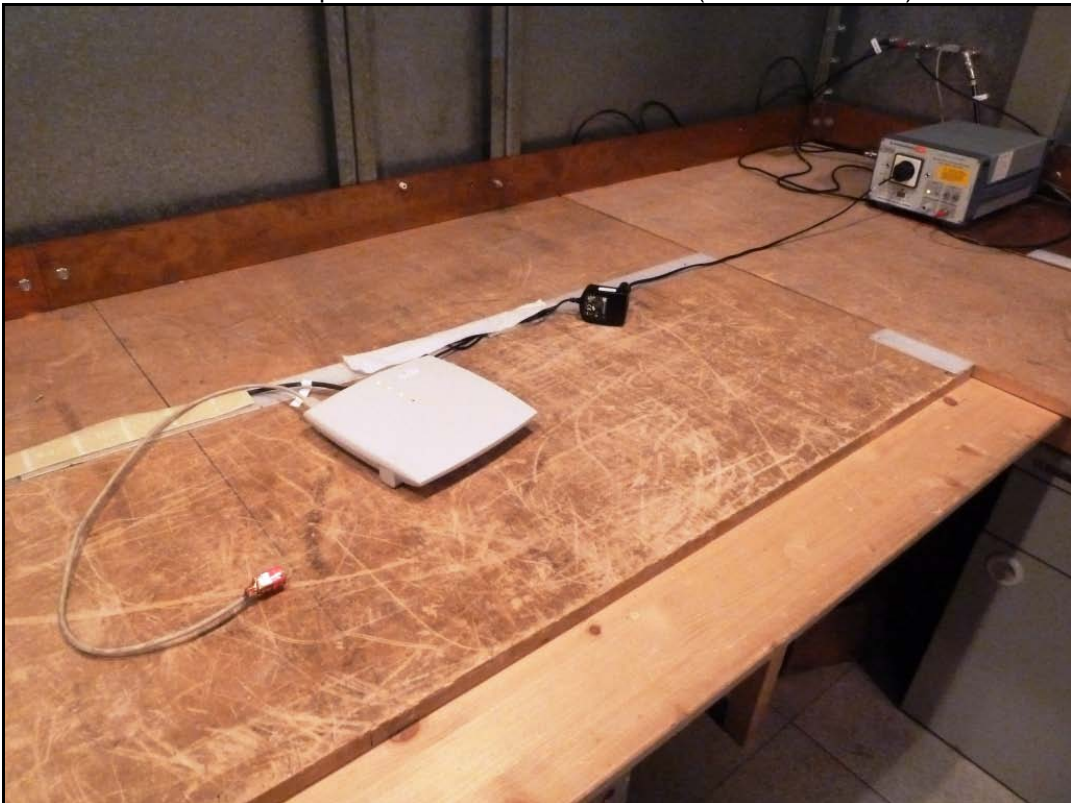




Photo 3: setup of radiated emission < 1 GHz (with PS 1 / set. 1)

