PHOENIX TESTLAB
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TEST REPORT

Test Report Reference: F080535E7

Equipment under Test: CT-DECT Conference (4)
FCC ID: L52CT-DECTCASE
Class II Permissive Change

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
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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

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Country:	Germany
Name for contact purposes:	Mr. Neuhaus
Tel:	+49 6074 8751631
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e-mail address:	entwicklung@ceotronics.com

1.3 DATES

Date of receipt of test sample:	08 July 2008
Start of test:	06 August 2008
Finish of test:	07 August 2008

1.4 TEST LABORATORY

The tests were carried out at: **PHOENIX TESTLAB GmbH**
Königswinkel 10
D-32825 Blomberg **Phone: +49 (0) 52 35 / 95 00-0**
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Test engineer:	Dieter SÜTTHOFF		21 October 2008
	Name	Signature	Date
Test report checked:	Bernd STEINER		21 October 2008
	Name	Signature	Date

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

1.5 RESERVATION

This test report is only valid in its original form.

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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.

2 TECHNICAL DATA OF EQUIPMENT

2.1 DEVICE UNDER TEST

Marketing Name of EUT	CT-DECT Conference (4)
Article Number: *	-
Type of equipment:	Digital communication system enables wireless digital duplex communication for max. 4 persons with wireless Headset DECT-Moduls

Mainboard:

Highest operating frequency	24.576 MHz *					
Supply Voltage: *	U_{DC} =	12 V DC	U_{Min}=	-	U_{Max}=	-
Power Supply: *	Powered with mains adapter JET model PSA21U-120					

Module inside EUT:

Module inside	DECT M5 Radio Module CeoTronics, FP (fixed part)
FCC ID (EUT)	L52CT-DECTCASE
FCC ID (Module)	L52CT-M5CEO1
Frequency Band(s) of Operation:	1921.54 -1928.45 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 (¼ wave antenna)
Antenna gain	0 dBi

* declared by the applicant.

2.2 ADDITIONAL INFORMATION

The EUT was changed as described in annex C of this document. The purpose of this document is to shows the compliance according to FCC 47 CFR Part 15 [3] of the EUT with the relevant changes.

2.3 EXTERNAL I/O:

Ports/Connectors

Identification	Connector		Length
	EUT	Ancillary	
DC-mains*	DC-Plug	Mains adapter	1.4 m
Audio line	CT-audio connector	-	0.5 m

2.4 PERIPHERY DEVICES

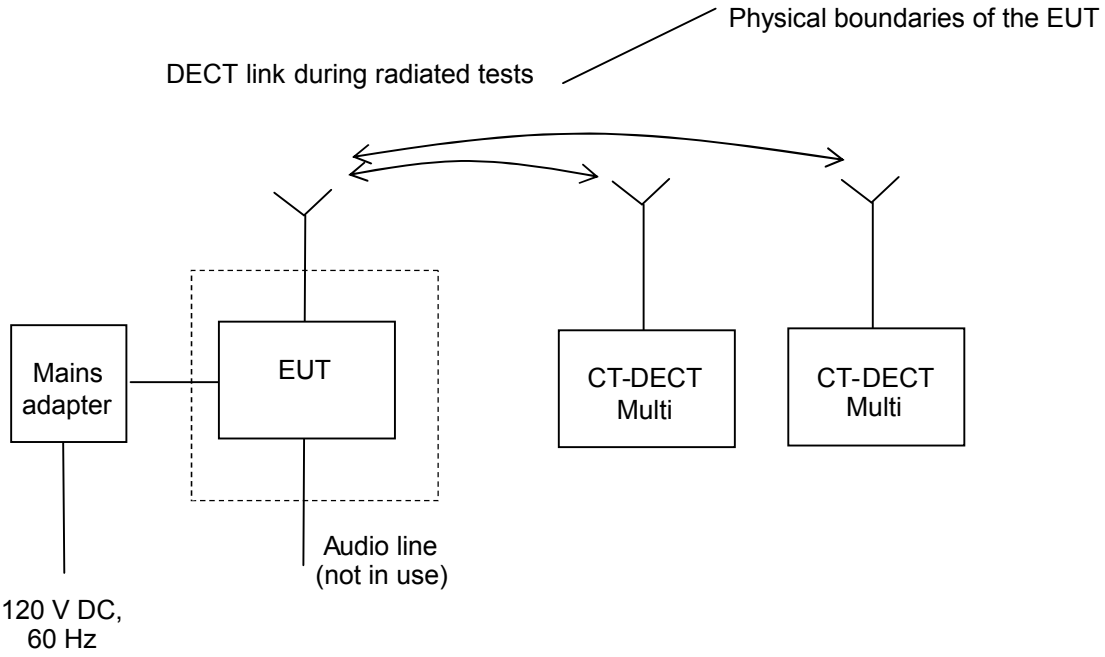
- Mains adapter: JET model PSA21U-120
- Two CT-DECT Multi

