PHOENIX TESTLAB
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TEST REPORT

Test Report Reference: F082629E01

Equipment under Test: CT-DECT Case with GSM

S/N: 1410118

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:	19 November 2008
Start of test:	20 November 2008
Finish of test:	27 November 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**
Germany **Fax:** **+49 (0) 52 35 / 95 00-10**

Test engineer:	Michael DINTER		15 December 2008
	Name	Signature	Date
Test report checked:	Bernd STEINER		15 December 2008
	Name	Signature	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.

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 Case with GSM
Article Number: *	1410118
Type of equipment:	Communication system to combine DECT, GSM and Radio equipment

Mainboard:

Highest operating frequency*	below 108 MHz					
Supply Voltage: *	U_{Nom} =	3.6 V DC	U_{Min}=	-	U_{Max}=	-
Power Supply: *	NiMH Li-Ion 6AH /12V ext. for charging					

Module inside EUT:

Module inside	DECT M5 Radio Module CeoTronics, FP (fixed part)
FCC ID	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.

Other devices inside:

GSM Handy : Nokia 6230i including Nokia car charger

Mobile Radio: Motorola HT 1250LS+

2.2 EXTERNAL I/O:

Ports/Connectors

Connector (Type)	Cable	Length / m	Shielding (Yes / No)	Connector (Type)
AC plug for AC Adaptor		1.5	No	plug

*: Length during the test.

2.3 PERIPHERY DEVICES

Other devices outside:

- CT DECT Multi , Motorola HT 1250LS+, GSM simulator CMD

2.4 ADDITIONAL INFORMATION

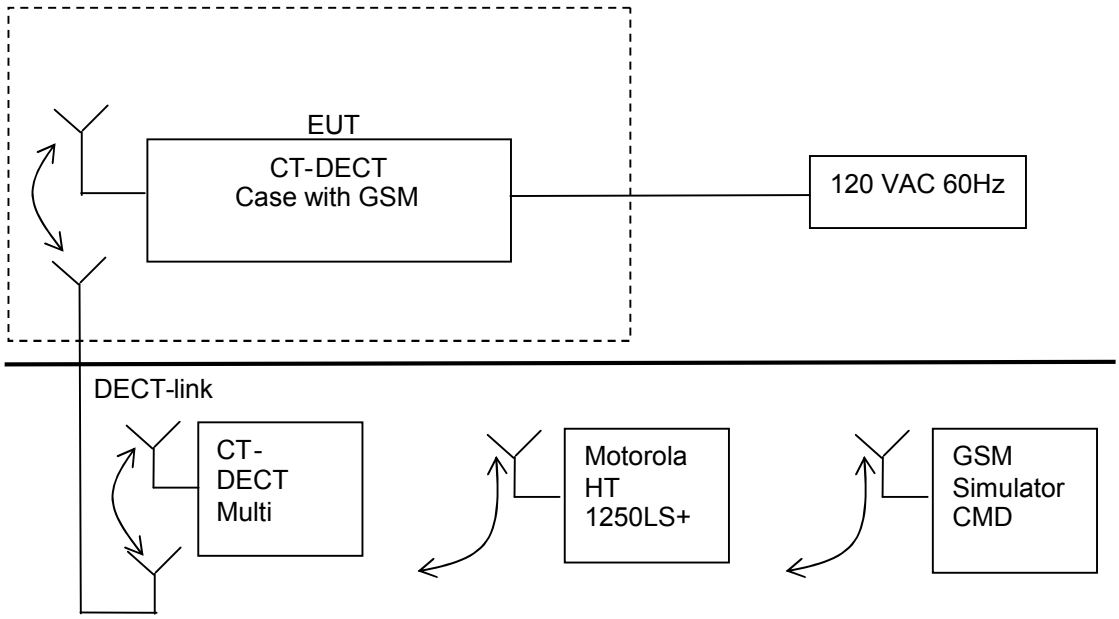
The tested samples were not marked with a type plate according to the FCC-rules.
The device under test is classified as a class B device according to FCC 47 CFR Part 15 [3] by the manufacturer.
DECT module (FCC ID: L52CT-M5CEO1) is used inside the EUT. An evaluation of the module nor the GSM mobile, nor the Motorola HT 1250LS+ is not part of this document.

