

Radio Frequency Electromagnetic Exposure

CDMA/GSM/LTE/WCDMA

Safety Information



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1 Introduction

This document provides information on Radio Frequency (RF) Electromagnetic Field (EMF) exposure from antennas either integrated in or connected to a radio base station (RBS) or a radio unit in the RBS 6000 family.



2 Compliance Boundaries for Electromagnetic Exposure

The compliance boundary defines the minimum separations that should be kept between the antenna and a person to ensure that the ICNIRP [1], FCC [2] and Industry Canada [3] RF exposure limits are not exceeded.

Ericsson has performed advanced numerical or experimental RF exposure assessments in accordance with European standards [4]-[6] in order to determine compliance boundaries for minimum and maximum power configurations of the RBS product with recommended antennas. The resulting dimensions, in meters, for a compliance boundary for both general public and occupational exposure are shown in the sections below for macro and micro RBS products.

The compliance boundary is defined as a cylinder or as a box surrounding the antenna/equipment. For configurations employing sector coverage antennas, the antenna/equipment is not located at the center of the compliance boundary. Instead it is located almost at the edge, facing towards the center of the cylinder/box. Figures illustrating the employed compliance boundaries for macro and micro configurations are provided in the subsections below.

2.1 Macro RBS

For the macro case, both cylindrical and box-shaped compliance boundaries are used as illustrated in Figure 1 and Figure 2. Box-shaped compliance boundaries are used for AIR configurations and for multicolumn MIMO configurations.

The distance between the back of the antenna and the cylinder/box is the "Distance behind antenna". The height of the cylinder/box is the antenna height plus a certain, equal distance above and below the antenna. For a box-shaped compliance boundary the 'Width' represents the width of the box.

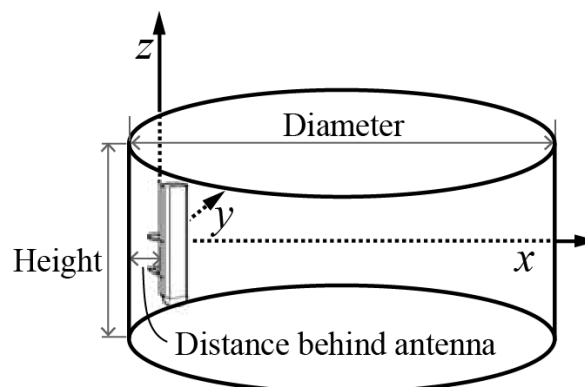


Figure 1. Cylindrical Compliance Boundary.

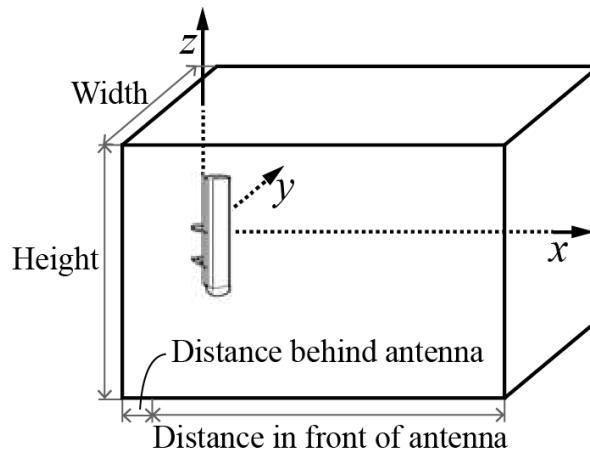


Figure 2. Box-shaped Compliance Boundary.

The resulting compliance boundary dimensions, in meters, for both general public and occupational exposure are shown in Table 1 for RU (internal radio unit), Tables 2-1, 2-2, 2-3, 2-4 and 2-5 for RRU (external radio unit), and Table 3 for AIR (antenna integrated radio unit).

It should be noted that Table 1 through Table 3 show examples for specified typical antennas and for minimum and maximum power levels, including the power tolerances and assumed transmission losses. As the antenna field distributions will differ for other antennas and power levels, calculations or measurements may be necessary to establish the compliance boundary for other configurations chosen by the customer. Other calculations or measurements may also be required if exposure limits other than [1] or [2] are specified in national regulations. For further information on RF exposure assessment methods, see [7].

The expanded uncertainty ($k=2$) is ± 2.3 dB for the underlying calculations of the power density used for assessment of the compliance boundary dimensions listed in Table 1 through Table 3.

Characteristics of the antennas recommended and tested for macro RBS 6000 configurations are listed in Table 4.

The total powers fed to the antennas (including tolerance and assumed transmission loss) are given in Table 5 for using RU, Table 6-1 and Table 6-2 for using RRU and Table 7 for using AIR.



Table 1 Cylindrical Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for Minimum and Maximum Output Powers using RU (Internal Radio Unit) with 0.6 dB Tolerance and Assumed 3 dB Transmission Loss.

