

TEST REPORT

Test Report Reference: F080535E2

Equipment under Test: CT-Headset Standard ASR

Applicant: CeoTronics AG

Manufacturer: CeoTronics AG

**Test Laboratory
(CAB)**

**accredited by DATech in der TGA GmbH
in compliance with DIN EN ISO/IEC 17025
under the Reg. No. DAT-P-105/99-21,**

**recognized by Bundesnetzagentur
under the Reg.-No. BNetzA-CAB-02/21-104/1,**

CAB Designation Number DE0004,

**listed by
FCC 31040/SIT1300F2
FCC Test site registration number 90877**

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1 IDENTIFICATION

1.1 APPLICANT

Name:	CeoTronics AG
Address:	Adam-Opel-Str. 6 63322 Rödermark
Country:	Germany
Name for contact purposes:	Mr. Neuhaus
Tel:	+49 6074 8751631
Fax:	+49 6074 8751659
e-mail address:	entwicklung@ceotronics.com

1.2 MANUFACTURER

Name:	CeoTronics AG
Address:	Adam-Opel-Str. 6 63322 Rödermark
Country:	Germany
Name for contact purposes:	Mr. Neuhaus
Tel:	+49 6074 8751631
Fax:	+49 6074 8751659
e-mail address:	entwicklung@ceotronics.com

1.3 DATES

Date of receipt of test sample:	29 February 2008
Start of test:	10 March 2008
Finish of test:	25 March 2008

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1.4 TEST LABORATORY

The tests were carried out at:

PHOENIX TESTLAB GmbH

Königswinkel 10

D-32825 Blomberg

Germany

Phone: +49 (0) 52 35 / 95 00-0

Fax: +49 (0) 52 35 / 95 00-10

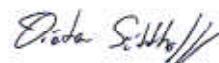
Test engineer: Dieter SÜTTHOFF

Name

Signature

19 May 2008

Date



Test report checked: Bernd STEINER

Name

Signature

19 May 2008

Date



PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Tel. 0 52 35 / 95 00-0
Fax 0 52 35 / 95 00-10

Stamp

1.5 RESERVATION

This test report is only valid in its original form.

Any reproduction of its contents without written permission of the accredited test laboratory
PHOENIX TESTLAB GmbH is prohibited.

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT REFERENCE.

1.6 NORMATIVE REFERENCES

- [1] **ANSI C63.4:2003** American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
- [2] **FCC 47 CFR Part 2** General Rules and Regulations
- [3] **FCC 47 CFR Part 15** Radio Frequency Devices (Subpart B)

1.7 TEST RESULTS

The requirements of this test document are fulfilled by the equipment under test. The complete test results are presented in the following.

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2 TECHNICAL DATA OF EQUIPMENT

2.1 DEVICE UNDER TEST

Marketing Name of EUT	CT-Headset Standard ASR				
Article Number: *	1410004				
Type of equipment:	Wireless Headset with DECT-Modul				

Mainboard:

Highest operating frequency	3.6864MHz *				
Supply Voltage: *	U_{Nom} =	3.6 V DC	U_{Min} =	-	U_{Max} =
Power Supply: *	Battery powered				

Module inside EUT:

Module inside	DECT M5 Radio Module CeoTronics, PP (portable part)				
FCC ID	L52CT-M5CEO1				
Frequency Band(s) of Operation:	1880-1900 MHz				
No. of Channels	12 duplex				
Channel frequency spacing	1728 kHz				
Type of Modulation	GFSK				
Data rate	1152 kbit/s				
Antenna type (if applicable all used antennas)	2 Printed Circuit Board Antennas (1/4 wave antenna)				
Antenna gain	0 dBi				

* declared by the applicant.

2.2 ADDITIONAL INFORMATION

The tested samples were not marked with a type plate according to the FCC-rules.

