

Recognized by the
Federal Communications Commission
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: IC 3463A-1
TCB ID: DE 0001



Accredited by the
German Accreditation Council
DAR-Registration Number
DAT-P-176/94-D1



Accredited Bluetooth[®] Test Facility (BQTF)

Test report no. : 3-5310-01-09/07
Applicant : Cycle Parts GmbH
Type : Z-Sender / Z-CAD
Test Standard : FCC Part 15.249 / RSS 210 Issue 7
FCC ID : TFO66023
Certification No. IC : 5957A-66023

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Table of contents

1	GENERAL INFORMATION	3
1.1.	ADMINISTRATIVE DATA OF THE TEST FACILITY	3
1.1.1	Identification of the testing laboratory	3
1.2.	NOTES	3
1.3	DETAILS OF APPLICANT.....	4
1.4	APPLICATION DETAILS	4
1.5	TEST ITEM	5
1.6	RF TECHNICAL BRIEF COVER SHEET ACC. TO RSS-102	6
2	STATEMENT OF COMPLIANCE	7
2.1	SUMMARY OF MEASUREMENT RESULTS.....	7
2.1.1	CFR 47 Part 15 Radio frequency devices.....	7
3	MEASUREMENTS AND RESULTS	8
4	FCC PART 15 SUBPART C.....	9
4.1	Timing of the transmitter	9
4.2	Field Strength of the Fundamental	11
4.3	Field Strength of the Harmonics and Spurious.....	12
5	ANNEX A: PHOTOGRAPHS OF TEST SITE	20

1 General information

1.1 Administrative data of the test facility

1.1.1 Identification of the testing laboratory

Company name:	Cetecom ICT Services GmbH
Address:	Untertürkheimerstr. 6-10 D-66117 Saarbruecken Germany
Laboratory accreditation:	DAR-Registration No. DAT-P-176/94-D1 Bluetooth Qualification Test Facility (BQTF) Federal Communications Commission (FCC)
Responsible for testing laboratory:	Identification/Registration No : 90462 Detlev Gillmann / Harro Ames Phone: +49 681 598 0 Fax: +49 681 598 9075 email: info@ict.cetecom.de

1.2 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The 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. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.



Responsible for testing laboratory
(Detlev Gillmann)



Responsible for test report
(Harro Ames)

1.3 Details of Applicant

Name : Cycle Parts GmbH
Address : Grosse Ahlmühle 33
City : 76 865 Rohrbach
Country : Germany
Phone : 49 (0) 6349 9635 - 0
Fax : 49 (0) 6349 9635 - 20
Contact : Mr. H. Noenen
Phone : 49 (0) 6349 9635 - 0
Fax : 49 (0) 6349 9635 - 20
e-mail : noenen@cycleparts.de

1.4 Application Details

Date of receipt of application : 2007-12-20
Date of receipt of test item : 2007-12-20
Date(s) of test : 2008-01-16 to 2008-01-22
Person(s) who have been present during the test : Mr. H. Noenen

Test report no.: 3-5310-01-09/07

Date: 2008-01-18

Page 5 of 24

1.5 Test Item

Type name	:	Z-Sender / Z-CAD
Manufacturer	:	Cycle Parts GmbH
Address	:	Grosse Ahlmühle 33
City	:	76 865 Rohrbach
Country	:	Germany
Tested to Radio Standards Specification(RSS) No.	:	RSS 210, Issue 7
Open Area Test Site Industry Canada Number	:	IC 3463A-1
Frequency Range (or fixed frequency)	:	2 457 MHz
Number of Channels	:	1
Maximum power (Average)	:	44.0 dBµV/m (at 3 m)
Type of Modulation	:	GFSK
Occupied Bandwidth (99% BW)	:	770 kHz
Antenna Information	:	Integrated antenna
Emission Designator (TRC-43)	:	770KF1D
Transmitter Spurious (worst case)	:	Nothing found < 15 dB below AV - limit
Receiver Spurious (worst case)	:	Noise floor (Nothing found)
IC No.	:	5957A-66023
FCC ID	:	TFO66023

ATTESTATION:

DECLARATION OF COMPLIANCE: I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Laboratory Manager :

2008-02-05

D. Gillmann



Date

Name

Signature

1.6 RF Technical Brief Cover Sheet acc. To RSS-102

All Fields must be completed with the requested information or the following codes: N/A for Not Applicable, N/P for Not Performed or N/V for Not Available. Where applicable, check appropriate box.