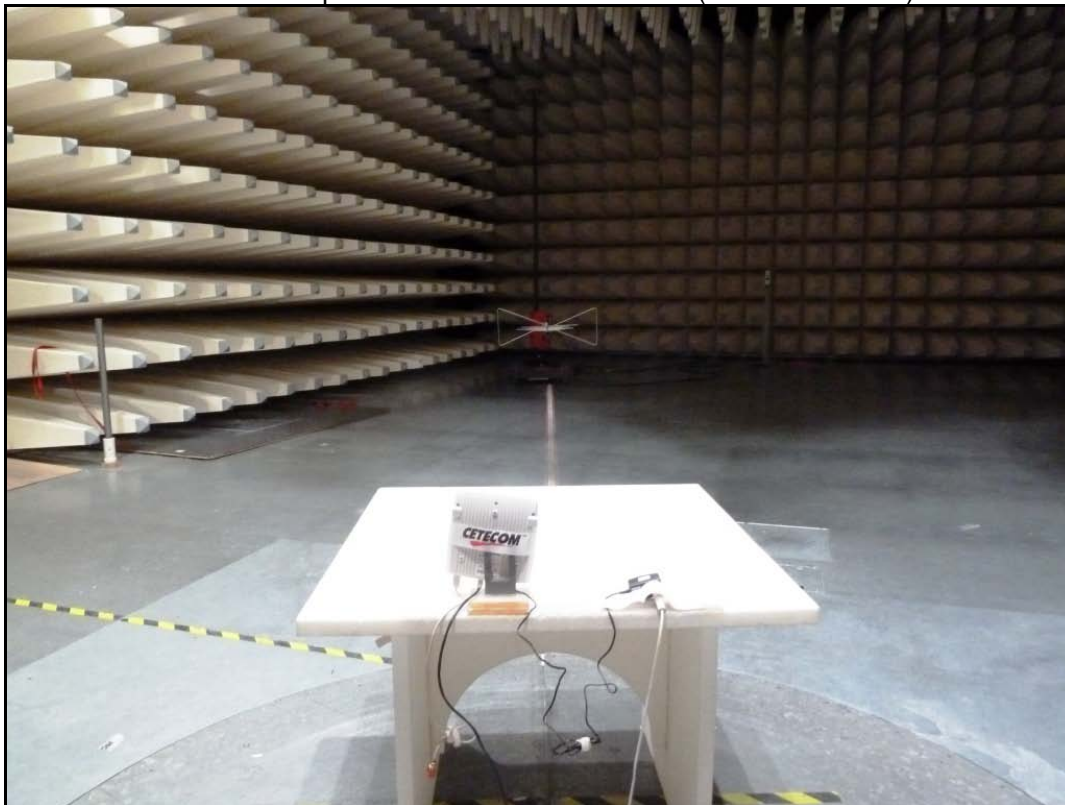


Photo 4: setup of radiated emission > 1 GHz (with PS 1 / set. 1)