3 OPERATIONAL STATES AND PHYSICAL BOUNDARIES

The operation mode of the equipment under test was defined as follows:

- During the tests, the EUT was not sealed or labelled with a FCC-label.
- The EUT was battery supplied with 3.6 V DC Battery which was connected to a Charger with 60 Hz 120V AC mains.
- DECT link between EUT and CT-DECT Multi was active during the tests.
- Radio link between EUT and Motorola HT 1250LS+ was active during the tests.
- GSM link between EUT and CMD GSM simulator was active during the tests.
- During the the tests the audio up- and downlink of the EUT were active.

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 at 10m distance	Reference standard	Remark	Status
Radiated emissions	30 – 88 MHz 88 – 216 MHz 216 – 960 MHz above 960 MHz	30 dBµV/m 33.5 dBµV/m 36.0 dBµV/m 43.9 dBµV/m	ANSI C63.4 (2003);	Class B equipment	Passed

* Decreases with the logarithm of the frequency.

6 TEST RESULTS

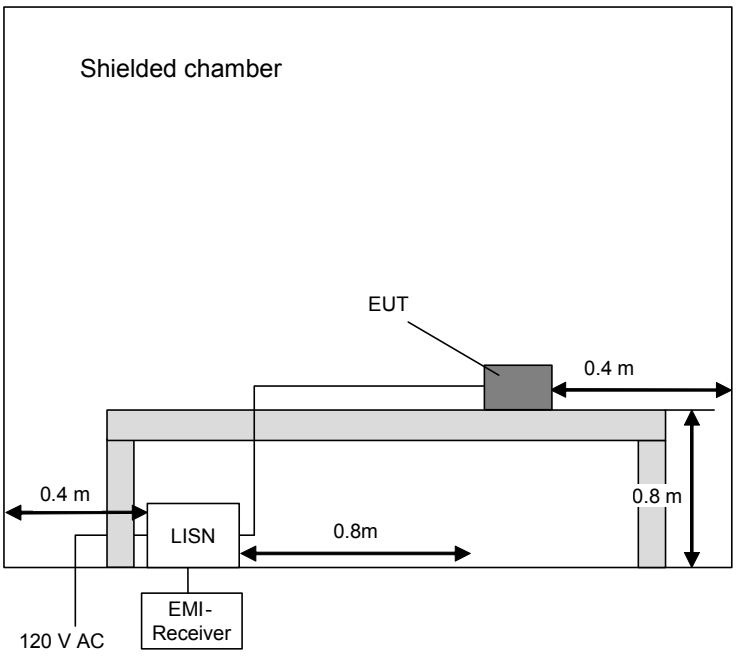
6.1 CONDUCTED EMISSIONS ON POWER SUPPLY LINES 150 kHz to 30 MHz

6.1.1 METHOD OF MEASUREMENT (RADIATED EMISSIONS)

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 CONDUCTED EMISSION MEASUREMENT ON DC MAINS 150 KHZ TO 30 MHZ

Ambient temperature:	20 °C	Relative humidity:	45 %

Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m.