1. COMPANY NUMBER: **5957A-66023**
2. MODEL NUMBER: **Z-Sender / Z-CAD**
3. MANUFACTURER: **Cycle Parts GmbH**
4. TYPE OF EVALUATION: **(c) RF Evaluation**

- Evaluated against exposure limits: General Public Use ☒ Controlled Use ☐
- Duty cycle used in evaluation: 99 %
- Standard used for evaluation: RSS-102 Issue 2 (2005-11)
- Measurement distance: 3 m
- RF value: 0.158 mV/m ☒ A/m ☐ W/m² ☐
- Measured ☒ Computed ☐ Calculated ☐

Declaration of RF Exposure Compliance

ATTESTATION:

I attest that the information provided in this test report are correct; that a Technical Brief was prepared and the information it contains is correct; that the device evaluation was performed or supervised by me; that applicable measurement methods and evaluation methodologies have been followed and that the device meets the SAR and/or RF exposure limits of RSS-102.

Name: Detlev Gillmann
Title: Engineer
Company: Cetecom ICT Services GmbH



2 Statement of Compliance

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

2.1 Summary of Measurement Results

2.1.1 CFR 47 Part 15 Radio frequency devices

Section in this Report	Test Name / Section FCC Part 15	Test Name	Measurement applicable	Verdict
4.1	§ 15.35 (c) Timing of the transmitter (Duty cycle correction factor)	RSS Gen Issue 2 Section 4.5	YES	pass
4.2	§ 15.249 (a) FIELDSTRENGTH OF FUNDAMENTAL	RSS 210, Issue 7 Section A2.9	YES	pass
4.3	§ 15.249 (a) (d) FIELDSTRENGTH OF HARMONICS and SPURIOUS	RSS 210, Issue 7 Section A2.9	YES	pass
4.4	§ 15.109 Receiver spurious emissions (radiated)	RSS 210, Issue 7 Section 4.10	NO	--
4.5	§ 15.107 / 15.207 Conducted Limits	RSS Gen	NO	--

3 Measurements and results

3.1 Description of test set-up

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas conform with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2003 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.4-2003 clause 4.2.

Antennas conform with ANSI C63.2-1996 item 15.

9 kHz – 150 kHz: Quasi Peak measurement, 100Hz Bandwidth, passive loop antenna.

150 kHz - 30 MHz: Quasi Peak measurement, 9kHz Bandwidth, passive loop antenna.