The device under test is classified as a class B device according to FCC 47 CFR Part 15 [3] by the manufacturer. DECT module (FCC ID: L52CT-M5CEO1) is used inside the EUT. An evaluation of the module is not part of this document.

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2.3 EXTERNAL I/O:

Ports/Connectors

Identification	Connector		Length
	EUT	Ancillary	
DC-mains*	DC-Plug	-	1.5 m
Audio line	CT-audio connector	-	1.0 m

* for charging

2.4 PERIPHERY DEVICES

- CT-Headset Base ASR
- CT Charger, Part. No. 4006543
- Audio Box

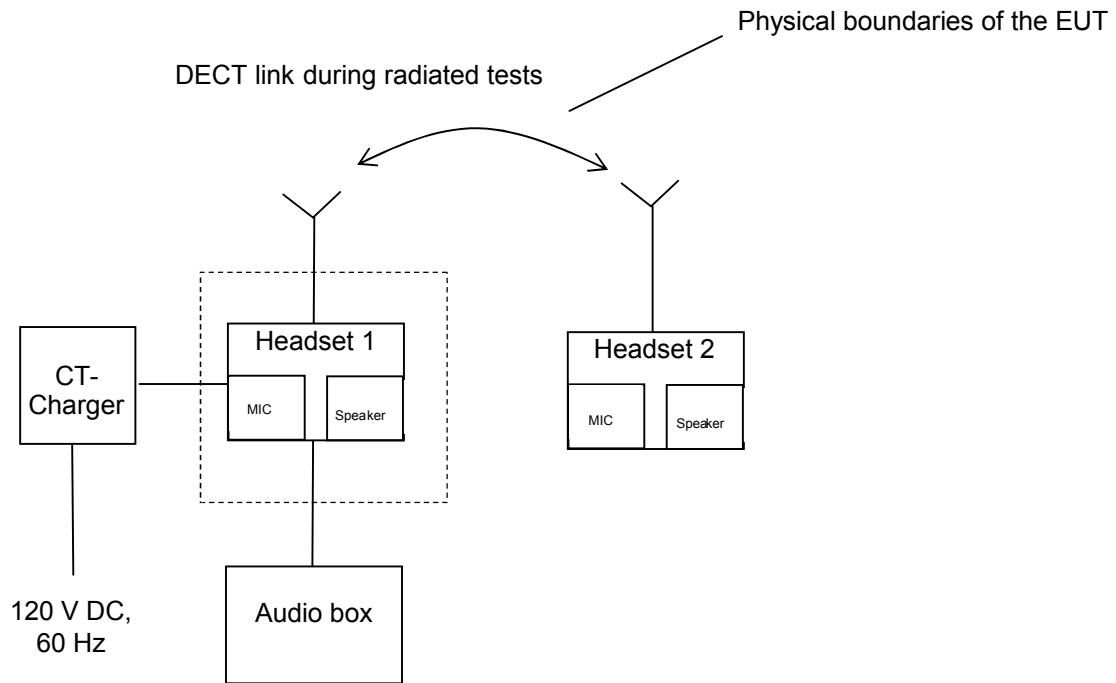
TEST REPORT REFERENCE: F080535E2

3 OPERATIONAL STATES AND PHYSICAL BOUNDARIES

The test was carried out in normal operation mode.
(defined as followed):

- During conducted emission test the battery was charging. No communication link is possible during charger is connected.
- During the radiated emission tests two samples generate the duplex communication DECT link. The CT-Charger was disconnected.
- The EUT was set to 70 % of the maximum volume,
- The EUT powered from the internal batteries.
- The audio lines were terminated in an audio box.

The physical boundaries of the EUT are shown below.