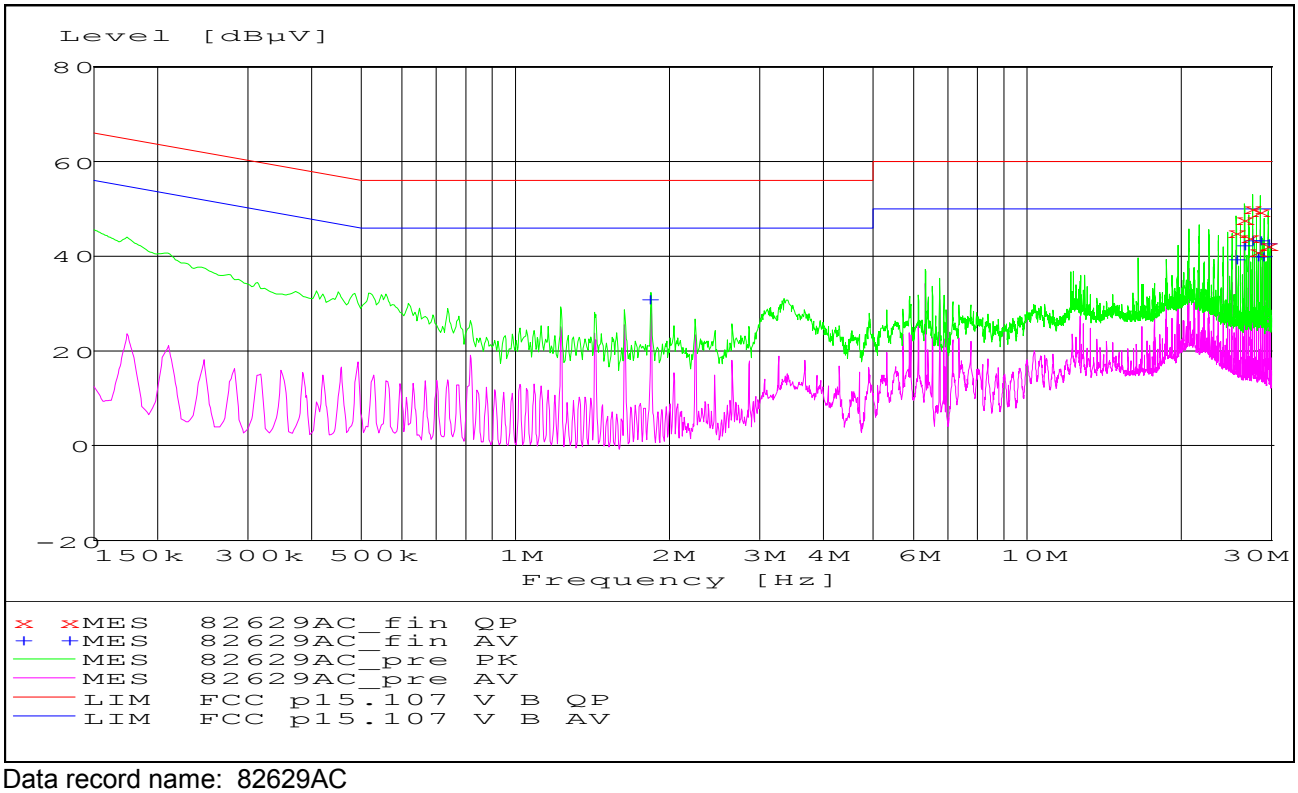
Cable guide: The cable of the EUT was fixed on the wooden table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: As described in chapter 3.

Power supply: During all measurements the EUT was supplied with 120 V AC 60 Hz.

Title: Mains terminal disturbance voltage measurement with protective ground conductor simulation
EUT: CT DECT Case with GSM
Manufacturer: Ceotronics
Operating Condition: GSM/DECT/Radio links active
Test site: PHOENIX TESTLAB Blomberg M4
Operator: D. Sütthoff
Test Specification: 120 V AC / 60 Hz
Comment:

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: 82629AC

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
25.613160	45.40	2.9	60.0	14.6	N	FLO
26.600460	48.00	3.0	60.0	12.0	N	FLO
27.103920	44.00	3.0	60.0	16.0	N	FLO
27.590460	50.10	3.0	60.0	9.9	N	FLO
28.090770	41.40	3.1	60.0	18.6	N	FLO
28.574340	49.60	3.2	60.0	10.4	N	FLO
29.571000	42.70	3.3	60.0	17.3	L1	FLO

Data record name: 82629AC_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
1.838580	31.40	0.7	46.0	14.6	L1	FLO
25.597770	39.80	2.9	50.0	10.2	N	FLO
26.580660	42.50	3.0	50.0	7.5	N	FLO
27.565710	43.50	3.0	50.0	6.5	N	FLO
28.058190	40.40	3.1	50.0	9.6	N	FLO
28.550130	43.30	3.2	50.0	6.7	N	FLO
29.041530	40.00	3.3	50.0	10.0	L1	FLO
29.533560	42.80	3.3	50.0	7.2	N	FLO

Data record name: 82629AC_fin AV

Test: Passed

TEST EQUIPMENT USED:

1-3, 5, 6, 38

6.2 RADIATED EMISSIONS

6.2.1 METHOD OF MEASUREMENT (RADIATED EMISSIONS)

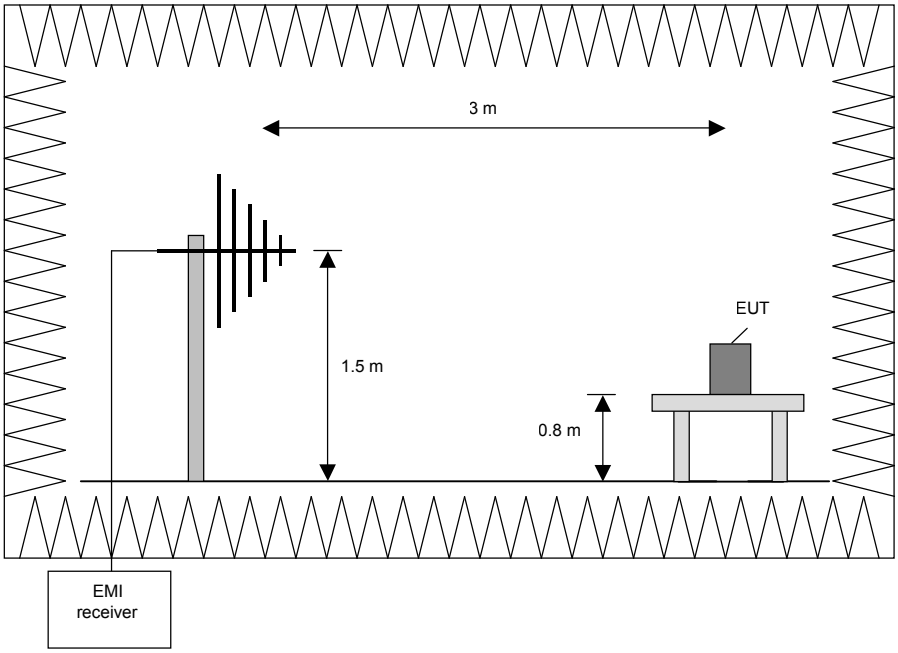
Preliminary measurement (30 MHz to 1 GHz)

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:

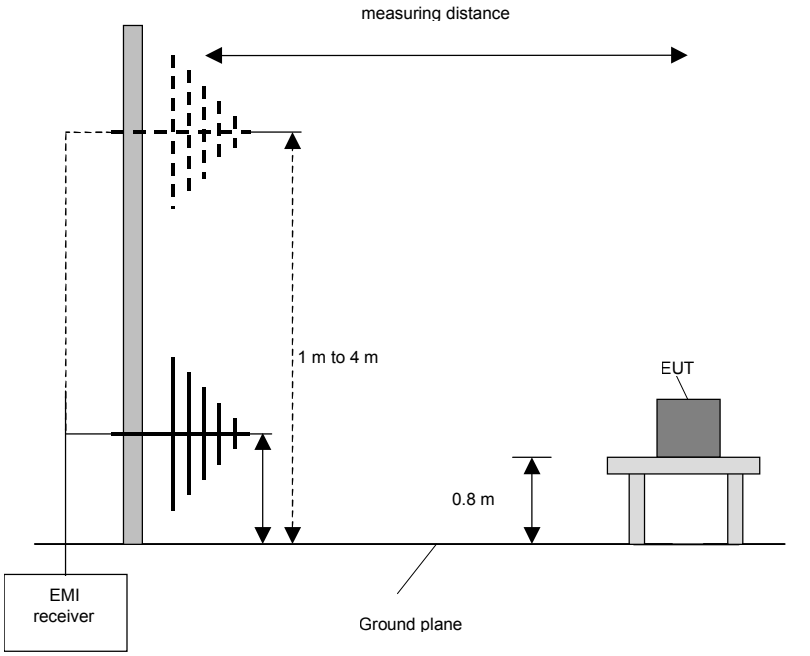
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the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

