Accredited testing-laboratory

DAR registration number: DAT-P-176/94-D1

Federal Motor Transport Authority (KBA)
DAR registration number: KBA-P 00070-97

Recognized by the Federal Communications Commission
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: 3462C-1 (IC)
Certification ID: DE 0001
Accreditation ID: DE 0002

Accredited Bluetooth® Test Facility (BQTF)

The Bluetooth word mark and logos are owned by the Bluetooth SIG, Inc. and any use of such marks by Cetecom ICT is under license

Test report no.	**:**	**2-4900-02-23/08**
Type identification	**:**	**MBR W35**
Applicant	**:**	**Ericsson AB**
FCC ID	**:**	**PJWMBRW35**
IC Certification No	**:**	**287X-MBRW35**
Test standards	**:**	**47 CFR Part 2**
		47 CFR Part 22
		47 CFR Part 24
		RSS - 132 Issue 2
		RSS - 133 Issue 4
		RSS - 102 Issue 2

Table of contents

1 General information 3

1.1 Notes 3
1.2 Testing laboratory 4
1.3 Details of applicant 4
1.4 Application details 4

2 Test standard/s: 5

3 Technical tests 6

3.1 Details of manufacturer 6
3.1.1 Test item 7
3.2 Test Setup 8

4 Annex A: MPE calculation 9

4.1 Antenna configurations 9
4.2 MPE calculation 10
4.2.1 RF Technical Brief Cover Sheet acc. To RSS-102 11
4.3 Data sheets 12
4.3.1 Antenna combinations 12
4.3.2 Omni-directional antenna 13
4.3.3 Portable antenna 14
4.3.4 Yagi antenna 15
4.3.5 Adapter cable 16

1 General information

1.1 Notes

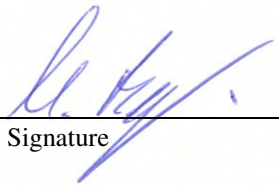
All test results of the EUT were taken from the test report 2-4900-02-07_08. This report only describes the MPE-Calculation of additional antennae.

The test results of this test report relate exclusively to the test item specified in 3.1.1. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations 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.

Test laboratory manager:

2009-05-07	**Marco Bertolino**	
Date	Name	Signature
2009-05-07	**Stefan Bös**	
Date	Name	Signature

Technical responsibility for area of testing:

2009-05-07	**Michael Berg**	
Date	Name	Signature

1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10
66117 Saarbrücken
Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
e-mail: info@ICT.cetecom.de
Internet: http://www.cetecom-ict.de

State of accreditation: **The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025**
DAR registration number: DAT-P-176/94-D1

Accredited by: **Federal Motor Transport Authority (KBA)**
DAR registration number: KBA-P 00070-97

Testing location, if different from CETECOM ICT Services GmbH:

Name :
Street :
Town :
Country :
Phone :
Fax :

1.3 Details of applicant

Name:	**Ericsson AB** **PDU RAN Transmission & Home**
Street:	**Datalinjen 3**
Town:	**58112 Linköping**
Country:	**Sweden**
Telephone:	**+46-13-322064**
Fax:	**+46 10 711 5089**
Contact:	**Anders Svensson**
E-mail:	**anders.b.svensson@ericsson.com**
Telephone:	**+46 10 711 5064**

1.4 Application details

Date of receipt of order:	**2009-04-25**
Date of receipt of test item:	**2009-04-25**
Date of start test:	**2009-05-02**
Date of end test:	**2009-05-07**
Persons(s) who have been present during the test:	**-/-**

2 Test standard/s:

47 CFR Part 2	**2006-10**	**Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission Frequency allocations and radio treaty matters; general rules and regulations**
47 CFR Part 22	**2006-10**	**Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission subchapter B - common carrier services, Part 22-Public mobile services**
47 CFR Part 24	**2006-10**	**Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission subchapter B - common carrier services, Part 24-Personal communications services**
RSS - 132 Issue 2	**2005-09**	**Spectrum Management and Telecommunications Policy - Radio Standards Specifications Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz**
RSS - 133 Issue 4	**2008-02**	**Spectrum Management and Telecommunications Policy - Radio Standards Specifications 2 GHz Personal Communication Services**
RSS - 102 Issue 2	**2005-11**	**Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)**

3 Technical tests

3.1 Details of manufacturer

Name:	**Ericsson AB PDU RAN Transmission & Home**
Street:	**Datalinjen 3**
Town:	**58112 Linköping**
Country:	**Sweden**