4 EMC MEASURES

none

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5 TESTOVERVIEW

5.1 EMISSION

Conducted emissions FCC 47 CFR Part 15 section 15.107 (b)[3]					
Application	Frequency range	Limits	Reference standard	Remark	Status
On AC supply line	0.15 to 0.5 MHz 0.5 to 5 MHz 5 to 30 MHz	66 to 56 dB μ V (QP)* 56 to 46 dB μ V (AV)* 56 dB μ V (QP) 46 dB μ V (AV) 60 dB μ V (QP) 50 dB μ V (AV)	ANSI C63.4 (2003)	Class B equipment (Battery charging mode)	Passed
Radiated emissions FCC 47 CFR Part 15 section 15.109 (b)[3]					
Application	Frequency range	Limits	Reference standard	Remark	Status
Radiated emissions	30 – 88 MHz 88 – 216 MHz 216 – 960 MHz above 960 MHz	40 dB μ V/m 43.5 dB μ V/m 46.0 dB μ V/m 53.9 dB μ V/m	ANSI C63.4 (2003);	Class B equipment	Passed

* Decreases with the logarithm of the frequency.

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6 TEST RESULTS

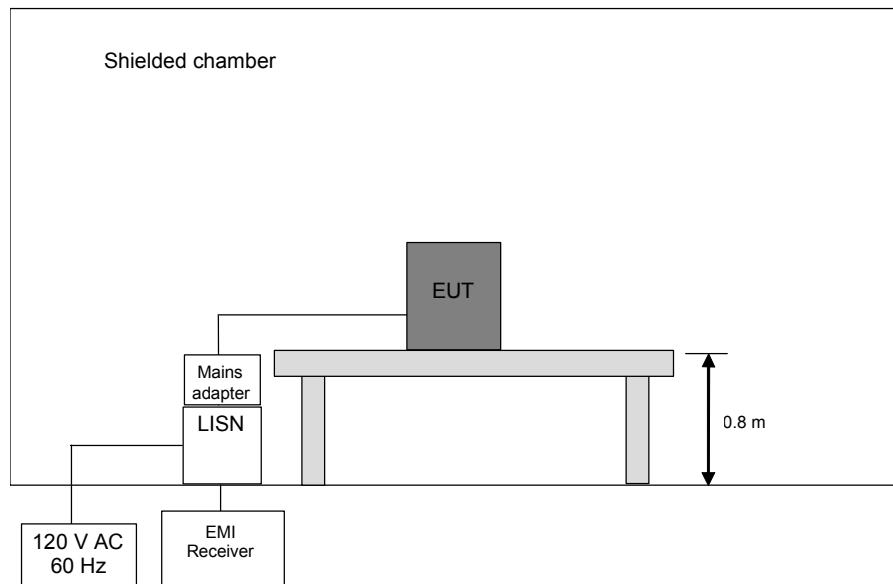
6.1 CONDUCTED EMISSIONS ON POWER SUPPLY LINES (150 kHz to 30 MHz)

6.1.1 METHOD OF MEASUREMENT

This test will be carried out in a shielded chamber. Tabletop devices will be set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm above the ground plane. Floor-standing devices will be placed directly on the ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003 [1].

The frequency range 150 kHz to 30 MHz will be measured with an EMI Receiver set to MAX Hold mode with peak and average detector and a resolution bandwidth of 9 kHz. A scan will be carried out on the phase (or plus pole in case of DC powered devices) of the AC mains network. If levels detected 10 dB below the applicable limit, this emission will be measured with the average and quasi-peak detector on all lines.

Frequency range	Resolution bandwidth
150 kHz to 30 MHz	9 kHz



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6.1.2 TEST RESULTS (CONDUCTED EMISSIONS ON POWER SUPPLY LINES)