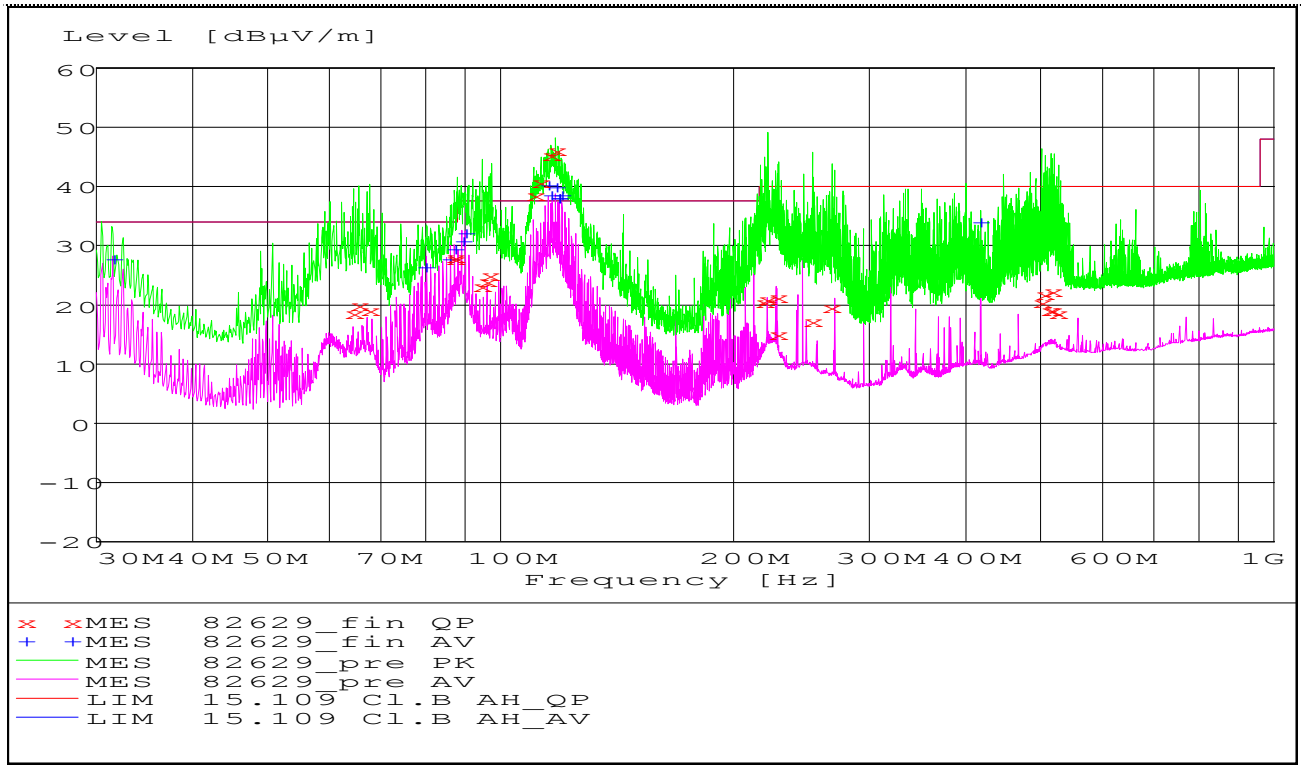
Ambient temperature	21 °C	Relative humidity	38 %

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 Case with GSM
Manufacturer: Ceotronics
Operating Condition: GSM/DECT/Radio links active
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.



Data record name: 82629

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
64.764000	18.90	5.6	34.0	15.1	150.0	113.00	HORIZONTAL
65.760000	20.30	5.6	34.0	13.7	150.0	90.00	HORIZONTAL
67.596000	19.10	5.9	34.0	14.9	150.0	247.00	HORIZONTAL
87.252000	28.30	9.0	34.0	5.7	150.0	135.00	HORIZONTAL
87.624000	28.00	9.1	34.0	6.0	150.0	122.00	HORIZONTAL
94.812000	23.10	10.4	37.5	14.4	150.0	136.00	VERTICAL
96.348000	24.10	10.6	37.5	13.4	150.0	169.00	VERTICAL
97.248000	25.00	10.7	37.5	12.5	150.0	45.00	HORIZONTAL
110.412000	38.80	11.9	37.5	-1.3	150.0	44.00	HORIZONTAL
112.776000	41.00	12.0	37.5	-3.5	150.0	136.00	VERTICAL
116.184000	45.30	12.1	37.5	-7.7	150.0	136.00	VERTICAL
117.660000	46.40	12.2	37.5	-8.8	150.0	136.00	VERTICAL
219.504000	20.80	9.9	40.0	19.2	150.0	226.00	VERTICAL
221.508000	21.30	10.0	40.0	18.7	150.0	226.00	VERTICAL
228.492000	15.30	10.6	40.0	24.7	150.0	315.00	HORIZONTAL
228.888000	21.60	10.6	40.0	18.4	150.0	130.00	HORIZONTAL
253.284000	17.50	13.6	40.0	22.5	150.0	254.00	HORIZONTAL
268.572000	20.00	13.7	40.0	20.0	150.0	315.00	HORIZONTAL
501.048000	20.60	19.0	40.0	19.4	150.0	69.00	HORIZONTAL
506.232000	22.20	18.9	40.0	17.8	150.0	89.00	HORIZONTAL
515.076000	19.10	18.9	40.0	20.9	150.0	148.00	VERTICAL
517.524000	22.50	18.9	40.0	17.5	150.0	88.00	HORIZONTAL
519.540000	19.30	18.9	40.0	20.7	150.0	155.00	VERTICAL
527.508000	18.70	19.2	40.0	21.3	150.0	225.00	HORIZONTAL