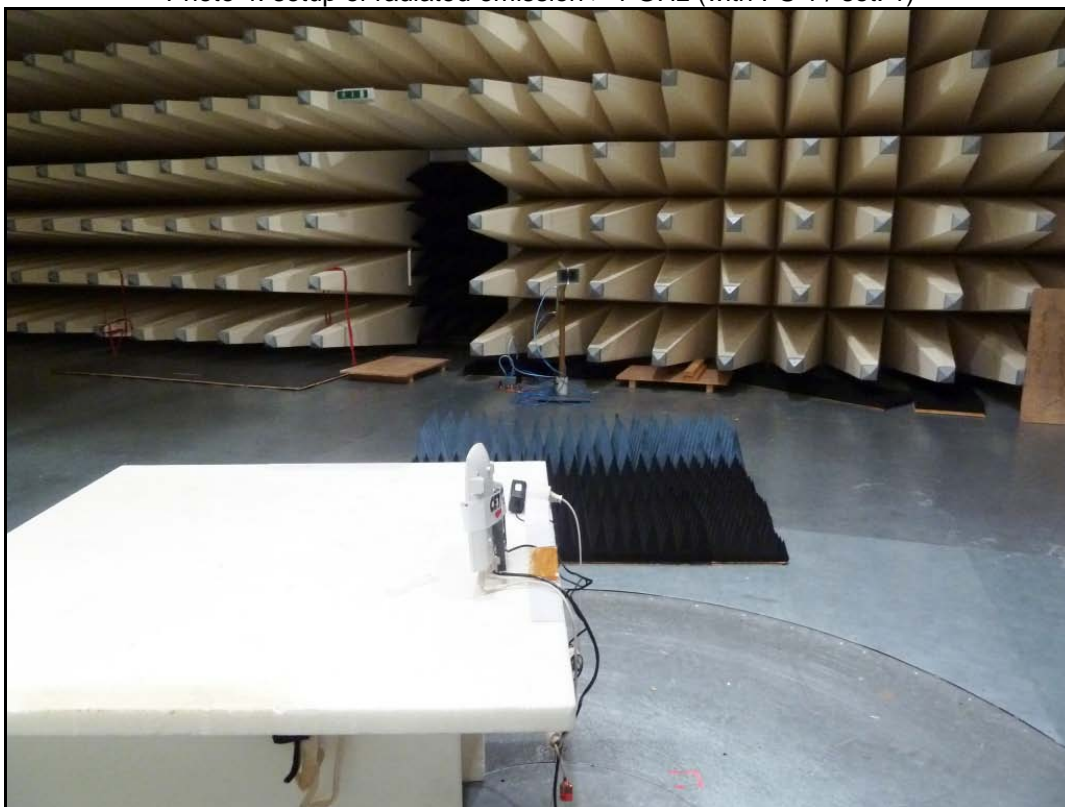


Photo 5: wiring of the setup of radiated emission (with PS 1 / set. 1)



Photo 6: setup of radiated emission < 1 GHz (with PS 2 / set. 2)

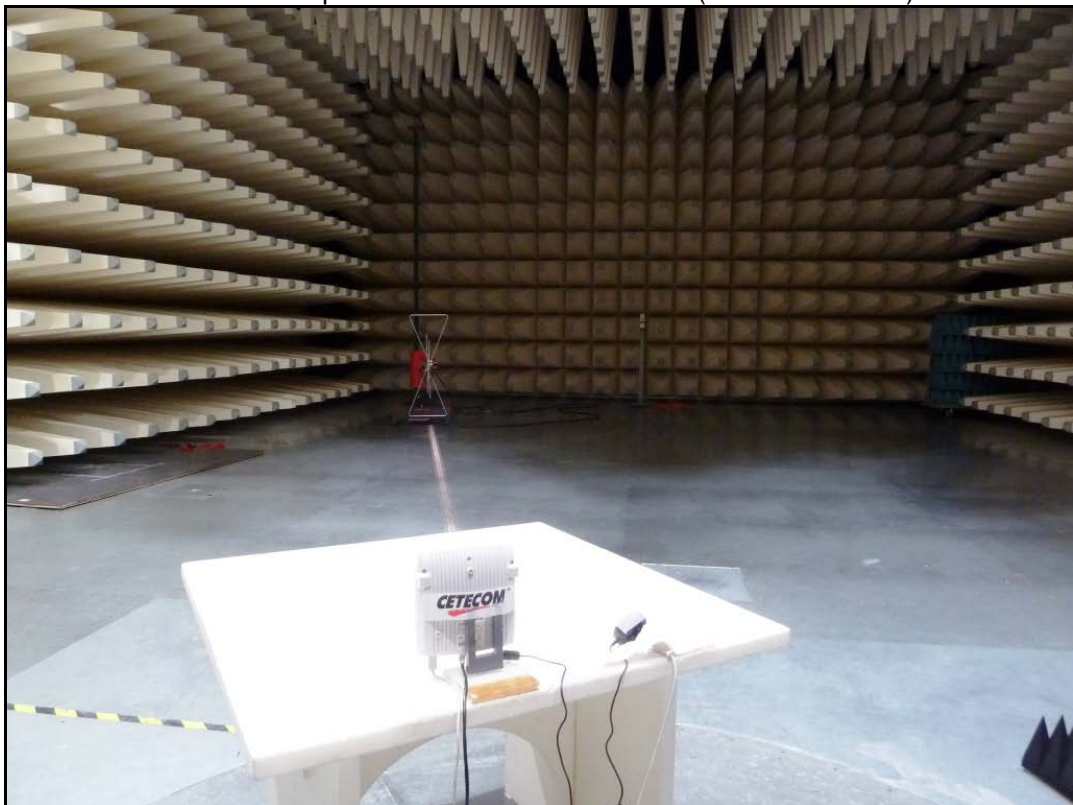




Photo 7: setup of radiated emission > 1 GHz (with PS 2 / set. 2)