30 MHz - 200 MHz: Quasi Peak measurement, 120KHz Bandwidth, biconical antenna

200MHz - 1GHz: Quasi Peak measurement, 120KHz Bandwidth, log periodic antenna

>1GHz: Average, RBW 1MHz, VBW 10 MHz, waveguide horn with lownoise preamp

All measurement settings are according to FCC 15.209 and 15.207

4 FCC Part 15 Subpart C

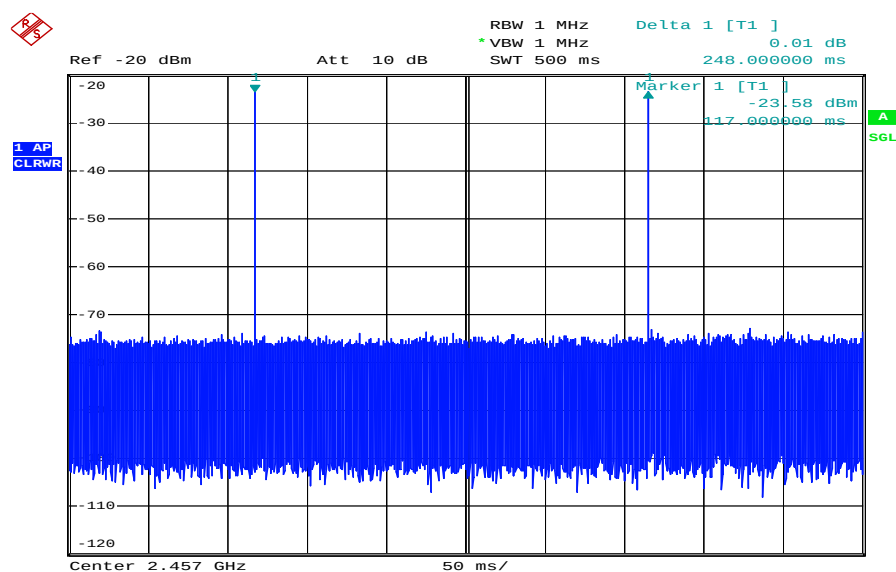
4.1 Timing of the transmitter

Reference

FCC:	CFR Part SUBCLAUSE § 15.35 (c)
IC:	RSS GEN

Timing schedule for 100 ms

EUT: Z-SENDER / Cadence Z-CAD

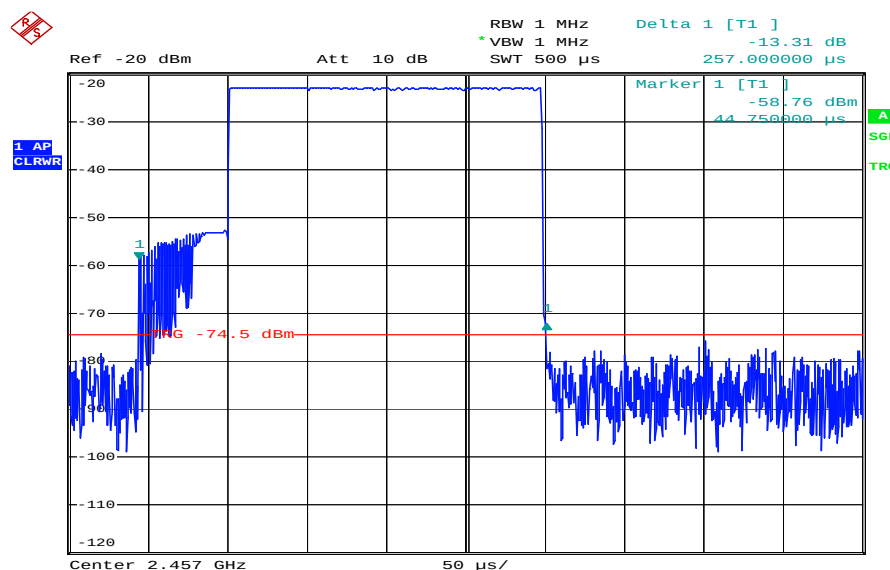


Date: 18.JAN.2008 10:21:39

Delta is 248 ms for the Z-Sender and 247ms for the Z-CAD.

Timing schedule of a single transmission

EUT: Z-SENDER / Cadence Z-CAD



Date: 21.JAN.2008 11:37:29

Within 100ms, there is only one packet .

According to FCC requirements we calculate the correction factor from Peak to Average

With $20 \cdot \log(0.00257) = -52.1$ dB.

Limits: § 15.35 (c)

(c) Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

Test report no.: 3-5310-01-09/07

Date: 2008-01-18

Page 11 of 24

4.2 Field Strength of the Fundamental

Reference

FCC:	CFR Part SUBCLAUSE § 15.249 (a)
IC:	RSS 210, Issue 7

MAXIMUM RADIATED OUTPUT POWER (Peak and Average)

EUT: Z-SENDER / Cadence Z-CAD

TEST CONDITIONS		MAXIMUM POWER (μV/m / 3m)	
Frequency		Peak	Average
T _{nom} 23 °C	V _{nom} 3.0V DC	2 457 MHz	2 457 MHz
		63.8 mV/m	(0.158 mV/m)
		(96.1 dBμV)	(44.0 dBμV)
Maximum deviation from output power under extreme test conditions (dBc)		not applicable	not applicable
Measurement uncertainty		±3dB	

RBW/VBW : 1 MHz

Average - Output power is calculated by using the correction factor from the duty cycle (here 52.1 db see page 10)

Limits

SUBCLAUSE § 15.249 (a)

Fundamental Frequency (MHz)	Field strength of Fundamental (mV/m)	Field strength of Harmonics (V/m)
902-928	50 (94 dB $\mu\text{V/m}$)	500 (54 dB $\mu\text{V/m}$)
2400-2483.5	50 (94 dB $\mu\text{V/m}$) (AV)	500 (54 dB $\mu\text{V/m}$)
5725-5875	50 (94 dB $\mu\text{V/m}$)	500 (54 dB $\mu\text{V/m}$)
24.0-24.25 GHz	250 (108 dB $\mu\text{V/m}$)	2500 (68 dB $\mu\text{V/m}$)

Test report no.: 3-5310-01-09/07

Date: 2008-01-18

Page 12 of 24

4.3 Field Strength of the Harmonics and Spurious

EUT: Z-SENDER / Cadence Z-CAD**Reference**

FCC:	CFR Part SUBCLAUSE § 15.249 (a)(d)
IC:	RSS 210, Issue 7

EMISSION LIMITATIONS				
f (MHz)	amplitude of emission (dBµV/m) AV/QP	limit max. allowed emmission power	actual attenuation below frequency of operation (dB)	results
2 457 MHz				
No critical peaks		see Limits		Complies
Measurement uncertainty		± 3dB		