Data record name: 82629_fin QP

Result measured with the average detector:
(These values are marked in the above diagram by +)

Frequency MHz	Level dBµV/m	Transducer dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
31.512000	28.10	17.8	34.0	5.9	150.0	283.00	VERTICAL
80.232000	26.30	7.6	34.0	7.7	150.0	198.00	HORIZONTAL
86.136000	27.60	8.9	34.0	6.4	150.0	315.00	HORIZONTAL
87.120000	29.60	9.0	34.0	4.4	150.0	179.00	HORIZONTAL
89.088000	30.80	9.4	37.5	6.7	150.0	135.00	HORIZONTAL
90.072000	32.40	9.5	37.5	5.1	150.0	177.00	HORIZONTAL
115.200000	40.40	12.1	37.5	-2.9	150.0	148.00	VERTICAL
116.628000	38.70	12.1	37.5	-1.2	150.0	136.00	VERTICAL
117.636000	40.20	12.2	37.5	-2.7	150.0	136.00	VERTICAL
118.644000	38.00	12.2	37.5	-0.5	150.0	134.00	VERTICAL
119.124000	38.30	12.2	37.5	-0.7	150.0	136.00	VERTICAL
120.108000	38.80	12.2	37.5	-1.3	150.0	136.00	VERTICAL
417.768000	34.20	18.2	40.0	5.8	150.0	78.00	HORIZONTAL

Data record name: 82629_fin AV

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.

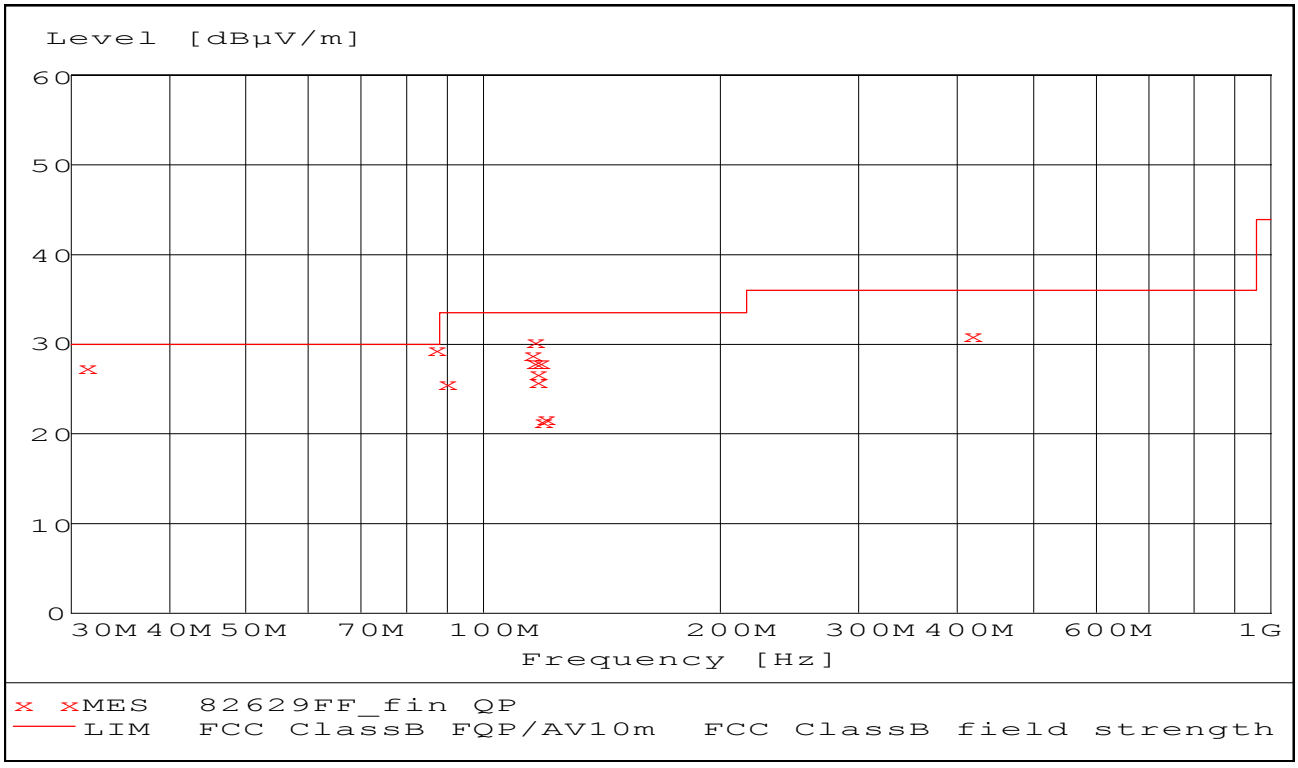
TEST EQUIPMENT USED FOR THE TEST:
29 – 35, 38