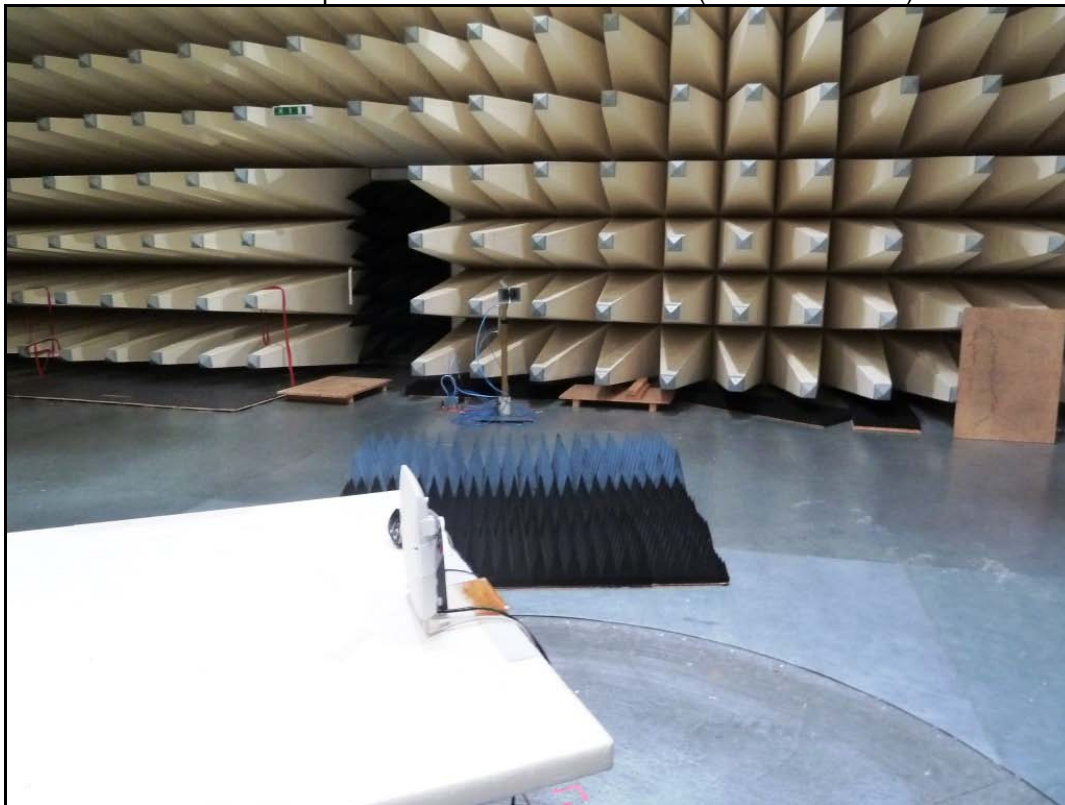


Photo 8: wiring of the setup of radiated emission (with PS 2 / set. 2)