Limits**SUBCLAUSE § 15.249 (a)**

Fundamental Frequency (MHz)	Field strength of Fundamental (mV/m)	Field strength of Harmonics (µV/m)
902-928	50 (94 dBµV/m)	500 (54 dBµV/m)
2400-2483.5	50 (94 dBµV/m)	500 (54 dBµV/m)
5725-5875	50 (94 dBµV/m)	500 (54 dBµV/m)
24.0-24.25 GHz	250 (108 dBµV/m)	2500 (68 dBµV/m)

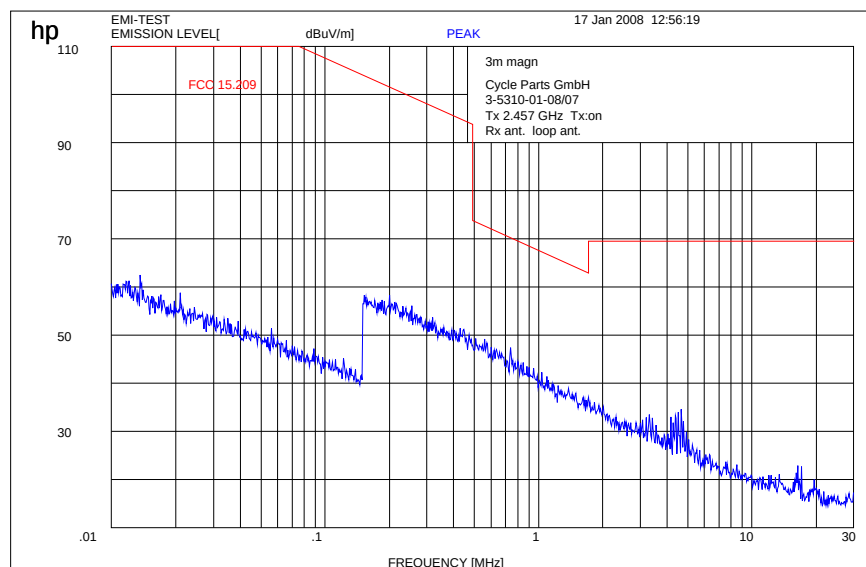
Limits**SUBCLAUSE § 15.249 (d)**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Traffic mode up to 30 MHz

Part 15.209 Magnetics

EUT: Z-Sender / Cadence Z - CAD



(to convert the measuring distance from 3m to 30m and 30 to 300m a correction factor from 40 dB/decade was used.)

Measurement distance 3m

This measurement was done in 3 polarisation's, the plot shows the worst case

Limits

SUBCLAUSE § 15.209

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.0009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

Test report no.: 3-5310-01-09/07

Date: 2008-01-18

Page 14 of 24

Tx : 30 MHz - 1 GHz

EUT: Z-SENDER / Cadence Z-CAD

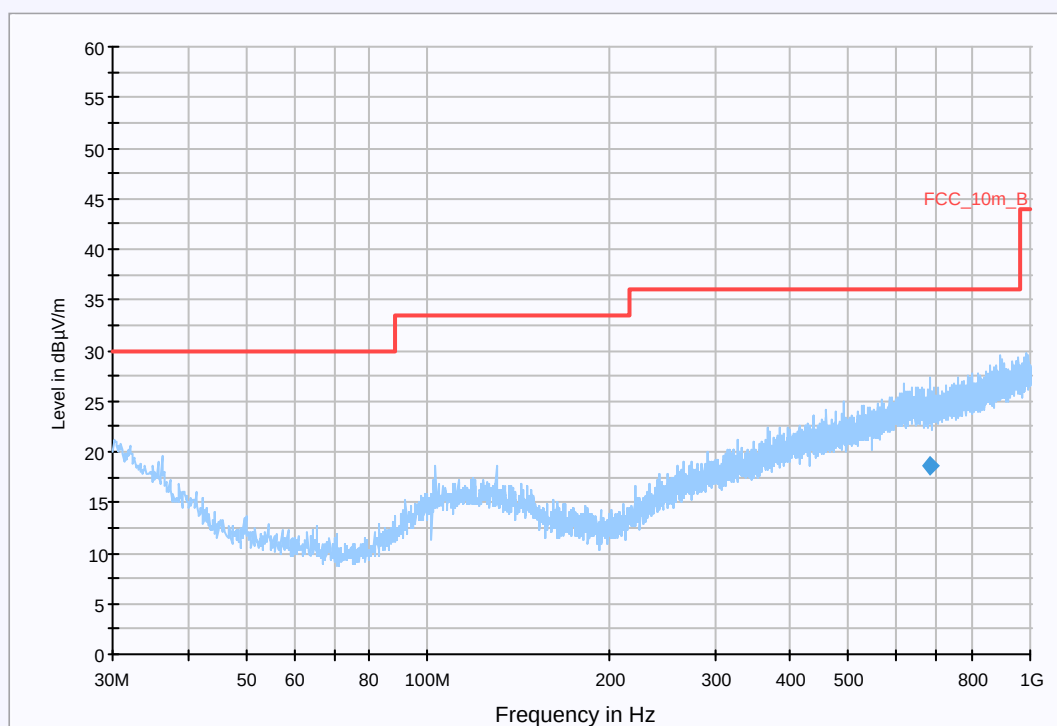
EUT: Z - SENDER / Cadence Z-CAD
Serial Number: none
Test Description: FCC part 15 class B @ 10 m
Operating Conditions: in use
Operator Name: Folz
Comment: Powered by battery (3V)