Mode and output power for RU (internal radio unit)			Dimensions of the cylindrical compliance boundary (m)					
			Diameter		Height		Distance behind antenna	
Band	Standard ¹	Nominal output power from the radio	GP	O	GP	O	GP	O
B0 (900P)	G/W/L	20 W	0.9	0.4	2.6	2.6	<0.1	<0.1
		100 W	5.4	1.0	2.7	2.6	<0.1	<0.1
B1 (2100)	W/L	20 W	0.9	0.3	1.4	1.4	<0.1	<0.1
		100 W	4.8	0.9	1.6	1.4	<0.1	<0.1
B2 (1900)	G/W/L/C	20 W	0.9	0.3	1.4	1.4	<0.1	<0.1
	C	80 W	4.1	0.8	1.5	1.4	<0.1	<0.1
	G/W/L	100 W	4.9	0.9	1.6	1.4	<0.1	<0.1
B3 (1800)	G/W/L	20 W	1.1	0.3	1.4	1.4	<0.1	<0.1
		100 W	5.0	1.1	1.5	1.4	<0.1	<0.1
B4 (17/2100)	W/L/C	20 W	0.9	0.3	1.4	1.4	<0.1	<0.1
		80 W	4.0	0.8	1.6	1.4	<0.1	<0.1
B5 (850)	G/W/L/C	20 W	2.5	0.6	1.4	1.3	<0.1	<0.1
		100 W	5.7	2.5	1.6	1.4	<0.1	<0.1
B7 (2600)	L	20 W	1.0	0.3	1.4	1.4	<0.1	<0.1
		60 W	3.2	0.6	1.4	1.4	<0.1	<0.1
B8 (900E)	W/L	20 W	2.4	0.6	1.3	1.3	<0.1	<0.1
		100 W	5.6	2.5	1.6	1.3	<0.1	<0.1
	G	20 W	0.9	0.4	2.6	2.6	<0.1	<0.1
		100 W	5.4	1.0	2.7	2.6	<0.1	<0.1
B11 (1500)	W	20 W	1.5	0.4	1.5	1.4	<0.1	<0.1
		60 W	4.6	1.0	1.6	1.4	<0.1	<0.1
B12 (700 ₁₂)	L	20 W	2.7	0.6	2.0	1.9	<0.1	<0.1
		60 W	5.7	1.5	2.2	2.0	<0.1	<0.1
B13 (700 ₁₃)	L	20 W	2.7	0.6	2.0	1.9	<0.1	<0.1
		60 W	5.6	1.5	2.2	2.0	<0.1	<0.1
B14 (700 ₁₄)	L	20 W	2.6	0.6	2.0	1.9	<0.1	<0.1
		60 W	5.6	1.4	2.2	2.0	<0.1	<0.1
B20 (800DD)	L	20 W	2.6	0.7	1.4	1.3	<0.1	<0.1
		80 W	5.2	2.3	1.6	1.3	<0.1	<0.1
B28 (700)	L	20 W	2.5	0.6	1.4	1.4	<0.1	<0.1
		100 W	5.7	2.5	2.0	1.4	<0.1	<0.1

Expanded uncertainty (k=2) 95 % for power density calculations

± 2.3 dB

¹ The standards are abbreviated in the tables of this document: G/W/L/C = GSM/WCDMA/LTE/CDMA.



Table 2-1 Cylindrical Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for Minimum and Maximum Output Powers using RRU (External Radio Unit) with 0.6 dB Tolerance and Assumed 0.5 dB Transmission Loss. (continues on the next page)

Mode and output power for RRU (external radio unit)			Dimensions of the cylindrical compliance boundary (m)					
			Diameter		Height		Distance behind antenna	
Band	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O
B0 (900P)	G/W/L	20 W	1.6	0.4	2.6	2.6	<0.1	<0.1
		100 W	8.7	1.7	2.8	2.6	<0.1	<0.1
B1 (2100)	W/L	20 W	1.5	0.4	1.4	1.4	<0.1	<0.1
		120 W	7.8	2.0	1.7	1.4	<0.1	<0.1
B2 (1900)	G/W/L	20 W	1.7	0.4	1.4	1.4	<0.1	<0.1
		120 W	7.7	2.0	1.6	1.4	<0.1	<0.1
B3 (1800)	G/W/L	20 W	1.8	0.4	1.4	1.4	<0.1	<0.1
		160 W	9.3	3.5	1.7	1.5	<0.1	<0.1
B4 (17/2100)	W/L/C	20 W	1.5	0.4	1.4	1.4	<0.1	<0.1
		120 W	7.8	2.0	1.7	1.4	<0.1	<0.1
B5 (850)	G/W/L/C	20 W	3.4	1.2	1.4	1.3	<0.1	<0.1
		120 W	8.4	3.8	1.9	1.4	<0.1	<0.1
B7 (2600)	L	20 W	1.9	0.4	1.4	1.4	<0.1	<0.1
		120 W	8.0	2.1	1.5	1.4	<0.1	<0.1
B8 (900E)	G/W/L ²	20 W	3.3	1.2	1.4	1.3	<0.1	<0.1
		120 W	8.2	3.7	1.9	1.4	<0.1	<0.1
	G ³	20 W	1.6	0.4	2.6	2.6	<0.1	<0.1
		120 W	9.9	2.0	2.9	2.6	<0.1	<0.1
B9 (17/1800)	W/L	20 W	1.8	0.4	1.4	1.4	<0.1	<0.1
		60 W	5.2	1.2	1.6	1.4	<0.1	<0.1
B11 (1500)	W/L	20 W	3.0	0.6	1.6	1.4	<0.1	<0.1
		80 W	7.4	1.9	1.8	1.6	<0.1	<0.1
B12 (700 ₁₂)	L	20 W	4.2	0.9	2.0	1.9	<0.1	<0.1
		80 W	9.0	3.8	2.4	2.0	<0.1	<0.1
B13 (700 ₁₃)	L	20 W	4.1	0.9	2.0	1.9	<0.1	<0.1
		80 W	8.8	3.7	2.4	2.0	<0.1	<0.1
B20 (800DD)	L	20 W	3.5	1.4	1.4	1.3	<0.1	<0.1
		80 W	7.0	3.2	1.8	1.4	<0.1	<0.1
B25 (1900G)	L/C	20 W	1.7	0.4	1.4	1.4	<0.1	<0.1
		80 W	6.0	1.3	1.6	1.4	<0.1	<0.1

Expanded uncertainty (k=2) 95 % for power density calculations	± 2.3 dB
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² This row shows the compliance boundary obtained with the X-pol macro RBS directional antenna (KRE 101 2021/1).

³ This row shows the compliance boundary obtained with the X-pol macro RBS directional antenna (KRE 101 2057/1).