3 OPERATIONAL STATES AND PHYSICAL BOUNDARIES

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

- During the radiated emission tests two samples of CT-DECT Multi generate two duplex communication DECT link to the EUT.
- The EUT was powered from a mains adapter “JET model PSA21U-120”.
- A 0.5 m connecting cable was connected to the optional audio interface of the EUT.

The physical boundaries of the EUT are shown below.



4 EMC MEASURES

none

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 dBµV (QP)* 56 to 46 dBµV (AV)* 56 dBµV (QP) 46 dBµV (AV) 60 dBµV (QP) 50 dBµV (AV)	ANSI C63.4 (2003)	Class B equipment	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 dBµV/m 43.5 dBµV/m 46.0 dBµV/m 53.9 dBµV/m	ANSI C63.4 (2003);	Class B equipment	Passed

* Decreases with the logarithm of the frequency.

6 TEST RESULTS

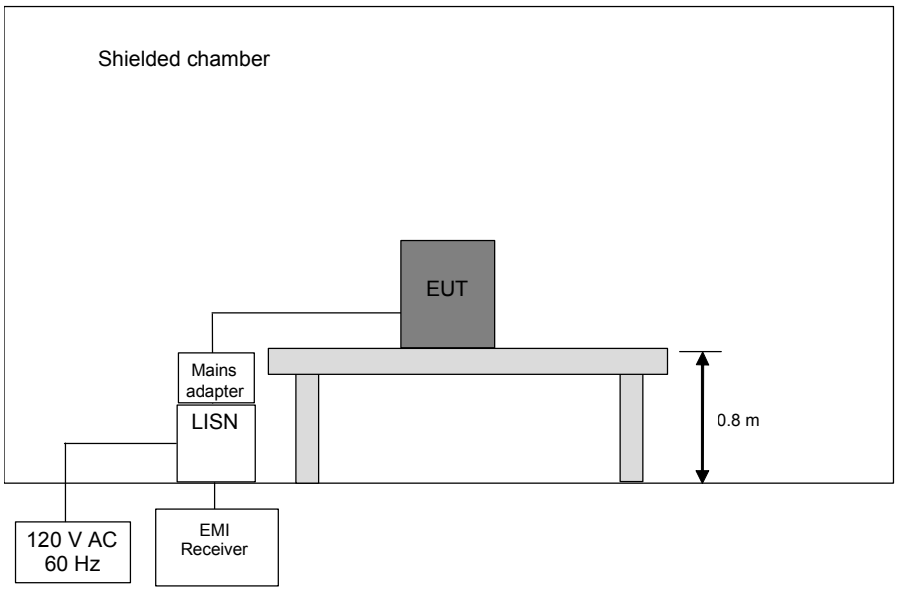
6.1 CONDUCTED EMISSIONS ON POWER SUPPLY LINES (150 kHz to 30 MHz)

6.1.1 METHOD OF MEASUREMENT

This test will be carried out in a shielded chamber. Tabletop devices will 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 appropriable 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