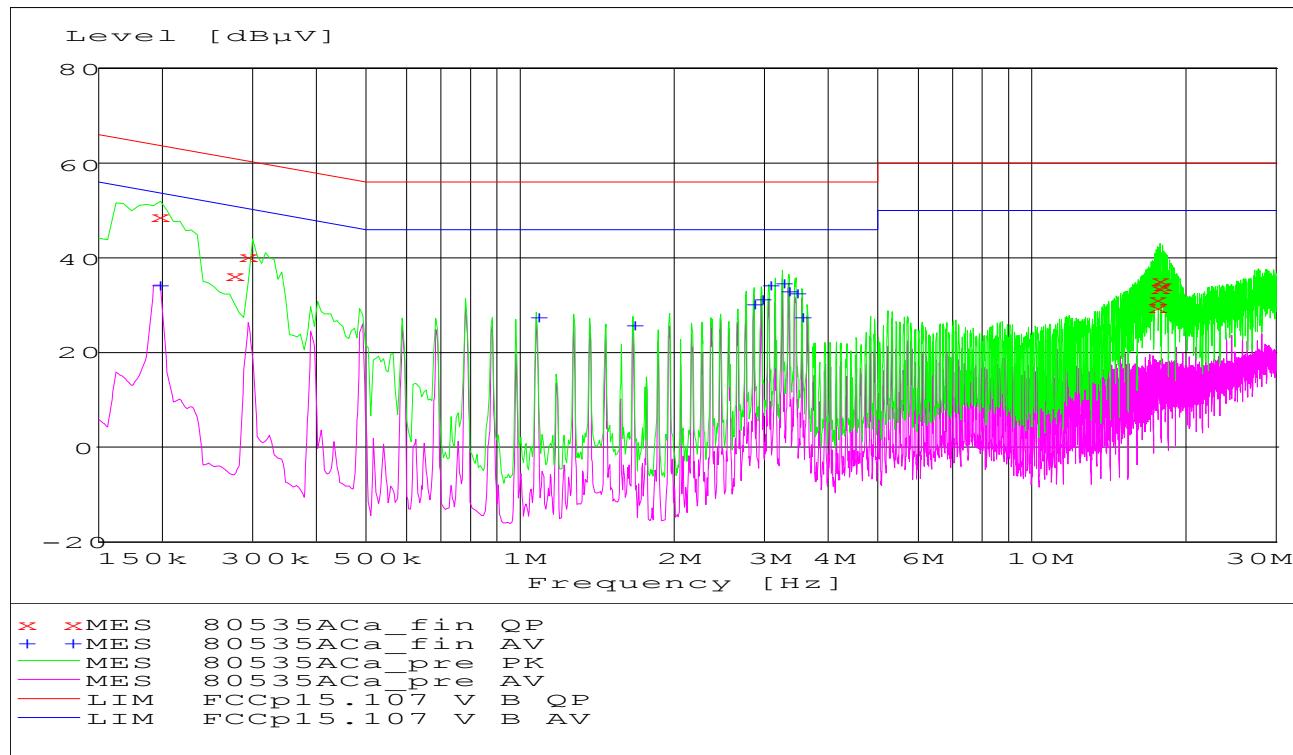
Ambient temperature	21 °C	Relative humidity	30 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m.
 Cable guide: The cable of the EUT was fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.
 Test record: All results are shown in the following.
 Supply voltage: During all measurements the EUT was supplied with AC mains adapter:
 Power supply: CT Charger, Part. No. 4006543.

Measurement uncertainty: +3.6 dB / -4.5 dB

Title: Conducted Emission Test with Line Impedance Stabilisation Network
 Title: Preliminary emission measurement
 according CFR 47 Part 15.109
 EUT: CT-Headset Standard ASR
 Manufacturer: CeoTronics AG
 Operating Condition: 120V AC 60 Hz
 Test site: PHOENIX TESTLAB Blomberg M4
 Operator: D. Sütthoff
 Test Specification: Charging mode

The curves in the diagram only represent for each frequency point the maximum measured value of all preliminary measurements which were made for each power supply line. The top measured curve represents the peak measurement and the bottom measured curve the average measurement. The quasi-peak measured points are marked by x and the average measured points by +.