## Annex B: Photographs of the EUT

Photo 9: front view of the EUT



Photo 10: back view of the EUT





Photo 11: bottom view of the EUT

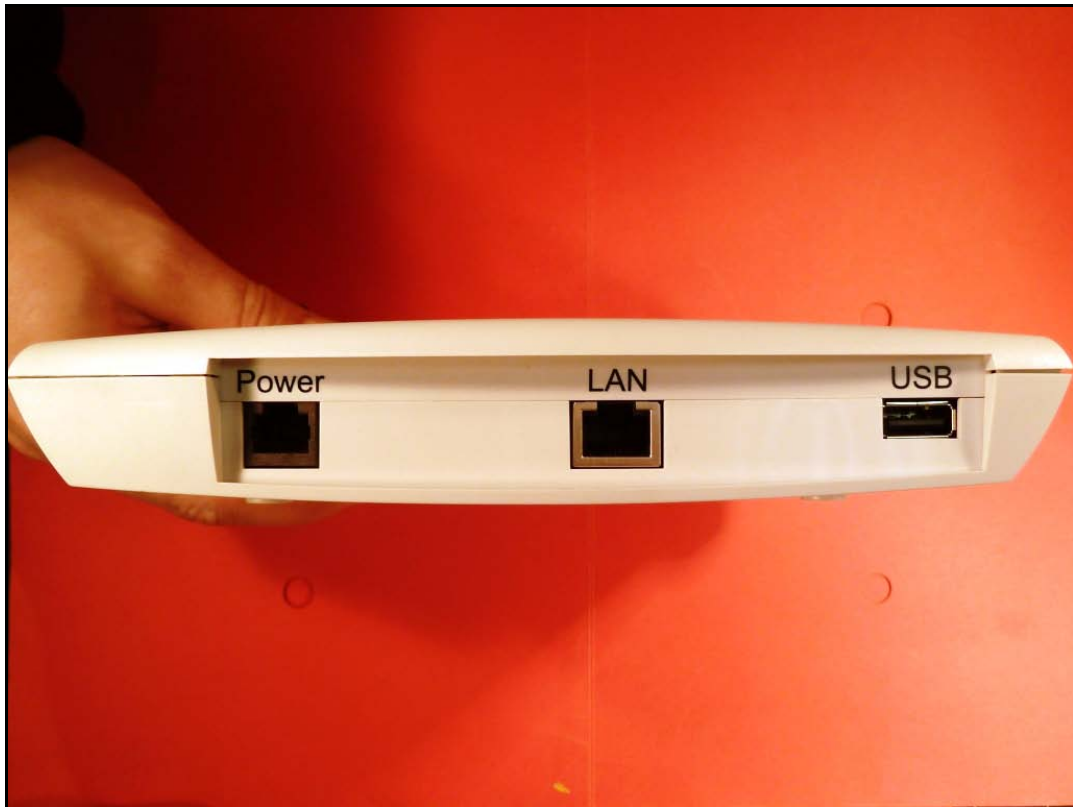


Photo 12: type plate of the EUT



Photo 13: inside view of the EUT

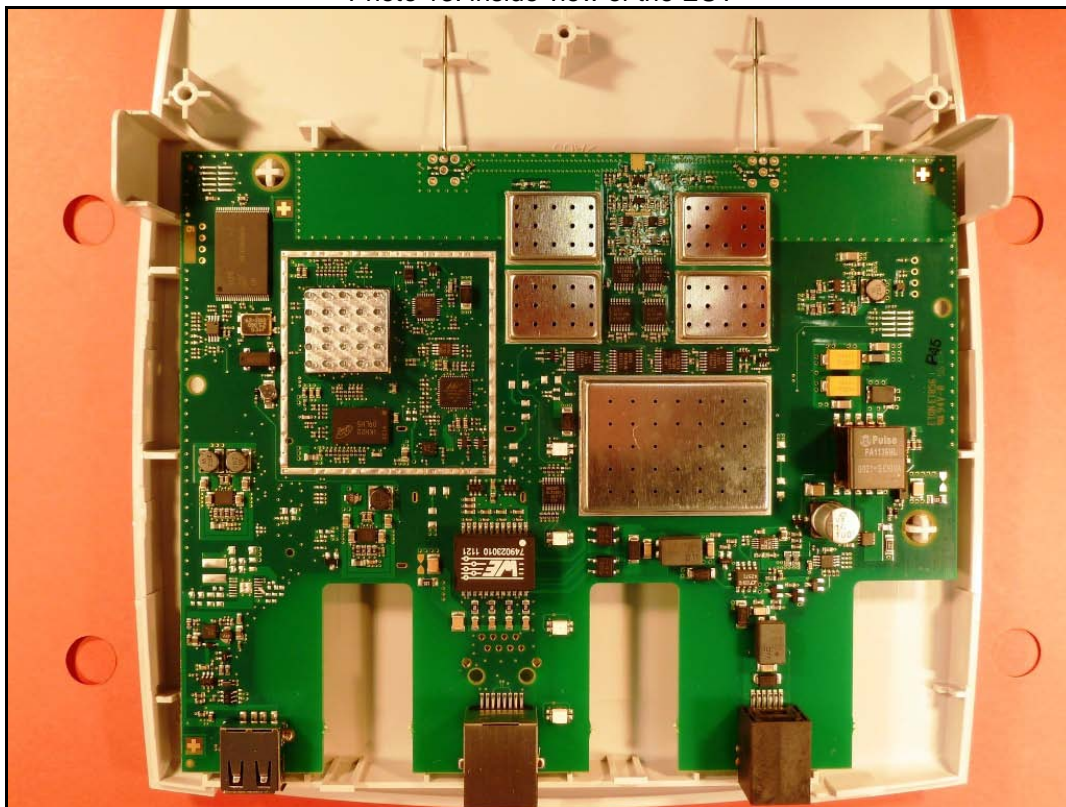