Table 2-1 (continued from the previous page) *Cylindrical Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for Minimum and Maximum Output Powers using RRU (External Radio Unit) with 0.6 dB Tolerance and Assumed 0.5 dB Transmission Loss.*

Mode and output power for RRU (external radio unit)			Dimensions of the cylindrical compliance boundary (m)					
			Diameter		Height		Distance behind antenna	
Band	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O
B26 (850)	L/C	20 W	3.4	1.2	1.4	1.3	<0.1	<0.1
		80 W	6.8	3.1	1.7	1.4	<0.1	<0.1
B28 (700)	L	20 W	3.4	1.2	1.6	1.4	<0.1	<0.1
		120 W	8.3	3.8	2.6	1.6	<0.1	<0.1
B29 (700)	L	20 W	3.4	1.2	1.6	1.4	<0.1	<0.1
		80 W	7.0	3.0	2.3	1.6	<0.1	<0.1
B31 (450)	L	20 W	4.7	1.2	2.3	2.0	<0.1	<0.1
		80 W	9.5	4.2	2.9	2.2	<0.1	<0.1
B38 (2600)	L	20 W	1.9	0.4	1.4	1.4	<0.1	<0.1
		80 W	6.4	1.4	1.4	1.4	<0.1	<0.1
B39 (1900)	L	20 W	1.8	0.4	1.4	1.4	<0.1	<0.1
		80 W	6.1	1.3	1.6	1.4	<0.1	<0.1
B40 (2300)	L	20 W	1.6	0.4	1.4	1.4	<0.1	<0.1
		100 W	7.0	1.5	1.5	1.4	<0.1	<0.1
B41 (2500)	L	20 W	1.9	0.4	1.4	1.4	<0.1	<0.1
		120 W	8.0	2.1	1.4	1.4	<0.1	<0.1
B42 (3500)	L	20 W	3.3	1.6	1.2	1.2	<0.1	<0.1
		80 W	6.4	3.0	1.2	1.2	<0.1	<0.1

Expanded uncertainty (k=2) 95 % for power density calculations	± 2.3 dB
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Table 2-2 *Cylindrical Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for Minimum and Maximum Output Powers using RRU (External Radio Unit) operating on multiple bands with 0.6 dB Tolerance and Assumed 0.5 dB Transmission Loss.*

Mode and output power for RRU (external radio unit)			Dimensions of the cylindrical compliance boundary (m)					
			Diameter		Height		Distance behind antenna	
Band	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O
B18 / B28 ⁴	L	10 W	2.3	0.6	1.4	1.4	<0.1	<0.1
		100 W	7.6	3.4	2.2	1.5	<0.1	<0.1
B3 ⁵	L	2 W	0.3	0.2	1.4	1.4	<0.1	<0.1
		20 W	1.8	0.4	1.4	1.4	<0.1	<0.1

Expanded uncertainty (k=2) 95 % for power density calculations	± 2.3 dB
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⁴ This row shows the result for RRU 22F2 with operation on B18 and B28 with power ratios of 60 % and 40 % on these bands respectively.

⁵ This row shows the results for RRU 22F1.



Table 2-3 *Box-Shaped Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for Minimum and Maximum Power Configurations with MIMO Multi-Column Antennas using RRU (External Radio Unit) with 1 dB Tolerance and Assumed 0.5 dB Transmission Loss.*

Mode and output power for RRU (external radio unit) using MIMO antenna and 1 dB tolerance				Dimensions of the box-shaped compliance boundary (m)							
				Distance in front of antenna		Width		Height		Distance behind antenna	
Band	Standard	Number of Tx/Rx	Nominal output power from the radio	GP	O	GP	O	GP	O	GP	O
B38 (2600)	L	8	40 W	11.2	2.7	9.4	2.0	2.1	1.6	<0.1	<0.1
			80 W	16.2	6.4	14.0	4.6	2.5	1.7	<0.1	<0.1
B39 (1900)	L	8	40 W	7.8	2.9	9.0	2.2	1.6	1.4	<0.1	<0.1
			80 W	11.2	4.8	13.2	5.2	1.9	1.4	0.3	<0.1
B41 (2500)	L	8	40 W	11.2	2.7	9.4	2.0	2.1	1.6	<0.1	<0.1
			80 W	16.2	6.4	14.0	4.6	2.5	1.7	<0.1	<0.1

Expanded uncertainty (k=2) 95 % for power density calculations	± 2.3dB
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Table 2-4 *Cylindrical Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for Minimum and Maximum Power Configurations with RRU (External Radio Unit) with 1 dB Tolerance and Assumed 0.5 dB Transmission Loss.*

Mode and output power for RRU (external radio unit) with 1 dB tolerance				Dimensions of the cylindrical compliance boundary (m)					
				Diameter		Height		Distance behind antenna	
Band	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O	
B38 (2600)	L	20 W	2.0	0.5	1.4	1.4	<0.1	<0.1	
		80 W	6.7	1.5	1.4	1.4	<0.1	<0.1	
B40 (2300)	L	20 W	1.6	0.4	1.4	1.4	<0.1	<0.1	
		40 W	3.9	0.7	1.4	1.4	<0.1	<0.1	

Expanded uncertainty (k=2) 95 % for power density calculations	± 2.3 dB
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Table 2-5 Box-Shaped Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for Minimum and Maximum Power Configurations with MIMO Multi-Column Antennas using RRU (External Radio Unit) with 0.6 dB Tolerance and Assumed 0.5 dB Transmission Loss.