3.1.1 Test item

Kind of test item	:	**Mobile Broadband Router with Module MC8790V**
Type identification	:	**MBR W35**
Serial Number	:	**T710443474**
Frequency	:	**1850.2 – 1909.8 MHz and 824.2 – 848.8 MHz**
Type of modulation	:	**GMSK; 8-PSK; QPSK**
Emission Designator for GSM 1900	:	**GMSK: 303KGXW** **8-PSK: 316KG7W**
Emission Designator for GSM 850	:	**GMSK: 303KGXW** **8-PSK: 317KG7W**
Emission Designator for WCDMA 1900	:	**QPSK: 4M68F9W**
Emission Designator for WCDMA 850	:	**QPSK: 4M64F9W**
Number of channels	:	**300 (PCS1900) and 125 (PCS850)** **103 (FDD V) / 278 (FDD II)**
Antenna Type	:	**Internal antenna and external connector** **Optional Omni-directional antenna 301202 (Wilson)** **Optional Portable antenna Code 5508E** **Optional Yagi antenna 301129 (Wilson)**
Power supply (normal)	:	**DC power supply or Accu-pack**
Output power GSM 850 / GMSK	:	**cond.: 31.6 dBm**
Output power GSM 1900 / GMSK	:	**cond : 28.3 dBm**
Output power GSM 850 / 8-PSK	:	**cond.: 26.7 dBm**
Output power GSM 1900 / 8-PSK	:	**cond : 25.3 dBm**
Output power UMTS 850 / WCDMA	:	**cond.: 22.7 dBm**
Output power UMTS 1900 / WCDMA	:	**cond : 21.3 dBm**
Transmitter Spurious (worst case)	:	**0.00004 mW / -44 dBm (noise floor)**
Receiver Spurious (worst case)	:	**140 µV/m @ 3 m (noise floor)**
FCC ID	:	**PJWMBRW35**
Certification No. IC	:	**287X-MBRW35**
Open Area Test Site IC No.	:	**IC 3462C-1**
IC Standards	:	**RSS132, Issue 2; RSS133, Issue 4; RSS 102, Issue 2**

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:

2009-05-07	Stefan Bös	Stefan Bös
Date	Name	Signature

3.2 Test Setup

Hardware	:	R1A
Software	:	R12A

Mobile; (cond. measurements)	:	T710443474
Mobile; (rad. measurements)	:	T710443474

All test results of the EUT were taken from the test report **2-4900-02-07/08**. This report only describes the MPE-Calculation of additional antennae.

4 Annex A: MPE calculation

4.1 Antenna configurations

The EUT can be used with different antenna configurations:

- Internal PCB-antenna
- Omni-directional antenna
- Portable antenna (only 850 MHz-band)
- Yagi antenna (only 850 MHz-band)

The EUT is equipped with a switching MCX-connector to switch between internal and external antenna.

Maximum conducted output power configurations:

850 MHz:	GPRS multi-slot class 12	1.446 W
1900 MHz:	GPRS multi-slot class 12	0.468 W

Maximum antenna gain for internal PCB-antenna

850 MHz: Gain -0.2 dBi
1900 MHz: Gain 0.5 dBi

Maximum antenna Gain for Omni-directional antenna (datasheet in chapter 4.3.1)

850 MHz: Gain 5.12 dBi
1900 MHz: Gain 6.12 dBi

This antenna will be delivered with one 30 ft antenna cable. (30 feet RG58 coax with FME male and FME female connector)

So the effective gain can be calculated as follows:

Gain = Gain(Antenna) – Attenuation(cable)

850 MHz: Gain(eff) = 5.12 dBi – 2.27 dB = 2.85 dBi
1900 MHz: Gain(eff) = 6.12 dBi – 3.21 dB = 2.91 dBi

Maximum antenna Gain for Portable antenna (datasheets in chapter 4.3.2)

850 MHz: Gain 4.5 dBi

Maximum antenna Gain for Yagi-antenna (datasheets in chapter 4.3.3)

850 MHz: Gain 10.0 dBi (antenna)

This antenna will be delivered with two 30 ft antenna cables. (1 x ft 30 feet RG58 low loss coax with N-male and FME-female connector (cable 1) and 30 feet RG58 coax with FME- male and FME-female connector (cable 2))

So the effective gain can be calculated as follows:

Gain = Gain(Antenna) – Attenuation(cable 1) – Attenuation(cable 2)

850 MHz: Gain(eff) = 10 dBi – 2.27 dB – 2.27 dB = 5.46 dBi

4.2 MPE calculation

Maximum possible radiated output power configurations

850 MHz: 31.6 dBm + 5.46 dBi = 37.06 dBm = 5081 mW (EIRP) = 3104 mW (ERP) (with Yagi-antenna)

1900 MHz: 28.3 dBm + 2.91 dBi = 31.21 dBm = 1321 mW (EIRP) (with Omni-directional antenna)

Maximum permissive exposure (MPE)

850 MHz: Limit 0.57 mW/cm²

$PD = P_{rad} * DF / (4 * Л * r²)$

$PD = 5081 mW * 0.5 / (4 * Л * 20² cm²)$

PD = 0.505 mW/cm²

Result: The device complies with the rules for a distance of 20 cm.