Photo 14: front view of the board of the EUT

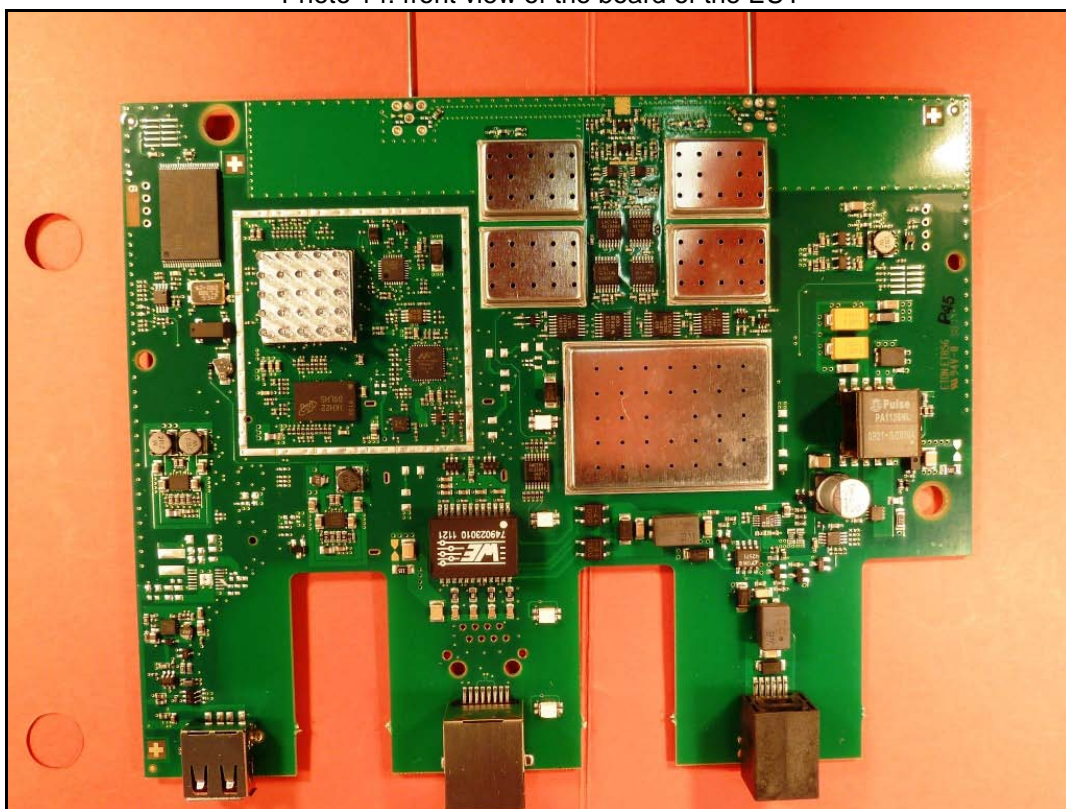




Photo 15: back view of the board of the EUT



Photo 16: type plate of the board of the EUT

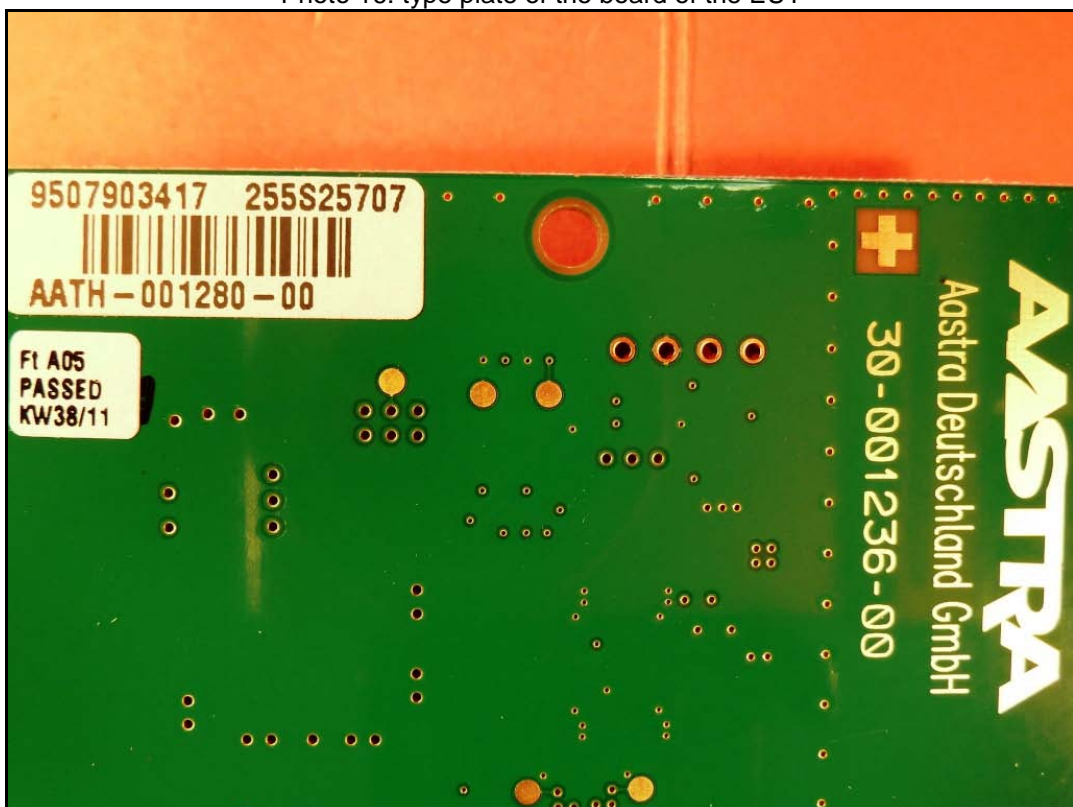


Photo 17: complete view of the first AC/DC power supply