6.1.2 TEST RESULTS (CONDUCTED EMISSIONS ON POWER SUPPLY LINES)

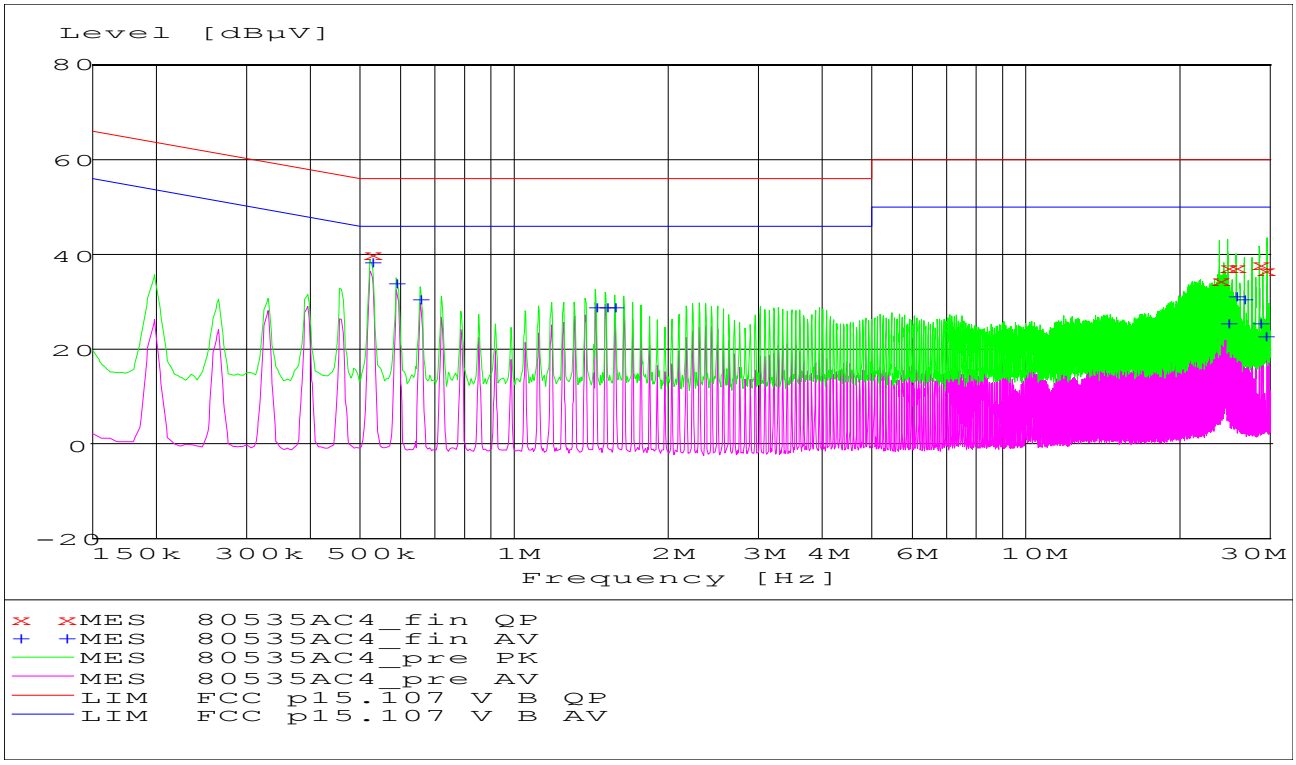
Ambient temperature	21 °C	Relative humidity	55 %

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: JET model PSA21U-120.

Measurement uncertainty: +3.6 dB / -4.5 dB

Title: AC Powerline Conducted Emission Test without with protective Ground connection
EUT: CT DECT Conference (4)
Manufacturer: CeoTronics AG
Operating Condition: Two CT-DECT Multi connected
Test site: PHOENIX TEST-LAB Blomberg M4
Operator: Dieter Sütthoff
Test Specification: 120 V / 60 Hz

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: 80535AC4

Result measured with the quasipeak detector:

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

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.524580	40.20	0.8	56.0	15.8	L1	FLO
23.832060	34.60	2.7	60.0	25.4	N	GND
24.787590	37.50	2.8	60.0	22.5	L1	GND
25.735290	37.70	2.9	60.0	22.3	N	GND
28.595940	38.10	3.2	60.0	21.9	N	GND
29.552460	37.00	3.3	60.0	23.0	N	GND