Mode and output power for RRU (external radio unit) using MIMO antenna and 0.6 dB tolerance				Dimensions of the box-shaped compliance boundary (m)							
				Distance in front of antenna		Width		Height		Distance behind antenna	
Band	Standard	Number of Tx/Rx	Nominal output power from the radio	GP	O	GP	O	GP	O	GP	O
B2 (1900)	G/W/L	4	40 W	7.2	1.4	4.6	0.7	1.6	1.5	<0.1	<0.1
			160 W	15.4	6.4	11.7	3.8	2.0	1.6	0.1	<0.1
B3 (1800)	G/L	4	40 W	7.1	1.7	4.8	0.8	1.6	1.5	<0.1	<0.1
			160 W	14.9	6.4	11.5	4.1	2.0	1.6	<0.1	<0.1
B4 (17/2100)	W/L	4	40 W	7.3	1.4	5.0	0.8	1.5	1.5	<0.1	<0.1
			160 W	15.3	6.3	11.7	4.1	1.9	1.5	0.1	<0.1
B7 (2600)	L	4	40 W	7.9	1.1	4.2	0.7	1.6	1.5	<0.1	<0.1
			160 W	17.3	6.7	13.1	2.9	2.1	1.6	0.3	<0.1
B25 (1900G)	L/C	4	40 W	5.6	1.3	3.8	0.9	2.0	1.8	<0.1	<0.1
			160 W	13.6	4.5	11.8	2.9	3.4	1.9	<0.2	<0.1
B30 (2300)	L	4	25 W	5.9	0.9	2.9	0.5	1.6	1.5	<0.1	<0.1
			100 W	13.7	4.7	9.4	2.1	1.7	1.5	<0.1	<0.1
B38 (2600)	L	4	40 W	7.9	1.1	4.5	0.7	1.6	1.5	<0.1	<0.1
			160 W	17.3	6.7	12.0	3.5	2.0	1.6	<0.3	<0.1
B40 (2300)	L	4	20 W	4.8	0.6	2.2	0.4	1.6	1.5	<0.1	<0.1
			160 W	17.4	7.0	12.2	3.9	1.9	1.6	<0.1	<0.1
B41 (2500)	L	4	40 W	7.9	1.1	4.5	0.7	1.6	1.5	<0.1	<0.1
			160 W	17.3	6.7	12.0	3.5	2.0	1.6	<0.3	<0.1
B41 (2500)	L	8	40 W	10.6	2.5	8.8	1.7	1.9	1.5	<0.1	<0.1
			160 W	22.1	9.2	19.2	7.5	3.0	1.8	<0.2	<0.1
B66A (17/2100)	W/L	4	40 W	7.3	1.4	5.0	0.8	1.5	1.5	<0.1	<0.1
			160 W	15.3	6.3	11.7	4.1	1.9	1.5	0.1	<0.1

Expanded uncertainty (k=2) 95 % for power density calculations	± 2.3dB
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Table 3 *Box-Shaped Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for Minimum and Maximum Power Configurations using AIR (Antenna Integrated Radio) with 0.6 dB Tolerance and Assumed 0 dB Transmission Loss. (continues on the next page)*

Mode and output power for AIR (antenna integrated radio)			Dimensions of the box-shaped compliance boundary (m)							
			Distance in front of antenna		Width		Height		Distance behind antenna	
Band	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O	GP	O
B1 (2100) ⁶	W/L	20 W	1.9	0.5	1.2	0.4	1.5	1.5	0	0
		60 W	5.5	1.1	4.0	0.7	1.5	1.5	0	0
B1 (2100) ⁷	W/L	20 W	1.7	0.5	1.2	0.5	2.0	2.0	0	0
		60 W	5.4	1.1	3.3	0.8	2.0	2.0	0	0
B2 (1900) ⁸	G/W/L	20 W	2.7	0.6	1.3	0.4	1.5	1.5	0	0
		60 W	5.9	1.6	4.1	0.9	1.7	1.5	0	0
B2 (1900) ⁹	G/W/L	20 W	1.8	0.5	1.0	0.4	2.5	2.5	0	0
		60 W	5.1	1.0	3.3	0.6	2.6	2.5	0	0
B2 (1900) ¹⁰	G/W/L	20 W	1.3	0.5	1.2	0.4	2.0	2.0	0	0
		60 W	5.4	1.2	3.6	0.9	2.0	2.0	0	0
B2 (1900) ¹¹	G/W/L	120 W	14.2	6.1	10.4	3.4	1.9	1.6	< 0.1	0
B3 (1800) ¹²	G/W/L	20 W	2.6	1.0	1.8	0.6	1.5	1.5	0	0
		60 W	5.6	1.9	3.6	1.4	1.5	1.5	0	0
B3 (1800) ¹³	G/W/L	20 W	1.9	0.5	1.3	0.5	2.5	2.5	0	0
		60 W	5.2	1.1	4.1	1.0	2.5	2.5	0	0
B4 (17/2100) ¹⁴	W/L	20 W	2.0	0.6	1.4	0.4	1.5	1.5	0	0
		60 W	5.7	1.4	4.2	0.8	1.6	1.5	0	0
B4 (17/2100) ¹⁵	W/L	20 W	1.8	0.5	1.2	0.4	2.5	2.5	0	0
		60 W	5.3	1.1	3.5	0.7	2.6	2.5	0	0
B4 (17/2100) ¹⁶	W/L	20 W	1.7	0.5	1.2	0.5	2.0	2.0	0	0
		60 W	5.4	1.1	3.3	0.8	2.0	2.0	0	0
B4 (17/2100) ¹⁷	W/L	120 W	15.2	6.1	10.5	3.0	1.8	1.5	0	0
B7 (2600)	L	20 W	1.2	0.4	0.9	0.4	1.5	1.5	0	0
		60 W	3.3	0.9	2.4	0.5	1.5	1.5	0	0
B7 (2600) ¹⁸	L	120 W	10.8	2.6	7.0	1.5	5.7	2.5	0	0
B3 (1800), B7 (2600) ¹⁹	G/L, L	240 W	16.7	6.9	13.6	4.0	5.8	2.6	0	0

⁶ Two different antennas were tested for AIR B1, results for KRE 101 2144/1 shown.

