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Test report issued by an Accredited Testing Laboratory

EMF Test Report: Ericsson RDS 2243 B41

Document number:	Rev A	**Date of report:**	2017-10-03
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:	Björn Thors	**Dates of tests:**	2017-09-29
Manufacturer and market name(s) of device:	Ericsson RD 2243 B41		
Testing has been performed in accordance with:	FCC CFR title 47, part 1.1310, FCC OET Bulletin 65, FCC KDB447498 D01, Innovation, Science and Economic Development 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		

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1 Summary of EMF Test Report[1]

Frequency Band [MHz]	2600
Modes	LTE
Supported	☑
Covered by report	☑
Exposure environment	General public

1.1 Results

RF exposure assessment results for general public (uncontrolled) exposure applicable in USA [1] - [3] 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 RD 2243 together with an assumed output power tolerance of 2 dB using procedures applicable for the US market [3].

3GPP band	Standard	Nominal output power from the radio	Test position	Test separation distance	Exposure ratio	Result
B41 (2600)	L	2 x 126 mW	Direction of maximum gain	20 cm	0.3	**PASSED**

The maximum EIRP has been found to be 1.3 W which is below the applicable exemption limit for routine evaluations of 2.75 W specified in RSS-102 [4]. As a consequence, for the Canadian market, no RF exposure evaluation is required.

[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] - **Error! Reference source not found.** .

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 2243 B41		
Product tested	KRY 901 405/1		
Dimensions, Thickness x Diameter (mm)	52 x 140		
Configurations(s) covered by this report	LTE 2600 (B41)		
Antenna(s)	Internal antennas	Product number	Maximum gain (dBi)
		KRE 101 2342/1	3.8
Transmitter frequency range (MHz)	LTE 2600 (B41): 2496 - 2690		

In Table 2 nominal output power levels are given.

Table 2 Nominal output power levels.

Band / Mode	Maximum downlink/uplink ratio	Nominal output power[2] (dBm)	Tolerance, upper limit (dB)	Transmission loss (dB)	Maximum output power[3] (dBm)
LTE B41 (2600), 2x126 mW	74 / 26	21	2	0.5	24.2

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 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 US market – field strength calculations

The maximum gain, G_{ANT}, of the two antenna ports used is 3.8 dBi (2.4), see Table 1. Assuming correlated transmit signals, the directional gain, G, may be taken as 6.8 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 antennas is 0.77 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 [3].

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, tolerances, and maximum downlink/uplink ratio.

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

where

P_{tot}: Total conducted power for the cellular bands (24.2 dBm),

G : Directional gain (6.8 dBi),

r: Separation distance from antenna

S_{lim} : Power density exposure limit of 10 W/m^2.

Setting P_{tot}= 0.263 W, G = 4.78, r = 0.20 m and S_{lim} = 10 W/m^2 gives the result for a 20 cm test separation distance 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 market [3]

3GPP band	Standard	Nominal output power from the radio	Test position[4]	Test separation distance[5]	Exposure ratio	Result
B41 (2600)	L	2 x 0.126 W	Direction of maximum gain	20 cm	0.3	**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.

4.2 Canadian market – use of exemption limits

According to the requirements in RSS-102 [4], in the frequency range at or above 300 MHz and below 6 GHz RF exposure evaluation is not required if the following exemption limit is fulfilled

$$EIRP \leq 0.0131 f^{0.6834} \text{ W},$$

where f is the frequency in MHz. With a total conducted power of 24.2 dBm and a maximum directional gain of 6.8 dBi the maximum $EIRP$ = 1.3 W, which is below the exemption limit $EIRP_{\text{lim}} = 0.0131 \cdot 2496^{0.6834}$ W = 2.75 W. As a consequence, no RF exposure evaluation is required according to the Canadian regulatory requirements [4].

5 Conclusion

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

The maximum EIRP has been found to be 1.3 W which is less than the applicable exemption limit for routine evaluations of 2.75 W specified in RSS-102 [4]. As a consequence, for the Canadian market, no RF exposure evaluation is required.

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

[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.

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] Innovation, Science, and Economic Development Canada (Industry Canada), Radio Standard Specification (RSS) 102, (Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), 2015.

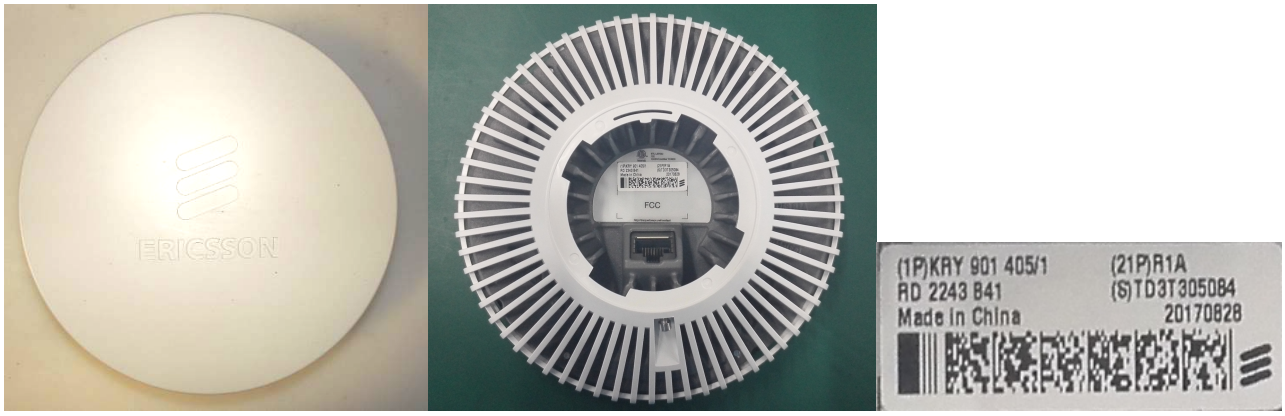
[5] FCC KDB 662911 D01, “Emissions Testing of Transmitters with Multiple Outputs in the Same Band”, 2013.

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

7 Revision History

Rev.	Date	Description
A	2017-10-03	First revision

APPENDIX A: Photographs of the EUT



(a) **(b)** **(c)**

Figure A.1 The EUT. (a) Front view. (b) Back view. (c) Sticker.