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: EMI radiated\Electric Field (NOS)
Level Unit: dBμV/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30MHz - 1GHz	QuasiPeak	120kHz	15s	Receiver

FCC_10m_FCCLIMIT(B)



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
680.404750	18.7	15000.000	120.000	253.0	V	13.0	21.7	17.3	36.0	

Test report no.: 3-5310-01-09/07

Date: 2008-01-18

Page 15 of 24

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

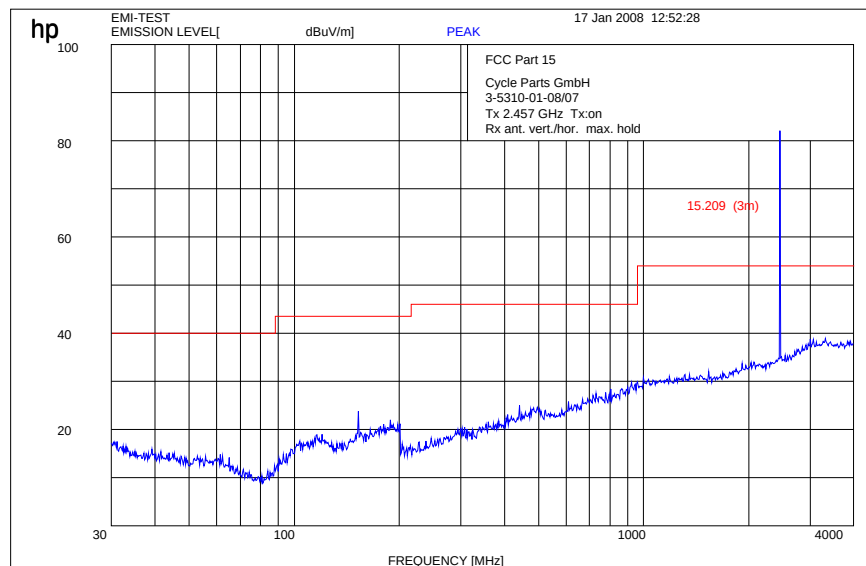
Subrange 1

Frequency Range: 30MHz - 1GHz

Receiver: Receiver [ESCI 3]
@ GPIB0 (ADR 20), SN 100083/003, FW 3.32, CAL 07.01.2009Signal Path: without Notch
FW 1.0Antenna: Chase Broadband BiLog Antenna CBL 6112
SN 2110, FW A, CAL 07.01.2009
Correction Table (vertical): Chase Broadband BiLog Antenna CBL
6112
Correction Table (horizontal): Chase Broadband BiLog Antenna CBL
6112
Correction Table: Cabel with switch (1007)Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.12Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9)