⁷ Two different antennas were tested for AIR B1, results for KRE 101 2168/1 shown.

⁸ This row shows results for the KRE 101 2132/1 antenna.

⁹ This row shows results for the KRE 101 2174/1 antenna.

¹⁰ This row shows results for the KRE 101 2170/1 antenna.

¹¹ This row shows results for the KRE 101 244/1 antenna.

¹² Three different antennas were tested for AIR B3, results for KRE 101 2148/1 shown.

¹³ Three different antennas were tested for AIR B3, results for KRE 101 2166/1 shown.

¹⁴ Four different antennas were tested for AIR B4, results for KRE 101 2133/1 shown.

¹⁵ Four different antennas were tested for AIR B4, results for KRE 101 2149/1 shown.

¹⁶ Four different antennas were tested for AIR B4, results for KRE 101 2167/1 shown.

¹⁷ Four different antennas were tested for AIR B4, results for KRE 105 216/1 shown.

¹⁸ Three different antennas were tested for AIR B7, results for KRE 105 237/1 shown.

¹⁹ Results for KRE 105 245/1 transmitting simultaneously on B3 and B7 with the power divided equally among the two bands.



Table 3 (continued from the previous page) *Box-Shaped Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for Minimum and Maximum Power Configurations using AIR (Antenna Integrated Radio) with 0.6 dB Tolerance and Assumed 0 dB Transmission Loss.*

Mode and output power for AIR (antenna integrated radio)			Dimensions of the box-shaped compliance boundary (m)							
			Distance in front of antenna		Width		Height		Distance behind antenna	
Band	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O	GP	O
B8 (900E)	G/W	20 W	3.6	0.8	1.7	0.4	2.0	2.0	0	0
		60 W	7.0	1.9	4.8	1.2	2.0	2.0	0	0
B20 (800DD) ²⁰	L	20 W	3.6	0.7	1.8	0.4	2.1	2.0	0	0
		60 W	7.2	1.9	5.4	1.1	2.3	2.0	0	0
B20 (800DD) ²¹	L	20 W	3.5	1.2	2.5	0.6	1.5	1.5	0	0
		60 W	6.2	2.8	4.8	1.8	1.8	1.5	0	0
B66A (17/2100) ¹¹	W/L	120 W	15.1	6.1	10.7	3.2	1.9	1.6	0	0
B2 (1900), B66A (17/2100) ²²	G/W, W/L	240 W	20.9	9.1	15.4	6.0	2.2	1.6	< 0.1	0
B7 (2600), B66A (17/2100) ²³	L, W/L	240 W	14.2	5.3	14.1	3.5	5.9	2.6	0	0
Expanded uncertainty (k=2) 95 % for power density calculations						± 2.3dB				

Note: The distance behind antenna given in Table 3 is measured from the back of the AIR radio unit.

²⁰ Two different antennas were tested for AIR B20, results for KRE 101 2087/1 shown.

²¹ Two different antennas were tested for AIR B20, results for KRE 101 2131/1 shown.

²² KRE 105 244/1 transmits simultaneously on B2 and B66A with equal power ratios.

²³ KRE 105 245/1 transmits simultaneously on B7 and B66A with equal power ratios.



Table 4 Characteristics for the tested antennas (continues on the next page)

Antenna specifications	X-pol macro RBS directional antenna (BXA-70063/6CF)	X-pol macro RBS directional antenna (KRE 101 1985/1)	X-pol macro RBS directional antenna (KRE 101 2021/1)	X-pol macro RBS directional antenna (KRE 101 2085/1)
Antenna dimensions	Height: 1.8 m	Height: 1.3 m	Height: 1.3 m	Height: 1.4 m
Half-power beam width	63 degrees	64-68 degrees	65-67 degrees	60-61 degrees
Antenna gain	17 dBi	18 dBi	15 dBi	18 dBi
Down tilt	0 degrees	0 degrees	0 degrees	0 degrees
Tested bands	B12, B13, B14	B1, B2, B3, B4, B9, B25, B39	B5, B8, B20, B26	B7, B38, B40, B41
Antenna specifications	X-pol macro RBS directional 8-branch antenna (TYDA-202415D4T0)	X-pol macro RBS directional 8-branch antenna (ODS-090R15NV06(F))	X-pol macro RBS directional antenna (KRE 101 2057/1)	X-pol macro RBS directional antenna
Antenna dimensions	Height: 1.4 m	Height: 1.4 m	Height: 2.6 m	Height: 1.4 m
Half-power beam width	29 degrees	≤25 degrees	65-66 degrees	67 degrees
Antenna gain	20 dBi	22 dBi	17 dBi	18 dBi
Down tilt	0 degrees	0 degrees	0 degrees	0 degrees
Tested bands	B39 (MIMO only)	B38, B41 (MIMO only)	B0, B8	B11
Antenna specifications	X-pol macro RBS directional antenna (KRE 101 2087/1), Integrated in AIR	X-pol macro RBS directional antenna (KRE 101 2132/1), Integrated in AIR	X-pol macro RBS directional antenna (KRE 101 2133/1), Integrated in AIR	X-pol macro RBS directional antenna (KRE 101 2146/1), Integrated in AIR
Antenna dimensions	Height: 2.0 m	Height: 1.4 m	Height: 1.4 m	Height: 2.0
Half-power beam width	66 degrees	62 degrees	62 degrees	63 degrees
Antenna gain	16 dBi	18 dBi	18 dBi	16 dBi
Down tilt	0 degrees	0 degrees	0 degrees	0 degrees
Tested bands	B20 (AIR only)	B2 (AIR only)	B4 (AIR only)	B8 (AIR only)
Antenna specifications	X-pol macro RBS directional antenna (KRE 101 2149/1), Integrated in AIR	X-pol macro RBS directional antenna (KRE 101 2144/1), Integrated in AIR	X-pol macro RBS directional antenna (KRE 101 2148/1), Integrated in AIR	X-pol macro RBS directional antenna (KRE 101 2166/1), Integrated in AIR
Antenna dimensions	Height: 2.3 m	Height: 1.4 m	Height: 1.4 m	Height: 2.4 m
Half-power beam width	60 degrees	65 degrees	65 degrees	63 degrees
Antenna gain	17 dBi	18 dBi	18 dBi	17.2 dBi
Down tilt	0 degrees	0 degrees	0 degrees	0 degrees
Tested bands	B4 (AIR only)	B1 (AIR only)	B3 (AIR only)	B3 (AIR only)