1900 MHz: Limit 1.00 mW/cm²

$PD = P_{rad} * DF / (4 * Л * r²)$

$PD = 1321 mW * 0.5 / (4 * Л * 20² cm²)$

PD = 0.131 mW/cm²

Result: The device complies with the rules for a distance of 20 cm.

PD = Power Density
P_{rad} = Maximum radiated output power in mW
DF = Duty factor
r = Distance in cm

4.2.1 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: **287X**

2. MODEL NUMBER: **MBR W35**

3. MANUFACTURER: **Ericsson AB PDU RAN Transmission & Home**

4. TYPE OF EVALUATION: **(c) RF Evaluation**

- Evaluated against exposure limits: General Public Use ☒ Controlled Use ☐
- Duty cycle used in evaluation: 100 %
- Standard used for evaluation: RSS-102 Issue 2 (2005-11)
- Measurement distance: 0.20 m
- RF value: 5.05 V/m □ A/m □ W/m^2 ☒ (850 MHz)
- RF value: 1.31 V/m □ A/m □ W/m^2 ☒ (1900 MHz)

Measured ☐ Computed ☐ Calculated ☒

Declaration of RF Exposure Compliance

ATTESTATION:

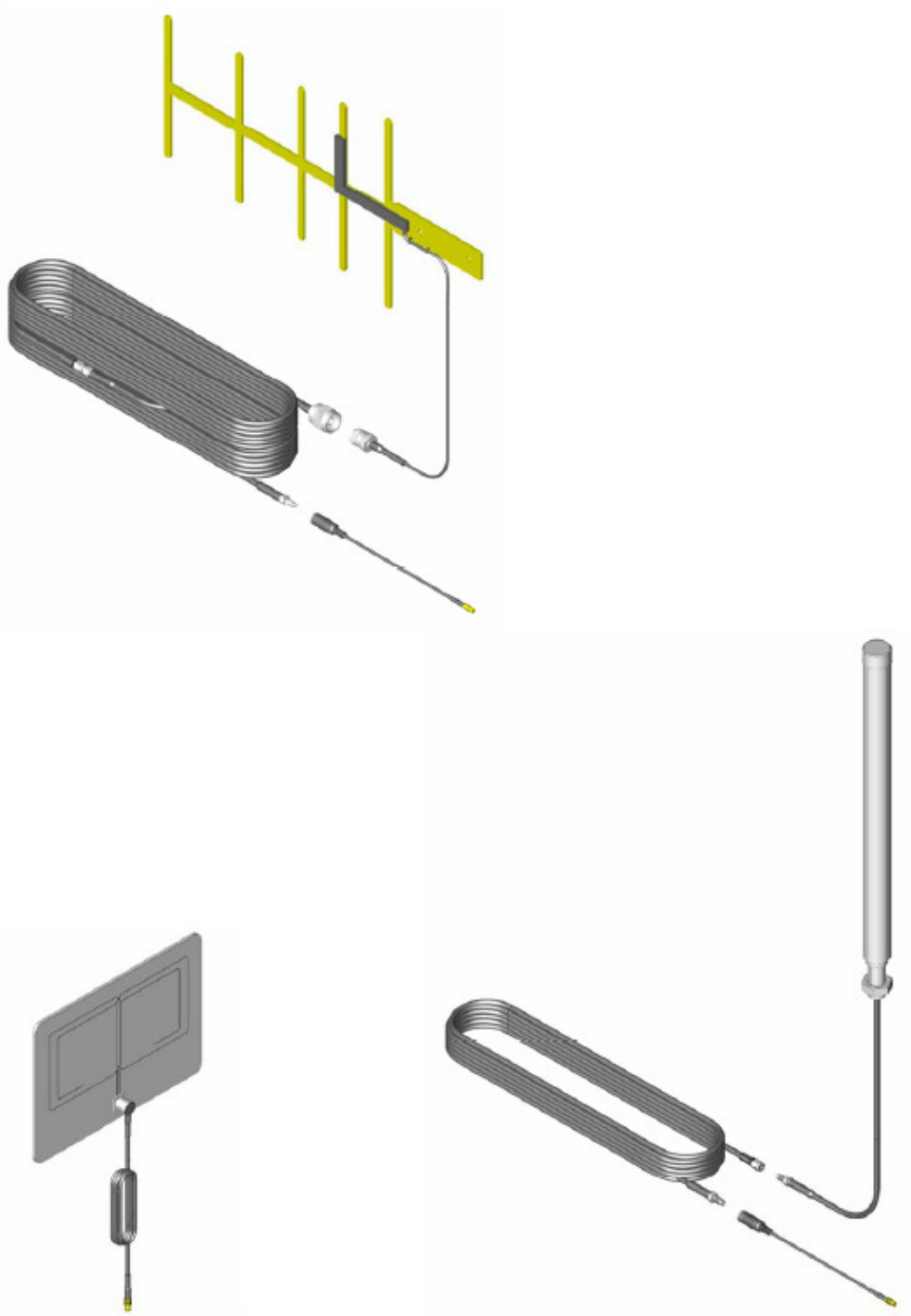
I attest that the information provided in this test report are correct; that a Technical Brief was prepared and the information it contains is correct; that the device evaluation was performed or supervised by me; that applicable measurement methods and evaluation methodologies have been followed and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