Data record name: 80535ACa

TEST REPORT REFERENCE: F080535E2

Result measured with the quasipeak detector:

(These values are marked in the above diagram by x)

Frequency MHz	Level dB μ V	Transducer dB	Limit dB μ V	Margin dB	Line	PE
0.198000	49.10	0.5	63.7	14.6	L1	FLO
0.276000	36.30	0.4	60.9	24.7	L1	FLO
0.294000	40.80	0.3	60.4	19.6	N	FLO
17.514000	29.60	3.4	60.0	30.4	L1	FLO
17.610000	31.70	3.4	60.0	28.3	L1	FLO
17.712000	33.70	3.4	60.0	26.3	L1	FLO
17.814000	35.40	3.4	60.0	24.6	L1	FLO
18.018000	34.40	3.5	60.0	25.6	L1	FLO

Data record name: 80535ACa_fin QP

Result measured with the average detector:

(These values are marked in the above diagram by +)

Frequency MHz	Level dB μ V	Transducer dB	Limit dB μ V	Margin dB	Line	PE
0.198000	34.40	0.5	53.7	19.3	L1	FLO
1.080000	27.80	0.2	46.0	18.2	N	FLO
1.668000	25.70	0.3	46.0	20.3	L1	FLO
2.868000	30.40	0.7	46.0	15.6	N	FLO
2.964000	31.30	0.6	46.0	14.7	L1	FLO
3.066000	34.40	0.6	46.0	11.6	L1	FLO
3.264000	34.80	0.6	46.0	11.2	L1	FLO
3.360000	33.10	0.6	46.0	12.9	L1	FLO
3.462000	32.80	0.8	46.0	13.2	L1	FLO
3.558000	27.50	0.7	46.0	18.5	L1	FLO

Data record name: 80535ACa_fin AV

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

1 – 6

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6.2 RADIATED EMISSIONS

6.2.1 METHOD OF MEASUREMENT (RADIATED EMISSIONS)

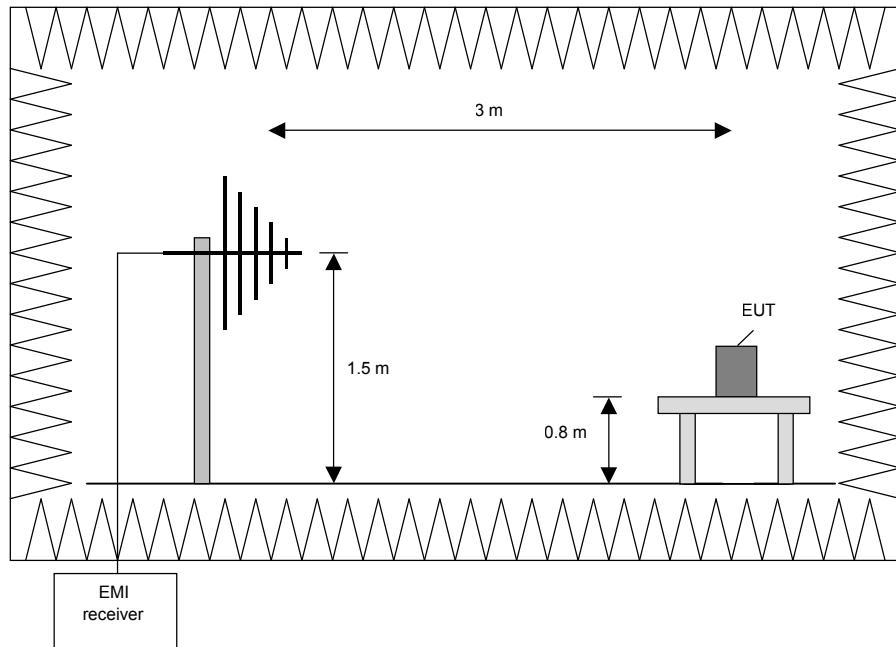
Preliminary measurement (30 MHz to 1 GHz)

In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. Tabletop devices will be set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003 [1].