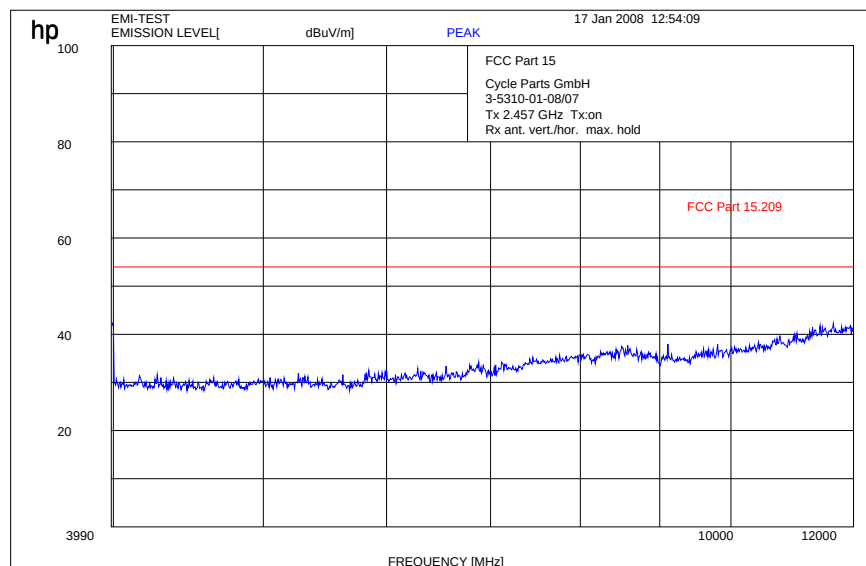
Tx : 30 MHz - 4 GHz

EUT: Z-SENDER / Cadence Z-CAD



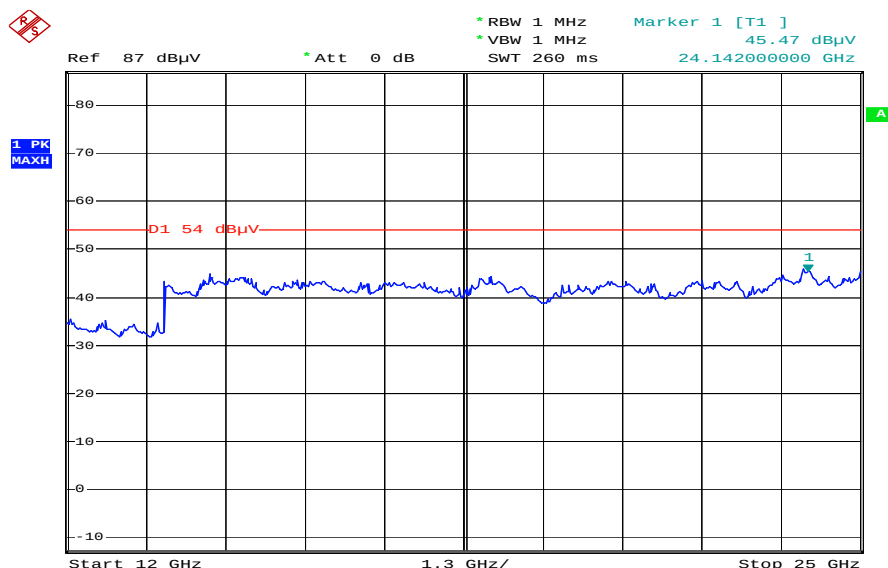
Tx : 4 GHz - 12 GHz

EUT: Speed Z - SENDER / Cadence Z-CAD



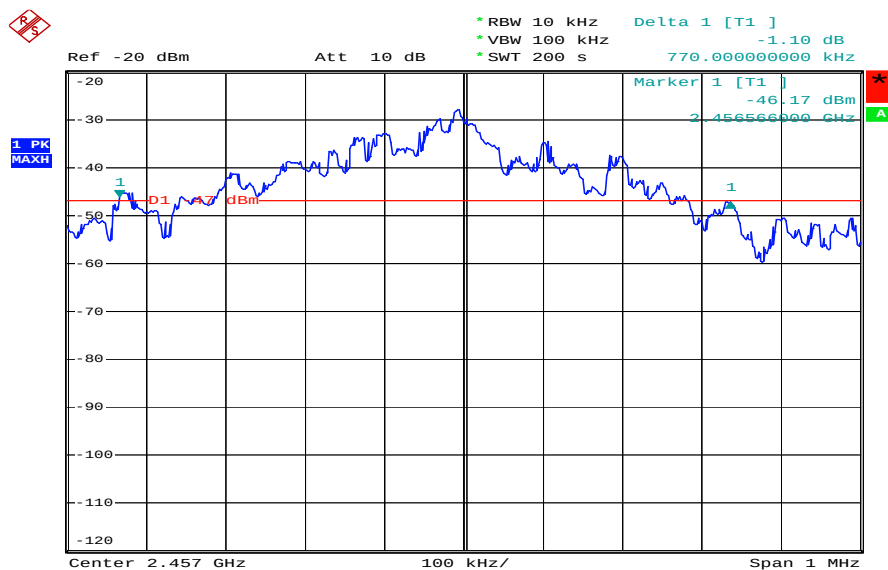
Tx : 12 GHz - 25 GHz

EUT: Z-SENDER / Cadence Z-CAD



Date: 3.AUG.2007 10:40:21

Occupied BW (99%)