Name: Stefan Boes
Title: Dipl.Ing.(FH)
Company: Cetecom ICT Services GmbH

4.3 Data sheets

4.3.1 Antenna combinations

Antennas 090505



4.3.2 Omni-directional antenna

Omni-directional Antenna

800/1900 MHz

FEATURES

- Omni-directional dual-band antenna
- Mounting hardware included
- For fixed installations

SPECIFICATIONS

Part Number	301202
Frequency	806-894 / 1850-1990
Impedance	50 ohm
Antenna Gain	5.12 dBi 806-894 / 6.12 dBi 1850-1980
Max Power	25 watts
Polarization	Vertical
Ground Plane	built-in
Connector	FME Female connector
Length	18 inches

BENEFITS

- Built-in ground plane
- Discreet design
- Weather resistant

www.wilsonelectronics.com 30 **Toll Free 1-866-294-6996**

4.3.3 Portable antenna

850MHz + 900MHz Portable Antenna

FREQ: 850MHz and 900MHz

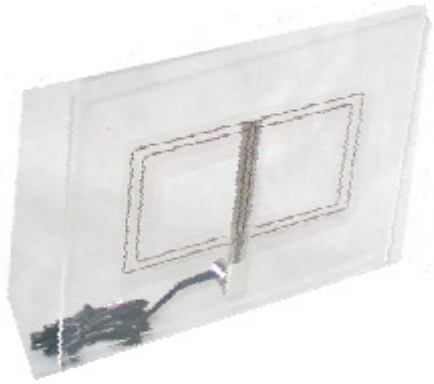
GAIN: 4.5dBi

THIS ANTENNA IS GROUND INDEPENDENT

Code 5508E

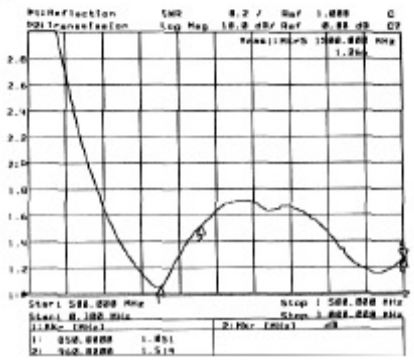
This portable antenna uses the LASER CLEAR transparent 707 element which is mounted on a clear acrylic panel with removable feet for easy portability.

The RG174 cable has a proprietary Snap-on-connector at the antenna end. This can be swivelled to the desired direction for cable routing.



Electrical

Radiator: 2 x full-wave loop with common center element.
Gain: 4.5dBi
VSWR: <2.5:1 @ 825MHz and 960MHz
<1.5:1 @ band centers (TX & RX)
Polarisation: mixed
Max Power: 10 watts