The frequency range 30 MHz to 1 GHz will be measured with an EMI Receiver set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 230 MHz	100 kHz
230 MHz to 1 GHz	100 kHz



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Procedure preliminary measurement:

Prescans were performed in the frequency range 30 MHz to 1 GHz.

The following procedure will be used:

1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
6. Repeat 1) to 4) with the other orthogonal axes of the EUT if handheld equipment.
7. Repeat 1) to 5) with the vertical polarisation of the measuring antenna.

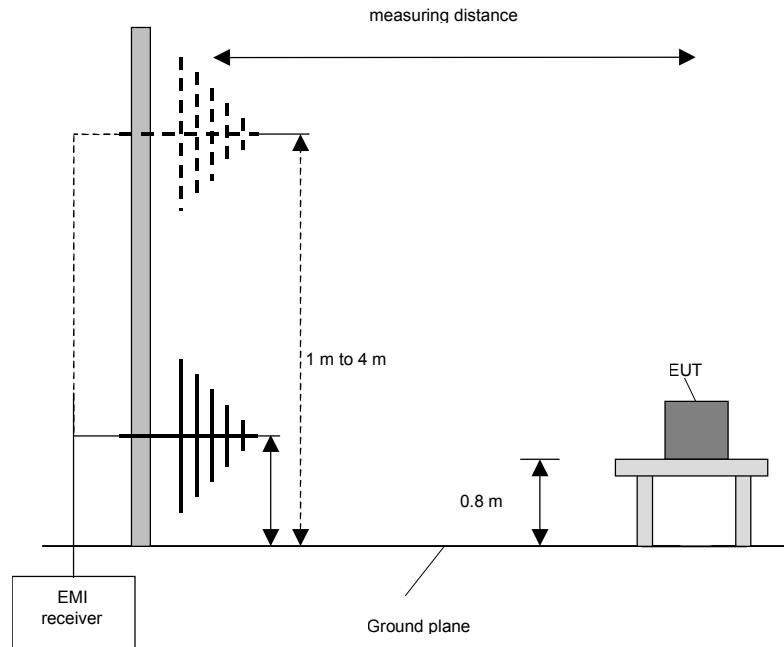
Final measurement (30 MHz to 1 GHz)

A final measurement on an open area test site will be performed on selected frequencies found in the preliminary measurement. During this test the EUT will be rotated in the range of

0 ° to 360 °, the measuring antenna will be set to horizontal and vertical polarisation and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



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Procedure final measurement:

The following procedure will be used:

- 1) Measure on the selected frequencies at an antenna height of 1 m and a EUT azimuth of 23 °.
- 2) Move the antenna from 1 m to 4 m and note the maximum value at each frequency.
- 3) Rotate the EUT by 45 ° and repeat 2) until an azimuth of 337 ° is reached.
- 4) Repeat 1) to 3) for the other orthogonal antenna polarization.
- 5) Move the antenna and the turntable to the position where the maximum value is detected.
- 6) Measure while moving the antenna slowly +/- 1 m.
- 7) Set the antenna to the position where the maximum value is found.
- 8) Measure while moving the turntable +/- 45 °.
- 9) Set the turntable to the azimuth where the maximum value is found.
- 10) Measure with Final detector (QP and AV) and note the value.
- 11) Repeat 5) to 10) for each frequency.
- 12) Repeat 1) to 11) for each orthogonal axes of the EUT if handheld equipment.

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6.2.2 PRELIMINARY MEASUREMENT (30 MHz to 2 GHz)

Ambient temperature	20 °C	Relative humidity	35 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m (preliminary measurement).

