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Test report issued by an Accredited Testing Laboratory

EMF Test Report: Ericsson RD 2243 B14 (FCC)

Document number:	GFTL-19:000931 Uen, Rev B	**Date of report:**	2019-09-03
Testing laboratory:	Ericsson EMF Research Laboratory Ericsson AB SE-164 80 Stockholm Sweden	**Company/Client:**	Denis Lalonde Ericsson Canada 349 Terry Fox Drive Ottawa ON K2K 2V6 Canada
Tests performed by:	Paramananda Joshi	**Dates of tests:**	2019-08-30 (Rev A) 2019-09-03 (Rev B)
Manufacturer and market name(s) of device:	Ericsson RD 2243 B14		
Testing has been performed in accordance with:	FCC OET Bulletin 65		
Test results:	Minimum separation distance for which the RF EMF exposure complies with the limits in FCC 47 CFR 1.1310 to be included in the Customer Product Information (CPI) for Ericsson RD 2243 B14.		
Additional information:	Testing was conducted for mobile exposure conditions according to KDB447498 DO1.		

Signature:	Test Engineer	Laboratory and Quality Manager
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1 Summary of EMF Test Report[1]

Equipment under test (EUT)

Product name	Ericsson RD 2243 B14		
Product number	KRY 901 451/1		
Supported bands, Tx frequency range (MHz), and standards	B14 (700)	758 – 768	LTE FDD
Exposure environment	General public/uncontrolled		

Results

The minimum (test) separation distance required for the equipment under test (EUT) to comply with the mobile device exposure conditions and relevant limits applicable in the USA [1]-[3] is provided in the table below for the general public (uncontrolled exposure).

RF exposure assessment results for general public (uncontrolled) exposure as obtained for RD 2243 B14 together with an assumed output power tolerance of 2 dB using procedures applicable for the US market [3].

Band	Standard	Nominal output power from the radio	Test position	Separation distance
B14	LTE	2 x 0.05 W	Direction of maximum gain	20 cm

[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 [3]. The purpose of the tests was to verify that the EUT is in compliance with the appropriate RF exposure standards, recommendations and limits [1]–[3].

It should be noted that the test results presented in this test report are valid for the frequency range and for the antenna properties specified in Table 1, in addition to the power level and the power tolerance specified in Table 2. These data were supplied by the client and may affect the validity of the results.

Proposed EMF health and safety information for inclusion in the Customer Product Information (CPI) is provided in Appendices A and B.

3 Equipment under test

Table 1 summarizes the technical data for the EUT.

Table 1 Technical data for the EUT.

Product name	Ericsson RD 2243 B14		
Product tested	KRY 901 451/1		
Supported bands, Tx frequency range (MHz), and standards	B14 (700)	758 – 768	LTE FDD
Dimensions, Thickness x Diameter (mm)	52 × 140		
Configuration(s) covered by this report	B14 (700)		
Antenna(s)	Two internal antenna branches	Maximum antenna gain: 1.7 dBi	
Exposure environment	General public/uncontrolled		

In Table 2 nominal output power levels are given. The EUT related data in Table 1 and Table 2 were supplied by the client.

Table 2 Nominal output power levels.

Band	Standard	Nominal output power[2] [dBm]	Power tolerance [dB]	Transmission loss [dB]	Maximum output power[3] [dBm]
B14	LTE (FDD)	17	2	0	22

4 EMF exposure assessments

FCC procedures [3] 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 minimum 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.

The assessments were conducted for maximum power configurations, i.e., by assuming 100% utilization. Effects of real RBS utilization (time-averaged) is reasonably foreseeable and will significantly reduce the time-averaged power and the RF exposure. This factor was not considered in this assessment, which adds to the conservativeness of the obtained compliance boundaries.