Photo 18: type plate of the first AC/DC power supply

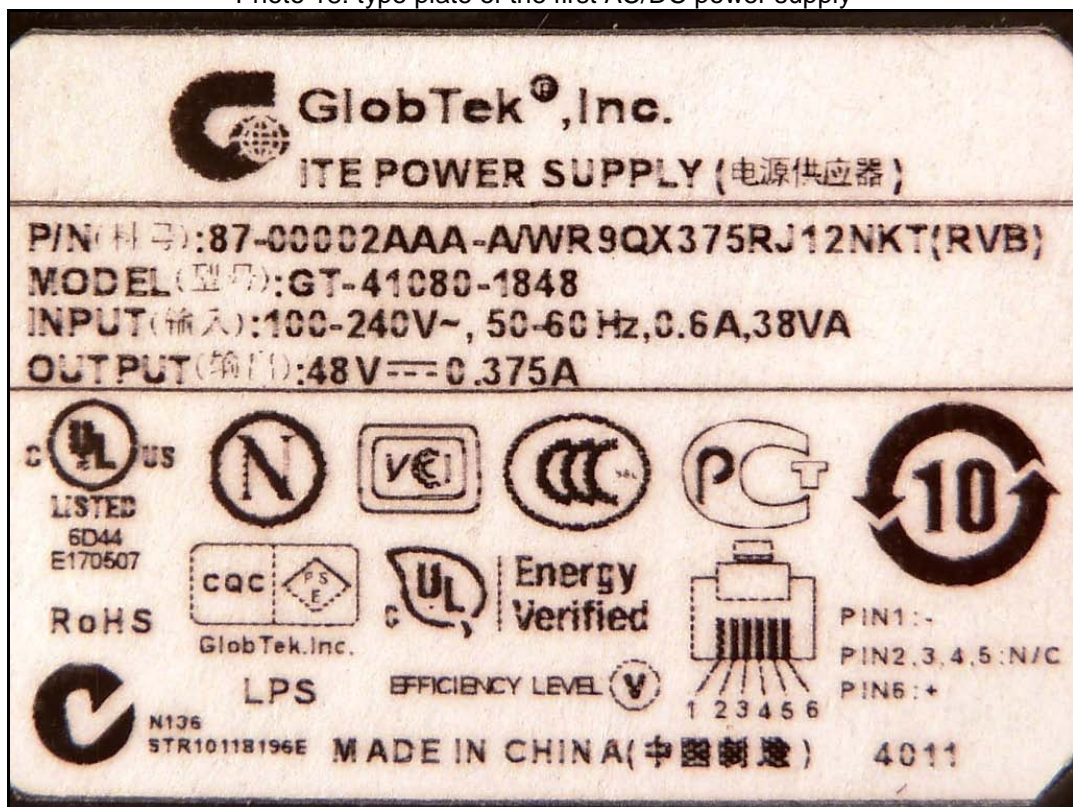
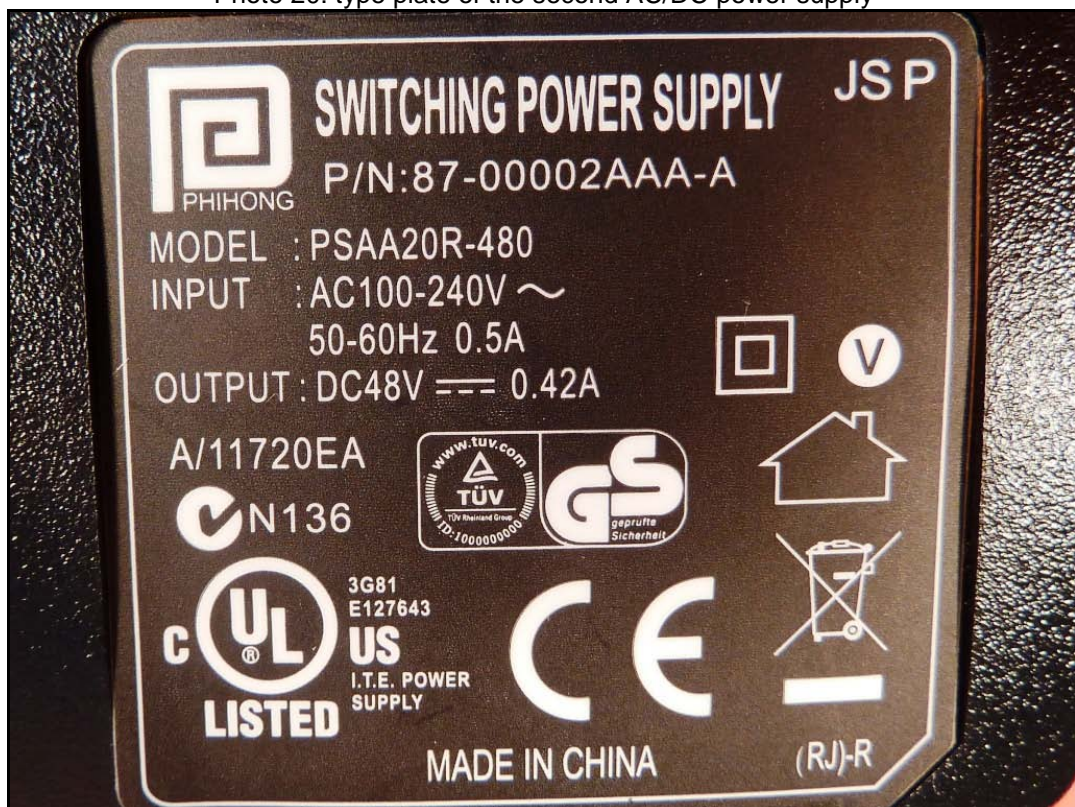




Photo 19: complete view of the second AC/DC power supply



Photo 20: type plate of the second AC/DC power supply



**Annex C: Document history**

Version	Applied changes	Date of release
- / -	Initial release	2012-01-25

**Annex D: Further information****Glossary**

DUT	-	Device under Test
EMC	-	Electromagnetic Compatibility
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	not applicable
S/N	-	Serial Number
SW	-	Software