6.2.3 FINAL MEASUREMENT (30 MHz to 1 GHz)

Ambient temperature:	21 °C	Relative humidity:	39 %

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 10 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 10m open area test site according to CFR47 Part 15.109
EUT:	CT DECT Case with GSM
Manufacturer:	Ceotronics
Operating Condition:	GSM/DECT/Radio links active
Test site:	PHOENIX TEST-LAB BLOMBERG; open area test site M6
Operator:	D. Sütthoff
Test Specification:	
Comment:	120 V / 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: 82629FF

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 10 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
31.512000	27.50	18.8	30.0	2.5	100.0	112.00	VERTICAL
87.120000	29.60	10.3	30.0	0.4	335.0	292.00	HORIZONTAL
90.072000	25.60	11.2	33.5	7.9	260.0	190.00	HORIZONTAL
115.200000	28.80	13.1	33.5	4.7	114.0	67.00	VERTICAL
116.184000	30.40	13.1	33.5	3.1	100.0	112.00	VERTICAL
116.628000	28.10	13.2	33.5	5.4	100.0	67.00	VERTICAL
117.636000	26.00	13.2	33.5	7.5	100.0	67.00	VERTICAL
117.660000	26.90	13.2	33.5	6.6	100.0	67.00	VERTICAL
118.644000	28.00	13.3	33.5	5.5	375.0	149.00	VERTICAL
119.124000	21.50	13.3	33.5	12.0	100.0	29.00	VERTICAL
120.108000	21.90	13.4	33.5	11.6	100.0	28.00	VERTICAL
417.768000	30.90	21.1	36.0	5.1	199.0	67.00	HORIZONTAL

Data record name: 82629FF_fin QP

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
14 – 20, 38

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	02/2010 02/2010
3	LISN	NSLK8128	Schwarzbeck	8128155	480058	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	Preamplifier	JS3-00101200-23-5A	Miteq	681851	480337	Six month verification (system cal.)	
38	Digital communication tester	CMD	Rohde & Schwarz	840966/011	480229	-	

All used measurement equipment was calibrated (if necessary). The calibration intervals and the calibration history will be given out on request.

8 LIST OF ANNEXES

ANNEX A	**PHOTOGRAPHS OF THE TEST SET-UPS**:	**3 pages**
	Test set-up conducted emission measurement	82629emic1.jpg
	Test set-up preliminary emission measurement	82629emi1.jpg
	Test set-up final emission measurement	82629emiff1.jpg
ANNEX B	**PHOTOGRAPHS OF THE TEST SAMPLE**:	**5 pages**
	EUT inside view	82629eut1.jpg
	EUT side view	82629eut2.jpg
	EUT 3D view	82629eut3.jpg
	EUT AC-Adapter	82629eut4.jpg
	EUT Label	82629eut5.jpg