Table 4 (continued from the previous page) *Characteristics for the tested antennas*

Antenna specifications	X-pol macro RBS directional antenna (KRE 101 2163/1), Integrated in AIR	X-pol macro RBS directional antenna (KRE 101 2131/1), Integrated in AIR	X-pol macro RBS directional antenna (KRE 101 2174/1), Integrated in AIR	X-pol macro RBS directional antenna (KRE 101 2170/1), Integrated in AIR
Antenna dimensions	Height: 1.4 m	Height: 1.4 m	Height: 2.4 m	Height: 2.0 m
Half-power beam width	55 degrees	67 degrees	60 degrees	63 degrees
Antenna gain	18.1 dBi	14.2 dBi	16.8 dBi	17.9 dBi
Down tilt	0 degrees	0 degrees	0 degrees	0 degrees
Tested bands	B7 (AIR only)	B20 (AIR only)	B2 (AIR only)	B2 (AIR only)
Antenna specifications	X-pol macro RBS directional antenna (KRE 101 2224/1)	X-pol macro RBS directional antenna (RFS APXVSP18-C)	X-pol macro RBS directional antenna (KRE 101 2167/1), Integrated in AIR	X-pol macro RBS directional antenna (KRE 101 2168/1), Integrated in AIR
Antenna dimensions	Height: 1.4 m	Height: 1.8 m	Height: 2.0 m	Height: 2.0 m
Half-power beam width	65-68 degrees	65 degrees	63 degrees	63 degrees
Antenna gain	14.2-14.8 dBi	18 dBi ²⁴	18.1 dBi	18.1 dBi
Down tilt	0 degrees	0 degrees	0 degrees	0 degrees
Tested bands	B18, B28, B29	B25	B4 (AIR only)	B1 (AIR only)
Antenna specifications	X-pol macro RBS directional antenna (KRE 101 2092/1)	X-pol macro RBS directional antenna (KRE 105 216/1), Integrated in AIR	X-pol macro RBS directional antenna (KRE 105 237/1), Integrated in AIR	X-pol macro RBS directional antenna (KRE 105 245/1), Integrated in AIR
Antenna dimensions	Height: 1.4 m	Height: 1.4 m	Height: 2.0 m	Height: 2.0 m
Half-power beam width	57-67 degrees	61 degrees	62/58 degrees	62/64 degrees (B3), 63/58 degrees (B7) 59/63 degrees (B66A)
Antenna gain	17.5 -18.9 dBi ²⁴	18.4 ²⁴	17.1/17.9 ²⁵	17/16.9 (B3), 17.5/17.9 (B7) ²⁶ 17.5 / 17.3 (B66A)
Down tilt	0 degrees	0 degrees	2.5 degrees	2.5 degrees
Tested bands	B2, B3, B4, B7, B30, B38, B40, B41, B66A	B4	B7	B3, B7, B66A
Antenna specifications	X-pol macro RBS directional antenna (KRE 101 1902/1)	X-pol macro RBS directional antenna (KRE 101 2260/1)	X-pol macro RBS directional antenna (KRE 105 244/1), Integrated in AIR	
Antenna dimensions	Height: 2 m	Height: 1.0 m	Height: 1.4 m	
Half-power beam width	65 degrees	70.6 degrees	62 degrees (B2), 61 degrees (B66A)	
Antenna gain	15 dBi	17.7 dBi	17.8 (B2), 18.3 (B66A) ²⁴	
Down tilt	0 degrees	2 - 12 degrees	2 degrees	
Tested bands	B31	B42	B2, B66A	

²⁴ The far-field properties for this antenna are given for one of the ports excited.

²⁵ The far-field properties for this antenna correspond to values for the two array columns.

²⁶ The far-field properties for this antenna correspond to values for the two array columns.



Table 5 *Total Power to the Antenna for Minimum and Maximum Power Configurations using RU (Internal Radio Unit) including 0.6 dB Tolerance and 3 dB Transmission Loss.*

Band	Standard	Nominal output power from the radio (dBm/W)	Total power delivered to antenna (dBm/W)
B0 (900P)	G/W/L	43.0/20	40.6/11.5
		50.0/100	47.6/57.5
B1 (2100)	W/L	43.0/20	40.6/11.5
		50.0/100	47.6/57.5
B2 (1900)	G/W/L/C	43.0/20	40.6/11.5
	C	49.0/80	46.6/45.7
	G/W/L	50.0/100	47.6/57.5
B3 (1800)	G/W/L	43.0/20	40.6/11.5
		50.0/100	47.6/57.5
B4 (17/2100)	W/L/C	43.0/20	40.6/11.5
		49.0/80	46.6/45.7
B5 (850)	G/W/L/C	43.0/20	40.6/11.5
		50.0/100	47.6/57.5
B7 (2600)	L	43.0/20	40.6/11.5
		47.8/60	45.4/34.7
B8 (900E)	W/L	43.0/20	40.6/11.5
		50.0/100	47.6/57.5
	G	43.0/20	40.6/11.5
		50.0/100	47.6/57.5
B11 (1500)	W	43.0/20	40.6/11.5
		47.8/60	45.4/34.7
B12 (700 ₁₂)	L	43.0/20	40.6/11.5
		47.8/60	45.4/34.7
B13 (700 ₁₃)	L	43.0/20	40.6/11.5
		47.8/60	45.4/34.7
B14 (700 ₁₄)	L	43.0/20	40.6/11.5
		47.8/60	45.4/34.7
B20 (800DD)	L	43.0/20	40.6/11.5
		49.0/80	46.6/45.7
B28 (700)	L	43.0/20	40.6/11.5
		50.0/100	47.6/57.5