Data record name: 80535AC4_fin QP

Result measured with the average detector:

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

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.524760	38.80	0.8	46.0	7.2	L1	GND
0.590370	34.30	0.8	46.0	11.7	L1	GND
0.656250	30.70	0.8	46.0	15.3	L1	GND
1.443300	29.00	0.7	46.0	17.0	L1	GND
1.509180	29.20	0.7	46.0	16.9	L1	GND
1.575060	28.80	0.7	46.0	17.2	L1	GND
24.799740	25.60	2.8	50.0	24.4	L1	GND
25.749690	31.20	2.9	50.0	18.8	N	FLO
26.703150	30.60	3.0	50.0	19.4	N	GND
28.615650	25.50	3.2	50.0	24.5	L1	FLO
29.569560	22.70	3.3	50.0	27.3	N	FLO

Data record name: 80535AC4_fin AV

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
1 – 6

6.2 RADIATED EMISSIONS

6.2.1 METHOD OF MEASUREMENT (RADIATED EMISSIONS)

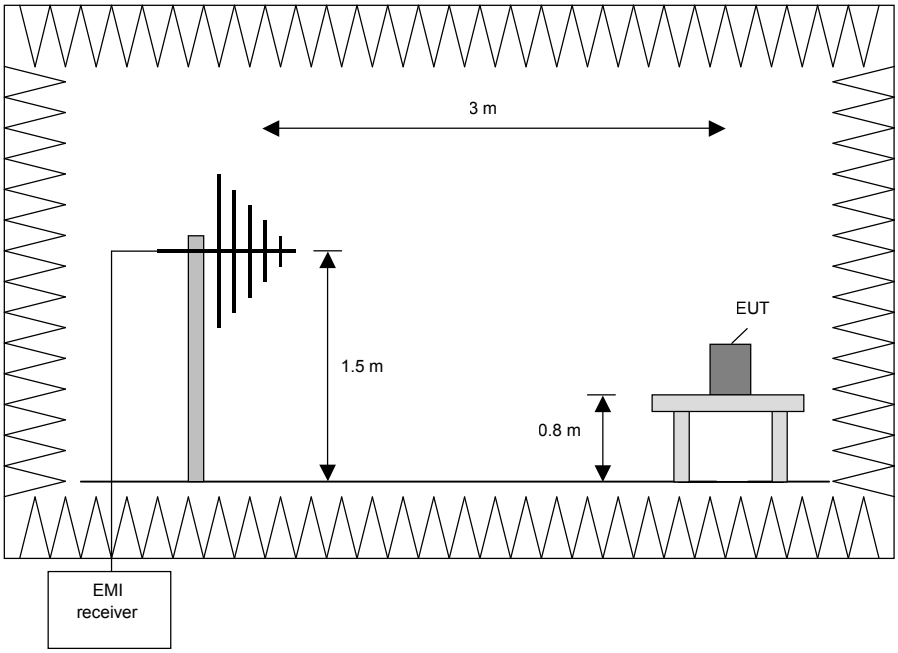
Preliminary measurement (30 MHz to 1 GHz)

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 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



Procedure preliminary measurement:

Prescans were performed in the frequency range 30 MHz to 1 GHz.
The following procedure will be used:

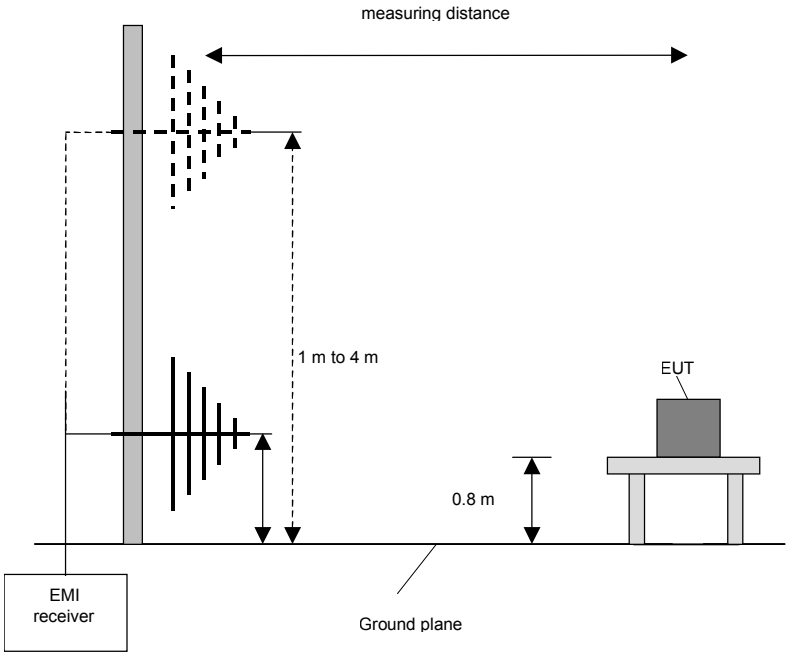
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the 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



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.

6.2.2 PRELIMINARY MEASUREMENT (30 MHz to 1 GHz)

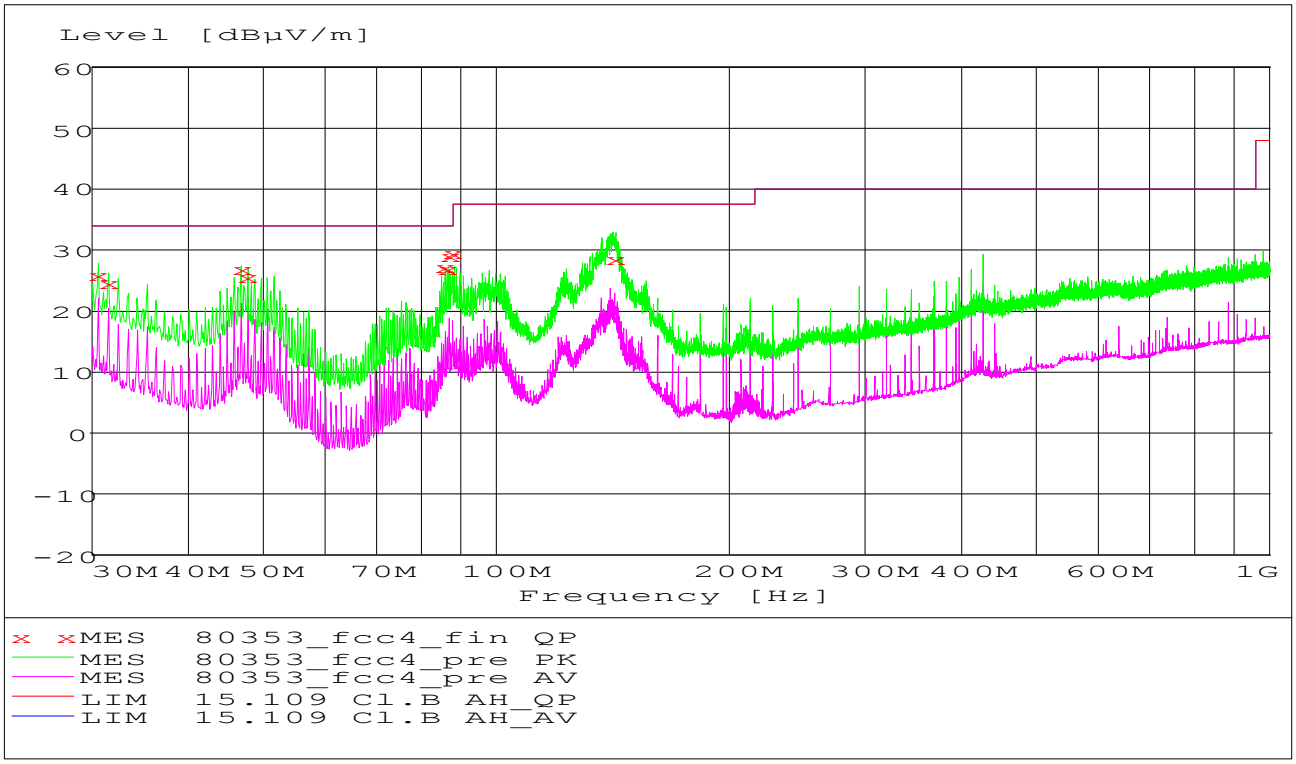
Ambient temperature	21 °C	Relative humidity	55 %