Cable guide: The cables of the EUT were fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Title: Preliminary emission measurement
according CFR 47 Part15.109

EUT: CT-Headset Standard ASR

Manufacturer: CeoTronics AG

Operating Condition: Connected to a second headset

Test site: Fully anechoic chamber M20; PHOENIX TEST LAB GmbH

Operator: D. Sütthoff

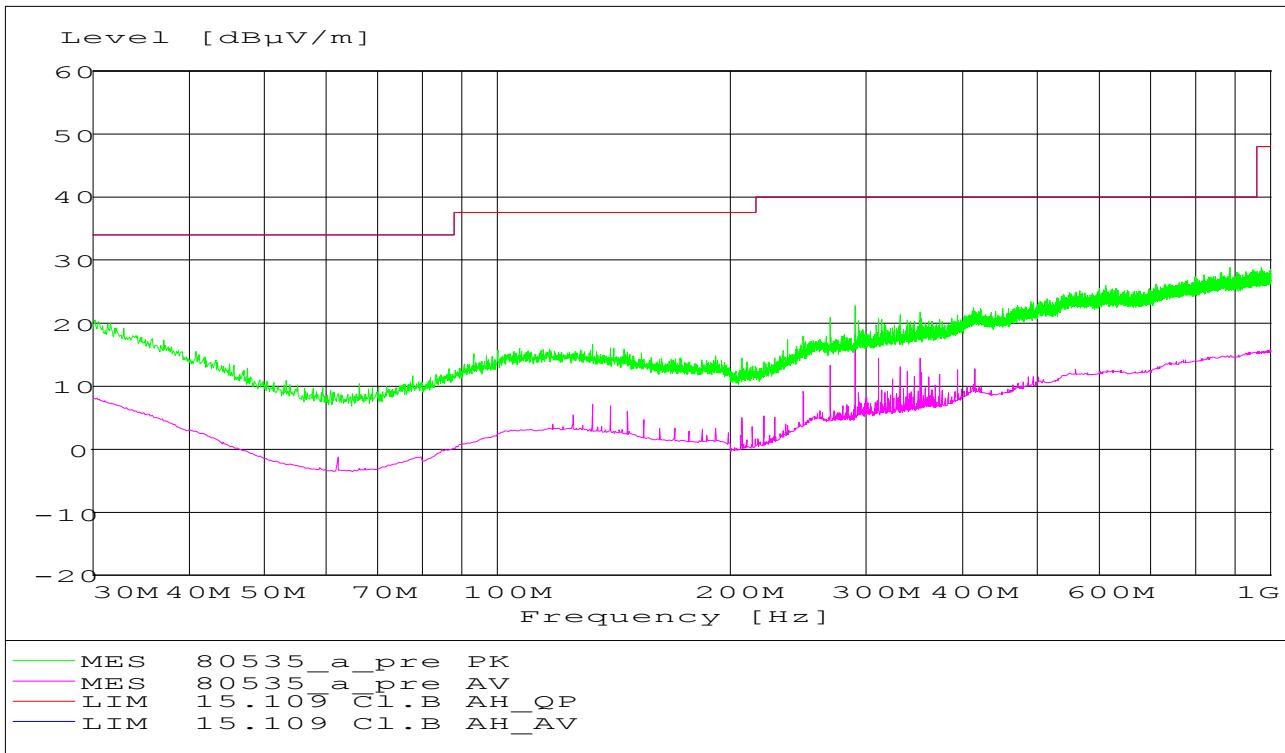
The limit line and measurement curve shown in the diagram below refer to the preliminary measurements. Here, it must be noted that because of the reduced measuring distance and because of the floor absorbers, the measured values do not comply with the values of the above mentioned standard; they only serve as orientation in determining which frequencies must be measured on the open area test site.

The limit line is achieved with the applied standard by converting to a 3m measurement distance (+10 dB) and the correction for the free space in which in the "worst case" the reflected floor wave is missing entirely (-6dB). Therefore 4dB is added to the limit line of the standard concerned.

The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with the EUT in various positions.

The top measured curve represents the peak measurement. The measured points marked with x are frequency points for which later measurements with a quasi-peak detector were carried out. These values are indicated in the following table. The bottom measured curve represents average values, which are only required for control purposes.