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

4.1 Field strength calculations

Transmit signals from the two antenna ports have been assumed to be correlated. Based on the maximum gain of the single antenna (G_{ant} = 1.7 dBi, see Table 1), the directional gain, G, may be taken as 4.7 dBi according to [4] ($G = G_{\text{ant}} + 10\log_{10} N$, where N is the number of simultaneously transmitting antennas). This is most likely a very conservative assumption since the antennas are spatially separated and their maximum gain occurs at different locations which add extra conservativeness of the results.

The total effective radiated power based on the maximum antenna gain of 4.7 dBi as described above and the output power level of Table 2 is 0.3 W, which is less than the categorical exclusion limit for routine RF exposure evaluation of 1.5 W[4] specified in the FCC CFR title 47, § 2.1091(c) [5]. As a consequence, the minimum test separation distance may be estimated by simple calculations according to plane-wave equivalent conditions [3].

Power density may be conservatively estimated as

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

where

P_{tot}: Total conducted power for the cellular bands[5],

G : Directional gain[6],

r: Separation distance from antenna,

S_{est} : Estimated power density.

For a minimum test separation distance of 20 cm (Table 3) the estimated power density is 0.94 W/m^2. This complies with the RF exposure evaluation conditions and the relevant exposure limit applicable in the USA [1]-[3] (see Table 4) for the general public (uncontrolled exposure).

Table 3 RF exposure assessment results for general public (uncontrolled) exposure as obtained for RD 2243 B14 together with an assumed output power tolerance of 2 dB using procedures applicable for the US market [3].

Band	Standard	Nominal output power from the radio	Test position	Separation distance
B14	LTE	2 x 0.05 W	Direction of maximum gain	20 cm

Table 4 General public (uncontrolled) RF EMF exposure limits applicable in the US market [1],[2]. The lowest exposure limit value within the tested frequency band was used for the assessmet and is reported in the table.

Band	S_{lim} (W/m^2)
B14 (700)	5.0

5 Conclusion

The results in Section 4 show that the plane-wave equivalent power density for the Ericsson RD 2243 B14, estimated according to the requirements of FCC [3] is below the relevant MPE limits [1] at a separation distance of at least 20 cm between the equipment and any nearby person.

[4] Valid for frequency ≤ 1500 MHz.
[5] This is equal to the maximum output power (in W) in Table 2.
[6] This is equal to linear value of G.

6 References

[1] FCC, Code of Federal Regulations CFR title 47, part 1.1310 “Radiofrequency radiation exposure limits”, Federal Communications Commission (FCC), 2017.

[2] FCC, OET Bulletin 65, “Evaluating compliance with FCC guidelines for human exposure to radiofrequency electromagentic fields”, 1997.

[3] FCC KDB 447498 D01, “Mobile and Portable Devices RF exposure procedures and Equipment Authorization Policies”, 2015.

[4] FCC KDB 662911 D01, “Emissions Testing of Transmitters with Multiple Outputs in the Same Band”, 2013.

[5] FCC, Code of Federal Regulations CFR title 47, part 2.1091, “ Radiofrequency radiation exposure evaluation: mobile devices”, Federal Communications Commission (FCC), 2017.

7 Revision History

Rev.	Date	Description
A	2019-09-02	First revision
B	2019-09-03	Added estimated power density value.

Appendix A. Information to be included in the CPI

Table A.1 lists the minimum separation distance for which the RF EMF exposure from RD 2243 B14 is below the limits specified by the FCC as applicable in:

- USA (47 CFR 1.1310)

Table A.1: Minimum separation distance for general public/uncontrolled exposure applicable in USA and markets employing the FCC RF exposure limits (including 2 dB output power tolerance).

Band	Standard	Nominal output power from the radio	Test position	Separation distance
B14	LTE	2 x 0.05 W	Direction of maximum gain	20 cm

Appendix B. Guidelines on how to install the product

The Ericsson RD 2243 B14 (KRY 901 451/1) shall be installed to make sure that the general public does not have access to the applicable RF EMF compliance boundary. The compliance boundary dimensions were determined for the product transmitting in free space.