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 DECT Conference (4)
Manufacturer: CeoTronics AG
Operating Condition: Two CT-DECT Multi connected
Test site: PHOENIX TEST-LAB Blomberg M4
Operator: Dieter Sütthoff
Test Specification: 120 V AC 60 Hz

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.



Data record name: 80353_fcc4

Result measured with the quasipeak detector:

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

Frequency MHz	Level dBµV/m	Transducer dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
30.528000	26.00	18.3	34.0	8.0	150.0	0.00	VERTICAL
31.500000	24.80	17.8	34.0	9.2	150.0	1.00	VERTICAL
46.740000	27.20	9.7	34.0	6.8	150.0	246.00	VERTICAL
47.724000	25.70	9.2	34.0	8.3	150.0	226.00	VERTICAL
85.860000	27.70	8.8	34.0	6.3	150.0	181.00	VERTICAL
86.424000	27.30	8.9	34.0	6.7	150.0	180.00	VERTICAL
86.856000	29.30	8.9	34.0	4.7	150.0	181.00	VERTICAL
87.768000	29.90	9.1	34.0	4.1	150.0	181.00	VERTICAL
141.636000	28.70	11.5	37.5	8.8	150.0	224.00	HORIZONTAL

Data record name: 80353_fcc4_fin QP

In this case it was necessary to carry out subsequent measurements because at some frequency points a value was above the Qualify limit curve during the preliminary measurements. The results from the standard subsequent measurements on the open area test site are presented in the following.

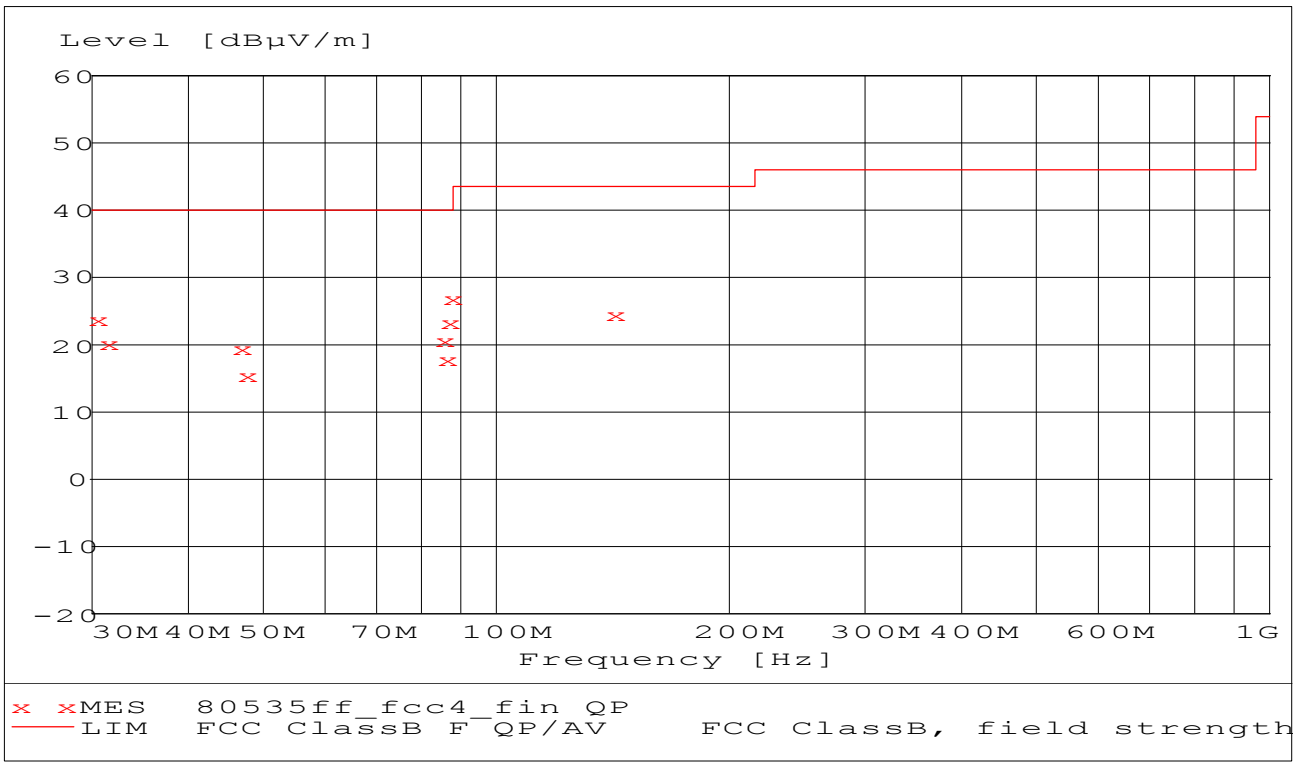
TEST EQUIPMENT USED FOR THE TEST:
29, 31 – 35, 43, 53, 54