Mechanical

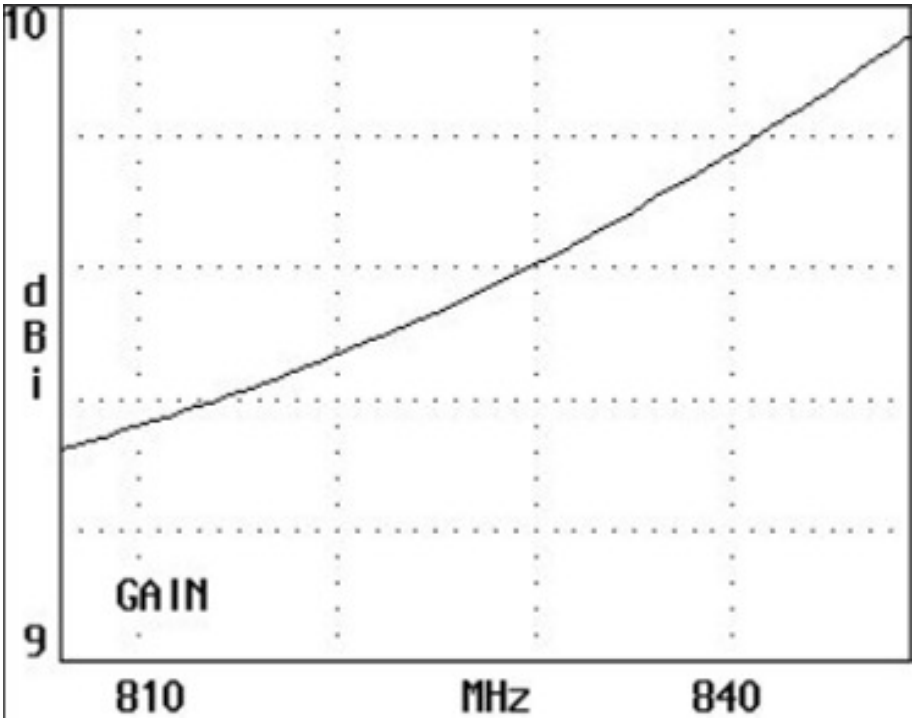
Radiating Element: Copper plated (10-15um) silver ink tracks
Substrate: CT 7 Polyester / Mylar film (180um) Not affected by UV
Adhesive/Dielectric: 3M467

Cable & Connector

RG174 with propietary Snap-on connector and MCX

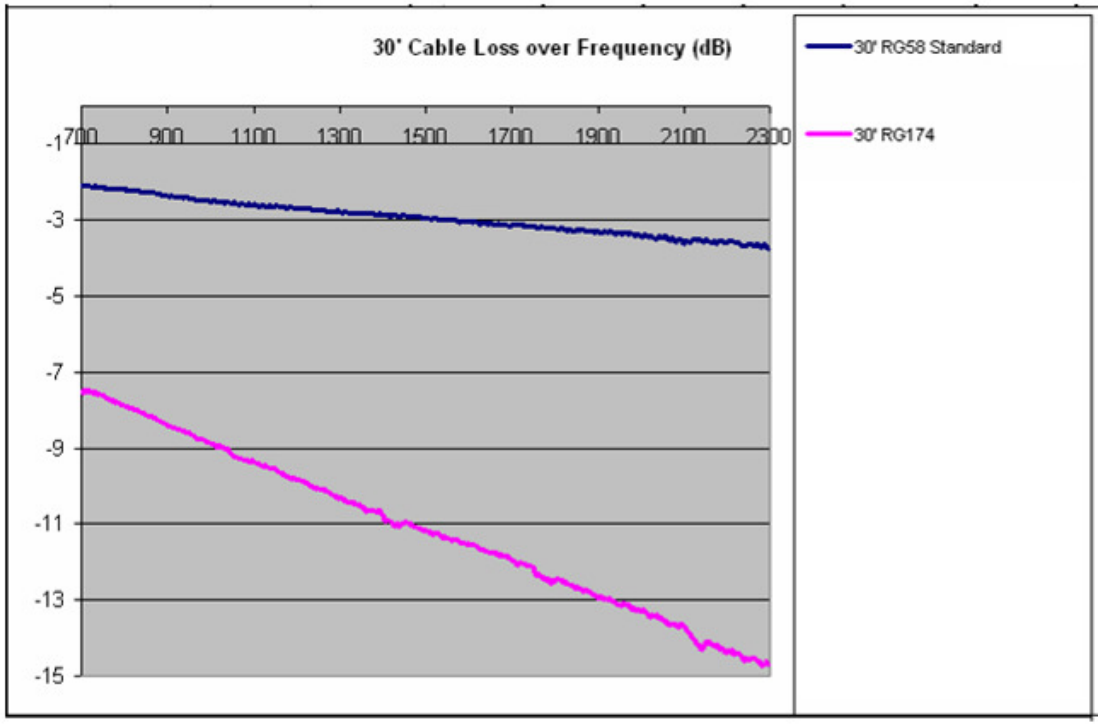
4.3.4 Yagi antenna

CKA 4/30/09 – Theoretical gain of Wilson 301129, 5 element Yagi



4.3.5 Adapter cable

CKA test – 4/23/2009; All frequencies shown are in MHz



Attenuation of 30 FT cable (RG58): 2.27 dB @ 850 MHz
3.21 dB @ 1900 MHz