

**Rapport utfärdad av ackrediterat provningslaboratorium**
*Test report issued by an Accredited Testing Laboratory*Ackred. Nr 1761
Provning
ISO/IEC 17025**EMF Test Report: Ericsson Radio 2205 B46**

Document number:	Rev C	Date of report:	2017-07-06
Testing laboratory:	Ericsson EMF Research Laboratory Ericsson AB SE-164 80 Stockholm Sweden	Company/Client:	Tingting Wang CBC - Ericsson Communications Co. Ltd. ET2, No.5 Lize East street, Chaoyang District 100102 Beijing China
Tests performed by:	Björn Thors	Dates of tests:	2017-07-06 (Rev C)
Manufacturer and market name(s) of device:	Ericsson Radio 2205 B46		
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		
Signature:	Deputy Quality Manager  Paramananda Joshi Experienced Researcher paramananda.joshi@ericsson.com Tel: +46 10 711 00 06	Test engineer, Quality Manager  Björn Thors Senior Specialist - RF Exposure Assessment bjorn.thors@ericsson.com Tel: +46 10 717 18 24	

1 Summary of EMF Test Report¹

Frequency Band [MHz]	5000
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 Radio 2205 together with an assumed output power tolerance of 1 dB and a transmission loss of 0.5 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
B46	L	2 x 0.32 W (external omni-directional antenna)	Direction of maximum gain	20 cm	0.57	PASSED
B46	L	2 x 0.11 W (internal sector coverage antenna)	Direction of maximum gain	20 cm	0.57	PASSED

The maximum EIRP has been found to be 2.82 W which is below the applicable exemption limit for routine evaluations of 4.5 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 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] - [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	Radio 2205		
Product tested	KRC 161 609/1		
Dimensions, Width x Height x Depth (mm)	200 x 200 x 100 (including mounting bracket and front cover)		
Configurations(s) covered by this report	LTE 5000 (B46)		
Antenna(s)		Product number	Maximum gain (dBi)
	External omni-directional antenna	Galtronics P6480i	6.0
	Internal sector coverage antenna	KRE 105 259/1	10.5
Transmitter frequency range (MHz)	LTE 5000 (B46): 5155.8 – 5250, 5725 – 5850		

In Table 2 nominal output power levels are given.

Table 2 Nominal output power levels.

Band / Mode	Nominal output power ² (dBm)	Tolerance, upper limit (dB)	Transmission loss (dB)	Maximum output power ³ (dBm)
LTE LAA B46 (5000), 2x316mW, External omni-directional antenna	25	1	0.5	28.5
LTE LAA B46 (5000), 2x112mW, Internal sector coverage antenna	20.5	1	0.5	24.0

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

For the tested external omni-directional and internal sector coverage antennas, the maximum gains are $G_{\text{Ext}} = 6.0$ dBi (4.0) and $G_{\text{Int}} = 10.5$ dBi (11.2), see Table 1. Since the antennas are cross-polarized the directional gain is taken as the gain of the individual antennas according to [5].

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.

The total effective radiated power for the external and internal configurations is 32.4 dBm (1.7 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

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

where

$EIRP$: Equivalent isotropically radiated power (34.5 dBm),

r : Separation distance from antenna (0.2 m)

S_{lim} : Power density exposure limit of 10 W/m² [1].

With $EIRP = 2.82$ W, $r = 0.20$ m and $S_{\text{lim}} = 10$ W/m² the results in Table 3 are obtained.

Table 3 RF exposure assessment results for general public (uncontrolled) exposure as obtained for Radio 2205 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
B46	L	2 x 0.32 W (external omni-directional antenna)	Direction of maximum gain	20 cm	0.57	PASSED
B46	L	2 x 0.11 W (internal sector coverage antenna)	Direction of maximum gain	20 cm	0.57	PASSED

The exposure ratio is 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

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

where f is the frequency in MHz. At the lowest frequency in tested band ($f = 5150$ MHz) $EIRP_{\text{lim}}$

= 4.5 W which is above the maximum EIRP of the EUT (2.82 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.

⁴ For a test separation distance of 20 cm, the exposure was found to be below applicable exposure limits in the direction of maximum gain. Since this test position corresponds to the direction of maximum exposure and Radio 2205 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.

The maximum EIRP has been found to be 2.82 W which is less than the applicable exemption limit for routine evaluations of 4.5 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.

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 electromagnetic fields”, 1997.
- [3] FCC KDB 447498 D01, “Mobile and Portable Devices RF exposure procedures and Equipment Authorization Policies”, 2015.
- [4] 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), 2016.

7 Revision History

Rev.	Date	Description
A	2017-04-20	First revision
B	2017-07-04	Updated output power levels
C	2017-07-06	Corrected typo in Table 2

APPENDIX A: Photographs of the EUT



Figure A.1 Ericsson Radio 2205.