Table 6-1 Total Power to the Antenna for Minimum and Maximum Power Configurations using RRU (External Radio Unit) including 0.6 dB Tolerance and 0.5 dB Transmission Loss. (continues on the next page)

Band	Standard	Nominal output power from the radio (dBm/W)	Total power delivered to antenna (dBm/W)
B0 (900P)	G/W/L	43.0/20	43.1/20.4
		50/100	50.1/102.3
B1 (2100)	W/L	43.0/20	43.1/20.4
		50.8/120	50.9/123
B2 (1900)	G/W/L	43.0/20	43.1/20.4
		50.8/120	50.9/123
B2 (1900) ²⁷	L	46.0/40	46.1/40.7
		52.0/160	52.1/162.2
B3 (1800)	G/W/L	43.0/20	43.1/20.4
		52.0/160	52.1/162.2
B3 (1800) ²⁷	L	46.0/40	46.1/40.7
		52.0/160	52.1/162.2
B4 (17/2100)	W/L/C	43.0/20	43.1/20.4
		50.8/120	50.9/123
B4 (17/2100) ²⁷	L	46.0/40	46.1/40.7
		52.0/160	52.1/162.2
B5 (850)	G/W/L/C	43.0/20	43.1/20.4
		50.8/120	50.9/123
B7 (2600)	L	43.0/20	43.1/20.4
		50.8/120	50.9/123
B7 (2600) ²⁷	L	46.0 / 40	46.1 / 40.7
		52.0 / 160	52.1 / 162.2
B8 (900E)	G/W/L	43.0/20	43.1/20.4
		50.8/120	50.9/123
	G	43.0/20	43.1/20.4
		50.8/120	50.9/123
B9 (17/1800)	W/L	43.0/20	43.1/20.4
		47.8/60	47.9/61.7
B11 (1500)	W/L	43.0/20	43.1/20.4
		49.0/80	49.1/81.3
B12 (700 ₁₂)	L	43.0/20	43.1/20.4
		49/80	49.1/81.3
B13 (700 ₁₃)	L	43.0/20	43.1/20.4
		49/80	49.1/81.3
B18 (800) , B28 (700) ²⁸	L	37.8/6.0	37.9/6.2
		36.0/4.0	36.1/4.1
		47.8/60.3	47.9/61.7
		46.0/39.8	46.1/40.7

²⁷ These assessments were made for a 4-branch antenna (4 Tx).

²⁸ This power level is used in a multi-band product transmitting simultaneously on B18 and B28 with power distributed as 60 % and 40 % over the bands, respectively.



Table 6-1 (continued from the previous page) *Total Power to the Antenna for Minimum and Maximum Power Configurations using RRU (External Radio Unit) including 0.6 dB Tolerance and 0.5 dB Transmission Loss.*

Band	Standard	Nominal output power from the radio (dBm/W)	Total power delivered to antenna (dBm/W)
B20 (800DD)	L	43.0/20	43.1/20.4
		49.0/80	49.1/81.3
B25 (1900G)	L/C	43.0/20	43.1/20.4
		49.0/80	49.1/81.3
B25 (1900G) ²⁹	L/C	46/40	46.1/40.7
		52/160	52.1/162.2
B26 (850)	L/C	43.0/20	43.1/20.4
		49.0/80	49.1/81.3
B28 (700)	L	43.0/20	43.1/20.4
		50.8/120	50.9/123
B29 (700)	L	43.0/20	43.1/20.4
		49.0/80	49.1/81.3
B31 (450)	L	43.0/20	43.1/20.4
		49.0/80	49.1/81.3
B30 (2300)	L	44.0 / 25	44.1 / 25.7
		50.0 / 100	50.1 / 102.3
B38 (2600)	L	43.0/20	43.1/20.4
		49.0/80	49.1/81.3
B38 (2600) ²⁹	L	46.0/40	46.1/40.7
		52.0/160	52.1/162.2
B39 (1900)	L	43.0/20	43.1/20.4
		49.0/80	49.1/81.3
B40 (2300)	L	43.0/20	43.1/20.4
		50.0/100	50.1/102
B40 (2300) ²⁹	L	46.0/40	46.1/40.7
		52.0/160	52.1/162.2
B41 (2500)	L	43.0/20	43.1/20.4
		46.0/40	46.1/40.7
		50.8/120	50.9/123
		52.0/160	52.1/162.2
B41 (2500) ²⁹	L	46.0/40	46.1/40.7
		52.0/160	52.1/162.2
B41 (2500) ³⁰	L	46.0/40	46.1/40.7
		50.8/120	50.9/123
B42 (3500)	L	43.0/20	43.1/20.4
		49.0/80	49.1/81.3
B66A (17/2100) ²⁹	W/L	46.0/40	46.1/40.7
		52.0/160	52.1/162.2

²⁹ These assessments were made for a 4-branch antenna (4 Tx).

³⁰ These assessments were made for an 8-branch antenna (8 Tx) contrary to the 2-branch antennas used for the other cases.



