



 <p>SWEDAC ACCREDITERING 1761 ISO/IEC 17025</p>	<p>Rapport utfärdad av ackrediterat provningslaboratorium <i>Test report issued by an Accredited Testing Laboratory</i></p>
--	---

EMF Test Report: Ericsson RD 2242 B4 R1A

Document number:	Rev C	Date of report:	2014-10-02
Testing laboratory:	Ericsson EMF Research Laboratory Ericsson AB SE-164 80 Stockholm Sweden	Company/Client:	FJB/RIC Peter Wedin Ericsson AB SE-164 80 Stockholm Sweden
Tests performed by:	Davide Colombi	Dates of tests:	2014-09-01
Manufacturer and market name(s) of device:	Ericsson RD 2242 B4 R1A		
Testing has been performed in accordance with:	FCC CFR title 47, part 1.1310, FCC OET Bulletin 65, FCC KDB447498 D01, Industry Canada RSS 102		
Test results:	The tested device complies with the requirements in respect of all parameters subject to the test.		
Additional information:	Testing was conducted for mobile exposure conditions		
Signature:	<p style="text-align: center;">Test engineer</p> <p style="text-align: center;"></p> <hr style="width: 20%; margin: auto;"/> <p style="text-align: center;">Davide Colombi Senior Researcher davide.colombi@ericsson.com Tel: +46 10 717 7089</p>	<p style="text-align: center;">Quality Manager</p> <p style="text-align: center;"></p> <hr style="width: 20%; margin: auto;"/> <p style="text-align: center;">Björn Thors Master Researcher bjorn.thors@ericsson.com Tel: +46 10 717 1824</p>	

1 Summary of EMF Test Report¹

Frequency Band [MHz]	2100
Modes	LTE
Supported	<input checked="" type="checkbox"/>
Covered by report	<input checked="" type="checkbox"/>
Exposure environment	General public

1.1 Results

RF exposure assessment results for general public (uncontrolled) exposure applicable in USA and Canada [1] - [4] are given in the table below. The equipment under test (EUT) conforms to the requirements of the relevant standards when the combined exposure ratio is less than one.

RF exposure assessment results for general public (uncontrolled) exposure as obtained for the RDS together with an assumed output power tolerance of 2 dB and a transmission loss of 0.5 dB using procedures applicable for the US and Canadian markets [3], [4].

3GPP band	Standard	Nominal output power from the radio	Test position	Test separation distance	Exposure ratio	Result
B4 (2100)	L	2 x 0.05 W	Direction of maximum gain	20 cm	0.1	PASSED

¹ This page contains a summary of the test results. The full report provides a complete description of all test details and results.

2 General information

The test results reported in this document have been obtained by simple calculations according to plane-wave equivalent conditions [4]. The purpose of the tests was to verify that the EUT is in compliance with the appropriate RF exposure standards, recommendations and limits [1] - [4].

3 Equipment under test

Table 1 summarizes the technical data for the EUT. Photographs of the EUT are presented in Appendix A.

Table 1 Technical data for the EUT.

Product name	RD 2242 B4 R1A		
Product tested	KRY 901 309/1	Serial number	C828243813
Dimensions, Thickness x Diameter (mm)	50 x 109		
Configurations(s) covered by this report	LTE 2100 (B4)		
Antenna(s)	Internal antennas	Product number	Maximum gain (dBi)
		KRE 1012191/2 R1A	2.3
Transmitter frequency range (MHz)	LTE 2100 (B4): 2110 – 2155		

In Table 2 nominal output power levels are given.

Table 2 Nominal output power levels.

Band / Mode	Nominal output power² (dBm)	Tolerance, upper limit (dB)	Transmission loss (dB)	Maximum output power³ (dBm)
LTE B4 (2100), 2x50mW	17	2	0.5	21.5

4 EMF exposure assessments

FCC procedures [4] specify exposure assessment methods to verify compliance with EMF exposure limits [1] of mobile devices. A minimum test separation distance of at least 20 cm is required between the device and nearby persons to apply mobile device exposure limits. The test separation distance for which the equipment is shown to comply with the exposure limits must be clearly provided in the operating and installation instructions.

4.1 Field strength calculations

The maximum gain, G_{ANT} , of the two antennas used is 2.3 dBi (1.7), see Table 1. Assuming correlated transmit signals, the directional gain, G , may be taken as 5.3 dBi according to [5]. This is most likely a very conservative assumption given the used transmission modes and antenna topology.

The total effective radiated power for the omni-directional antennas is 0.29 W. As a consequence, the categorical exclusion provision of FCC CFR title 47, § 2.1091(c) applies [6] and the minimum test separation distance may be estimated by simple calculations according to plane-wave equivalent conditions [4].

The exposure ratio, ER , may be conservatively estimated as

² Nominal output power per port.

³ Conservative measure of the total maximum possible output power level delivered to the antennas including losses and tolerances.

$$ER = \frac{S_{est}}{S_{lim}} = \frac{P_{tot}G}{4\pi r^2 S_{lim}},$$

where

P_{tot} = Total conducted power for the cellular bands (21.5 dBm).

r = Separation distance from antenna.

S_{lim} = Power density exposure limit of 10 W/m².

The result for a 20 cm test separation distance is given in Table 3.

Table 3 RF exposure assessment results for general public (uncontrolled) exposure as obtained for the RDS using procedures applicable for the US and Canadian markets [3], [4].

3GPP band	Standard	Nominal output power from the radio	Test position ⁴	Test separation distance ⁵	Exposure ratio	Result
B4 (2100)	L	2 x 0.05 W	Direction of maximum gain	20 cm	0.1	PASSED

The exposure ratio is well below one. Hence, the RF EMF exposure is below the relevant exposure limits [1] for the 20 cm test separation distance.

5 Conclusion

The results in Section 4 show that the plane-wave equivalent power density, estimated according to the requirements of FCC [4] and Industry Canada [3], is below the relevant MPE limits [1] at a separation distance of 20 cm between the equipment and any nearby person.

Consequently, the EUT is in compliance with the appropriate RF exposure standards and recommendations.

6 References

- [1] FCC, Code of Federal Regulations CFR title 47, part 1.1310 “Radiofrequency radiation exposure limits”, Federal Communications Commission (FCC), August 1997.
- [2] FCC, OET Bulletin 65, “Evaluating compliance with FCC guidelines for human exposure to radiofrequency electromagnetic fields”, August 1977.
- [3] Industry Canada, Radio Standard Specification (RSS) 102, (Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), 2010.
- [4] FCC KDB447498 D01, “Mobile and Portable Devices RF exposure procedures and Equipment Authorization Policies”, February 2014.
- [5] FCC KDB662911 D01, “Emissions Testing of Transmitters with Multiple Outputs in the Same Band”, 2013.
- [6] FCC, Code of Federal Regulations CFR title 47, part 2.1091, “ Radiofrequency radiation exposure evaluation: mobile devices”, Federal Communications Commission (FCC), November 2013.

⁴ For a test separation distance of 20 cm, the exposure was found to be well below applicable exposure limits in the direction of maximum gain. Since this test position corresponds to the direction of maximum exposure and the RDS is classified as a mobile device with an intended separation distance to the user or nearby persons of at least 20 cm, other test positions were not considered.

⁵ The separation distance is measured from the EUT casing.

7 Revision History

Rev.	Date	Description
A	2014-09-08	First revision
B	2014-09-24	Corrected typo in Table 3
C	2014-10-02	Considered effect of possible array gain

APPENDIX A: Photographs of the EUT



(a)

(b)

Figure A.1 The EUT. (a) Front view with radome. (b) Slanted view without radome.