6.2.3 FINAL MEASUREMENT (30 MHz to 1 GHz)

Ambient temperature:	22 °C	Relative humidity:	55 %

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.
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.
Test record:	All results are shown in the following.
Title:	Final measurement on 3 m open area test site according to CFR47 Part 15.109
EUT:	CT DECT Conference (4)
Manufacturer:	CeoTronics AG
Operating Condition:	Two CT-DECT Multi connected
Test site:	PHOENIX TEST-LAB BLOMBERG; open area test site M6
Operator:	Dieter Sütthoff
Test Specification:	120 V AC 60 Hz

The measured points and the limit line in the following diagram refer to the standard measurement of the emitted interference in compliance with the above mentioned standard. The measured points marked with x are the measured results of the standard subsequent measurement on the open area test site.



Data record name: 80535ff_fcc4

The results of the standard subsequent measurement on the open area test site are indicated in the table below. The limits as well as the measured results (levels) refer to the above mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

Result measured with the quasipeak detector:

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

Frequency MHz	Level dBµV/m	Transducer dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
30.528000	23.70	19.1	40.0	16.3	333.0	277.00	VERTICAL
31.500000	20.30	18.6	40.0	19.7	327.0	359.00	VERTICAL
46.740000	19.70	10.8	40.0	20.3	100.0	113.00	VERTICAL
47.724000	15.60	10.4	40.0	24.4	100.0	90.00	VERTICAL
85.860000	20.80	10.5	40.0	19.2	400.0	180.00	VERTICAL
86.424000	17.90	10.6	40.0	22.1	125.0	134.00	VERTICAL
86.856000	23.40	10.6	40.0	16.6	131.0	297.00	VERTICAL
87.768000	27.00	10.7	40.0	13.0	372.0	180.00	HORIZONTAL
141.636000	24.80	13.5	43.5	18.7	100.0	315.00	VERTICAL

Data record name: 80535ff_fcc4_fin QP

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
14 – 20

7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. due
1	Shielded chamber M4	-	Siemens	B83117S1-X158	480088	Weekly verification (system cal.)	
2	Measuring receiver	ESAI	Rohde & Schwarz	831953/001 833181/018	480025 480026	02/26/2008 02/26/2008	2
3	LISN	NSLK8128	Schwarzbeck	8128155	480058	01/09/2008	3
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

8 LIST OF ANNEXES

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	EUT opened	80535_EUT52.jpg
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	EUT PCB, top view, shielding removed	80535_EUT55.jpg
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	EUT periphery CT-DECT Multi	80535_Multi4.jpg
ANNEX C	**CLASS II PERMISSIVE CHANGE FOR CONFERENCE (4)**	**1 pages**