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Data record name: 80535_a

In this case it was not necessary to carry out subsequent measurements because at no frequency was a value above the noise of the system.

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 35, 43, 53, 54

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7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

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No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. due
1	Shielded chamber M47	-	Albatross Projects	B83117-C6439-T262	480662	Weekly verification (system cal.)	
2	EMI Receiver	ESCS 30	Rohde & Schwarz	834489/011	580007	02/27/2008	02/2010
3	LISN	ESH2-Z5	Rohde & Schwarz	879675/037	580006	01/09/2008	01/2009
5	AC-Filter	B84299-D87-E3	Siemens	930262292	480097	Weekly verification (system cal.)	
6	EMI-Software	ES-K1	Rohde & Schwarz	-	480111	-	
14	Open area test site	-	Phoenix Test-Lab	-	480085	Weekly verification (system cal.)	
15	Measuring receiver	ESCS30	Rohde & Schwarz	828985/014	480270	02/27/2008	02/2010
16	Controller	HD100	Deisel	100/670	480139	-	-
17	Turntable	DS420HE	Deisel	420/620/80	480087	-	-
18	Antenna support	AS615P	Deisel	615/310	480086	-	-
19	Antenna	CBL6111 A	Chase	1643	480147	08/01/2007	08/2012
20	EMI Software	ES-K1	Rohde & Schwarz	-	480111	-	
29	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303	Weekly verification (system cal.)	
31	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355	02/25/2008	02/2010
32	Controller	HD100	Deisel	100/670	480326	-	
33	Turntable	DS420HE	Deisel	420/620/80	480315	-	
34	Antenna support	AS615P	Deisel	615/310	480187	-	
35	Antenna	CBL6112 B	Chase	2688	480328	10/11/2005	10/2010
36	Antenna	3115 A	EMCO	9609-4918	480183	08/04/2003	08/2008
37	Standard Gain Horn 11.9 GHz – 18 GHz	18240-20	Flann Microwave	483	480294	Six month verification (system cal.)	
39	Standard Gain Horn 17.9 GHz – 26.7 GHz	20240-20	Flann Microwave	411	480297	Six month verification (system cal.)	
43	RF-cable No. 30	RTK 081	Rosenberger	-	410141	Weekly verification (system cal.)	
44	RF-cable No. 31	RTK 081	Rosenberger	-	410142	Weekly verification (system cal.)	
46	RF-cable 1m	KPS-1533-400-KPS	Insulated Wire	-	480301	Six month verification (system cal.)	
49	Preamplifier	JS3-00101200-23-5A	Miteq	681851	480337	Six month verification (system cal.)	
50	Preamplifier	JS3-12001800-16-5A	Miteq	571667	480343	Six month verification (system cal.)	
51	Preamplifier	JS3-18002600-20-5A	Miteq	658697	480342	Six month verification (system cal.)	
53	EMI Software	ES-K1	Rohde & Schwarz	-	480111	-	
54	Power supply	TOE 8852	Toellner	51712	480233	11/27/2006	11/2008

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8 LIST OF ANNEXES

ANNEX A	PHOTOGRAPHS OF THE TEST SET-UPS:	3 pages
	Test set-up conducted emission measurement	80535_AC10.jpg
	Test set-up preliminary emission measurement	80535_EMI10.jpg
	Test set-up preliminary emission measurement	80535_EMI11.jpg
ANNEX B	PHOTOGRAPHS OF THE TEST SAMPLE:	7 pages
	EUT top view	80535_EUT10.jpg
	EUT rear view	80535_EUT11.jpg
	EUT PCB1 top view	80535_EUT13.jpg
	EUT PCB1 rear view	80535_EUT14.jpg
	EUT PCB2 top view	80535_EUT15.jpg
	EUT PCB2 rear view	80535_EUT16.jpg
	EUT battery	80535_EUT17.jpg