



	Rapport utfärdad av ackrediterat provningslaboratorium <i>Test report issued by an Accredited Testing Laboratory</i>
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EMF Test Report: Ericsson Dot 4479/4489 B41K (FCC)

Document number:	GFTL-19:000861 Uen, Rev A	Date of report:	2019-08-16
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Tests performed by:	Davide Colombi	Dates of tests:	2019-08-16 (Rev A)
Manufacturer and market name(s) of device:	Ericsson Dot 4479/4489 B41K		
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 Dot 4479/4489.		
Additional information:	Testing was conducted for mobile exposure conditions according to KDB447498 DO1		
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1 Summary of EMF Test Report¹

Equipment under test (EUT)

Product name	Ericsson Dot 4479 B41K (internal antennas) Ericsson Dot 4489 B41K (external antennas)		
Product number	KRY 901 432/1 KRY 901 432/2		
Supported bands, Tx frequency range (MHz), and standards	B41K (2600)	2515–2675	NR TDD
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 Dot 4479/4489 B41K 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	TDD DL duty cycle	Separation distance
B41K	NR	4 x 0.25 W	Direction of maximum gain	74%	34 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, the power tolerance and TDD downlink duty cycle specified in Table 2. These data were supplied by the client and may affect the validity of the results.

The test results were determined for Dot 4479 B41K (equipped with internal antennas) and are also applicable for Dot 4489 B41K connected to external antennas provided that the antenna gain is equal to or smaller than 4.9 dBi.

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	Ericsson Dot 4479 B41K		
Product tested	KRY 901 432/1		
Supported bands, Tx frequency range (MHz), and standards	B41K (2600)	2515–2675	NR TDD
Dimensions of Radio head, H x D (mm)	50 x 200		
Configuration(s) covered by this report	B41K (2600)		
Antenna(s)	Four internal antenna branches	Maximum antenna gain: 4.9 dBi	
Exposure environment	General public/uncontrolled		

In Table 2 nominal output power levels are given.

Table 2 Nominal output power levels.

Band	Standard	Nominal output power ² [dBm]	Power tolerance [dB]	Transmission loss [dB]	TDD DL duty cycle	Maximum time-averaged output power ³
B41K	NR (TDD)	24	2	0	74%	30.7

The EUT related data in Table 1 and Table 2 were supplied by the client.

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.

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.

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.

4.1 Field strength calculations

The total effective radiated power based on the maximum antenna gain of Table 1 and the output power level of Table 2 is 2.2 W. As a consequence, the categorical exclusion provision of FCC CFR title 47, § 2.1091(c) applies [5] and the minimum test separation distance may be estimated by simple calculations according to plane-wave equivalent conditions [3].

The minimum test separation distance is determined assuming correlated transmit signals. Based on the maximum gain of the single antenna ($G_{ant} = 4.9$ dBi, see Table 1), the directional gain, G , may be taken as 10.9 dBi according to [4] ($G = G_{ant} + 10 \log_{10} N$, 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.

Power density may be conservatively estimated as

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

where

P_{tot} : Total conducted power for the cellular bands⁴,

G : Directional gain⁵,

r : Separation distance from antenna

S_{lim} : Power density exposure limit of 10 W/m²,

S_{est} : Estimated power density.

For a minimum test separation distance of 34 cm (Table 3), the estimated power density complies with the mobile device exposure conditions and relevant limits 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 Dot 4479/4489 B41K 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	TDD DL duty cycle	Separation distance	3GPP band
B41K	NR	4 x 0.25 W	Direction of maximum gain	74%	34 cm	B41K

Table 4 General public (uncontrolled) RF EMF exposure limits applicable in the US market.

Band	S_{lim} (W/m ²)
B41K (2600)	10

⁴ This is equal to the maximum output power (in W) in **Error! Reference source not found.**

⁵ This is equal to linear value of G .

5 Conclusion

The results in Section 4 show that the plane-wave equivalent power density for the Ericsson Dot 4479 B41K, estimated according to the requirements of FCC [3] is below the relevant MPE limits [1] at a separation distance of at least 34 cm between the equipment and any nearby person.

As Dot 4489 B41K is equipped with the same hardware as Dot 4479 B41K except the antennas, the test results are also applicable for Dot 4489 connected to external antennas with similar radiation characteristics as the Dot 4479 antennas.

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] 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	2019-08-16	First revision

Appendix A. Information to be included in the CPI

Table A.1 lists the minimum separation distance for which the RF EMF exposure from Dot 4479 B41K and Dot 4489 B41K 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

Band	Standard	Nominal output power from the radio	Test position	TDD DL duty cycle	Separation distance	3GPP band
B41K	NR	4 x 0.25 W	Direction of maximum gain	74%	34 cm	B41K

Note to the table: The test results were determined for Dot 4479 (equipped with internal antennas) and are also applicable for Dot 4489 connected to external antennas provided that the antenna gain is equal or smaller than 4.9 dBi.

Appendix B. Guidelines on how to install the product

The Ericsson Dot 4479 B41K and Dot 4489 B41K (KRY 901 432/1 and KRY 901 432/2) 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.

Appendix C. Photographs of the EUT



Figure D.1: Top view on the EUT front side.



Figure D.2: Top view on the EUT back side.