Date: 21.JAN.2008 09:39:05

Test report no.: 3-5310-01-09/07

Date: 2008-01-18

Page 18 of 24

Used Testequipment

Anechoic chamber C:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Anechoic chamber	MWB	87400/02	300000996	Monthly verification		
2	System-Rack 85900	HP I.V.	*	300000222	n.a.		
3	Measurement System 1						
4	Spektrum Analyzer 8566B	HP	2747A05306	300001000	05.10.2006	24	05.10.2008
5	Spektrum Analyzer Display 85662A	HP	2816A16541	300002297	05.10.2006	24	05.10.2008
6	Quasi-Peak-Adapter 85650A	HP	2811A01131	300000999	05.10.2006	24	05.10.2008
7	RF-Preselector 85685A	HP	2837A00779	300000218	08.11.2006	24	08.11.2008
8	PC Vectra VL	HP		300001688	n.a.		
9	Software EMI	HP		300000983	n.a.		
10	Measurement System 2						
11	FSP 30	R&S	100623	ICT 300003464	26.10.2006	12	26.10.2007
12	PC	F+W			n.a.		
13	TILE	TILE			n.a.		
14	Biconical antenna	EMCO	S/N: 860 942/003		Monthly verification (System cal.)		
15	Log. Period. Antenna 3146	EMCO	2130	300001603	Monthly verification (System cal.)		
16	Double Ridged Antenna HP 3115P	EMCO	3088	300001032	Monthly verification (System cal.)		
17	Active Loop Antenna 6502	EMCO	2210	300001015	Monthly verification (System cal.)		
18	Power Supply 6032A	HP	2818A03450	300001040	12.05.2007	36	12.05.2010
19	Busisolator	Kontron		300001056	n.a.		
20	Leitungsteiler 11850C	HP		300000997	Monthly verification (System cal.)		
21	Power attenuator 8325	Byrd	1530	300001595	Monthly verification (System cal.)		
22	Band reject filter WRCG1855/1910	Wainwright	7	300003350	Monthly verification (System cal.)		
23	Band reject filter WRCG2400/2483	Wainwright	11	300003351	Monthly verification (System cal.)		

SRD Laboratory Room 005:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	FSP 30	R&S		300003575	02.04.2007	24	02.04.2009
2	CBT	R&S	100313	300003516	24.10.2006	24	24.10.2008
3	Switch Matrix	HP		300000929	n.a.		
4	Power Supply	HP	3041A00544	300002270	13.05.2007	36	13.05.2010
5	Signal Generator	R&S	836206/0092	300002680	30.05.2007	36	30.05.2010
6	Power Supply	Heiden	003202	300001187	12.05.2007	36	12.05.2010
7	Power Supply	Heiden	1701	300001392	12.05.2007	36	12.05.2010

CETECOM ICT Services GmbH

Untertürkheimer Str. 6-10, 66117 Saarbruecken
RSC-Laboratory

Phone: +49 (0) 681 598-0
Phone: +49 (0) 681 598-8412

Fax: -9075
Fax: -8484

Test report no.: 3-5310-01-09/07

Date: 2008-01-18

Page 19 of 24

Anechoic chamber F:

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal identification
Radiated emission in chamber F					
F-1	Control Computer	F+W		FW0502032	300003303
F-2	Bilog antenna	Chase	CBL 6112A	2110	300000573
F-3	EMI Test receiver	R&S	ESCI	100083	300003312
F-4	Turntable Controller	EMCO	1061 3M	1218	300000661
F-5	Tower Controller	EMCO	1051 Controller	1262	300000625
F-6	Tower	EMCO	1051 Tower	1262	300000625
F-7	Ultra Notch-Filter Rejected band Ch. 62	WRCD		9	

Test report no.: 3-5310-01-09/07

Date: 2008-01-18

Page 20 of 24

5 Annex A: Photographs of Test site**Photo No.: 01****EUT: Z-SENDER / Cadence Z-CAD****Photo No.: 02****EUT: Z-SENDER / Cadence Z-CAD**

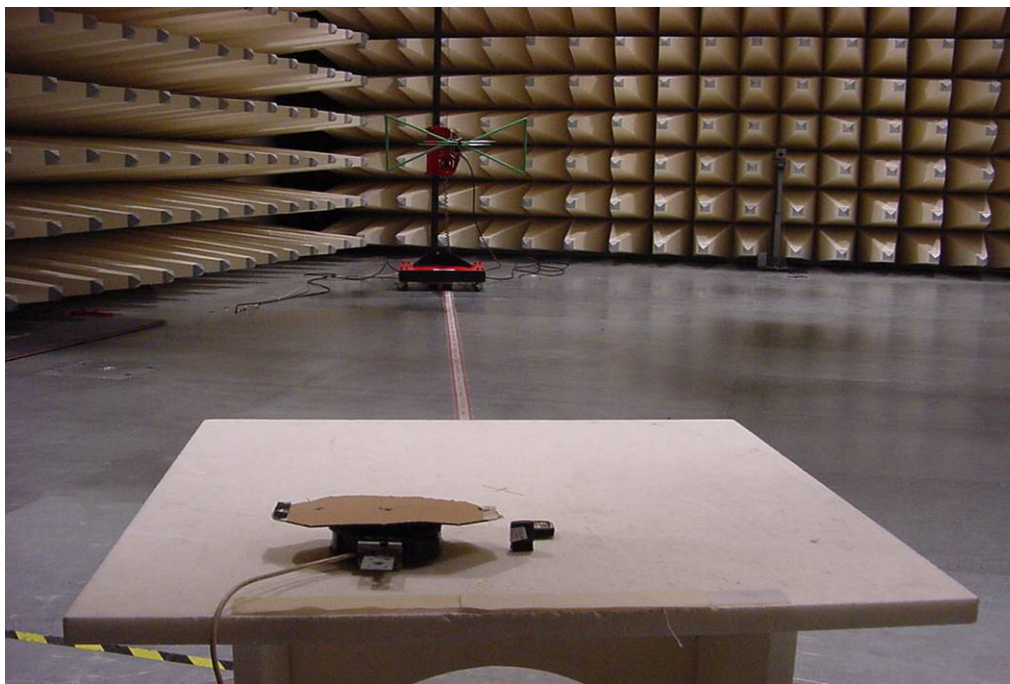
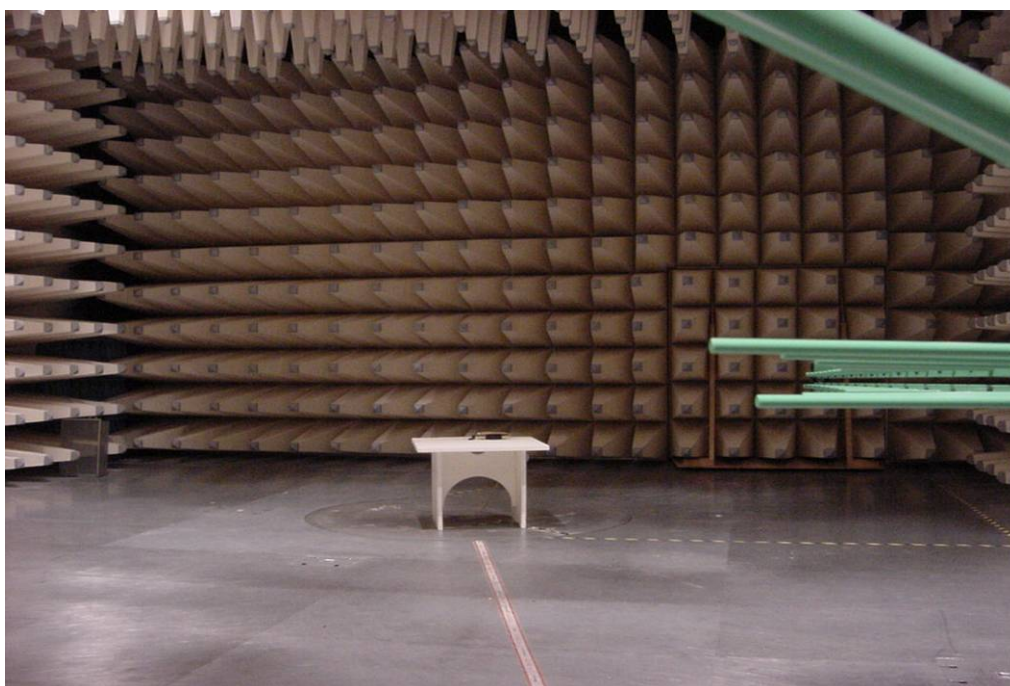
Photo No.: 03**EUT: Z-SENDER / Cadence Z-CAD****Photo No.: 04****EUT: Z-SENDER / Cadence Z-CAD**

Photo No.: 01**EUT: Z-SENDER / Cadence Z-CAD****Photo No.: 02****EUT: Z-SENDER / Cadence Z-CAD**

Photo No.: 03**EUT: Z-SENDER / Cadence Z-CAD****Photo No.: 04****EUT: Z-SENDER / Cadence Z-CAD**

Photo No.: 05**EUT: Z-SENDER / Cadence Z-CAD****Photo No.: 06****EUT: Z-SENDER / Cadence Z-CAD**