Table 6-2 Total Power to the Antenna for Minimum and Maximum Power Configurations using RRU (External Radio Unit) including 1 dB Tolerance and 0.5 dB Transmission Loss.

Band	Standard	Nominal output power from the radio (dBm/W)	Total power delivered to antenna (dBm/W)
B38 (2600)	L	43.0/20	43.5/22.4
		49.0/80	49.5/89.1
B38 (2600) ³¹	L	46.0/40	46.5/44.7
		49.0/80	49.5/89.1
B39 (1900) ³¹	L	46.0/40	46.5/44.7
		49.0/80	49.5/89.1
B40 (2300)	L	43.0/20	43.5/22.4
		46.0/40	46.5/44.7
B41 (2500) ³¹	L	46.0/40	46.5/44.7
		49.0/80	49.5/89.1

Table 7 Total Power to the Antenna for Minimum and Maximum Power Configurations using AIR (Antenna Integrated Radio Unit) including 0.6 dB Tolerance and 0 dB Transmission Loss.

Band	Standard	Nominal output power from the radio (dBm/W)	Total power delivered to antenna (dBm/W)
B1 (2100) ³²	W/L	43.0/20	43.6/22.9
		47.8/60	48.4/69.2
B2 (1900) ³³	G/W/L	43.0/20	43.6/22.9
		47.8/60	48.4/69.2
		50.8 / 120	51.4 / 138
B3 (1800) ³⁴	G/W/L	43.0/20	43.6/22.9
		47.8/60	48.4/69.2
B4 (17/2100) ³⁵	W/L	43.0/20	43.6/22.9
		47.8/60	48.4/69.2
		50.8/120	51.4/138
B7 (2600) ³⁶	L	43.0/20	43.6/22.9
		47.8/60	48.4/69.2
		50.8/120	51.4/138
B3 (1800), B7 (2600) ³⁷	G/L, L	53.8 / 240	54.4 / 275
B8 (900E)	G/W	43.0/20	43.6/22.9
		47.8/60	48.4/69.2
B20 (800DD) ³⁸	L	43.0/20	43.6/22.9
		47.8/60	48.4/69.2
B66A (17/2100)	W/L	50.8 / 120	51.4 / 138

³¹ These assessments were made for an 8-branch antenna (8 Tx) contrary to the 2-branch antennas used for the other cases.

³² B1 has been tested for two different antennas.

³³ B2 has been tested for four different antennas.

³⁴ B3 has been tested for three different antennas.

³⁵ B4 has been tested for four different antennas.

³⁶ B7 has been tested for three different antennas.

³⁷ This power level is used in a multi-band product transmitting simultaneously on B3 and B7 with the power distributed equally among the two bands.

³⁸ B20 has been tested for two different antennas.



Band	Standard	Nominal output power from the radio (dBm/W)	Total power delivered to antenna (dBm/W)
B2 (1900), B66A (17/2100) ³⁹	G/W, W/L	53.8 / 240	54.4 / 275
B3 (1800), B7 (2600) ⁴⁰	L, W/L	53.8 / 240	54.4 / 275

2.2 Micro RBS

For the micro products, box-shaped compliance boundaries are used. For configurations with internal antennas or external sector coverage antennas, the front and back compliance distances are defined from the equipment/antenna casing as shown in Figure 3. For configurations with external omni-directional antennas, the compliance boundary dimensions are defined with respect to the origin centered between the dipole antenna elements, see Figure 4.

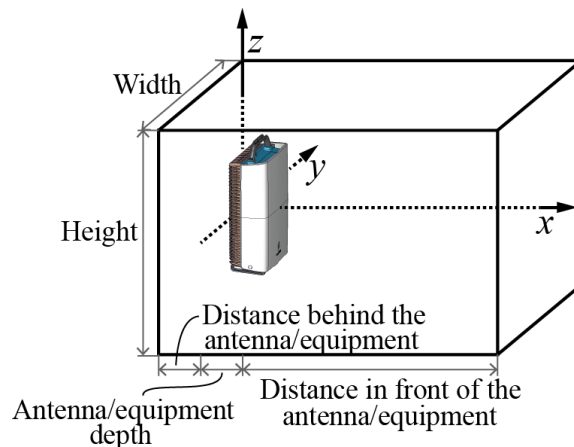


Figure 3. Box-shaped Compliance Boundary used for configurations with internal antennas and for configurations with external sector coverage antennas. The front and back compliance distances are defined from the EUT/antenna casing.

³⁹ This power level is used in a multi-band product transmitting simultaneously on B2 and B66A with the power distributed equally among the two bands.

⁴⁰ This power level is used in a multi-band product transmitting simultaneously on B7 and B66A with the power distributed equally among the two bands.

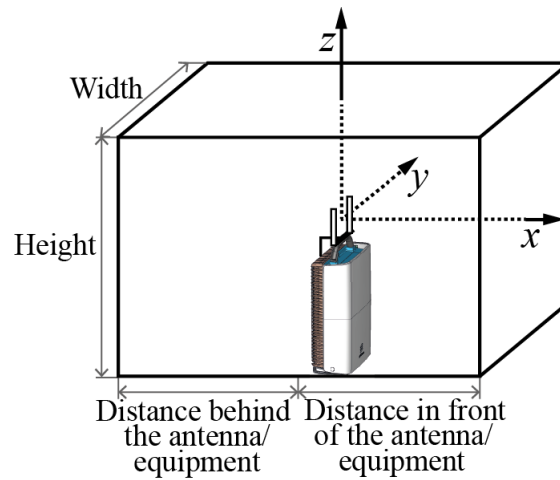


Figure 4. Box-shaped Compliance Boundary used for configurations with external omni-directional antennas. The compliance boundary dimensions are defined with respect to the origin centered between the dipole antenna elements.

The resulting compliance boundary dimensions in meters are shown in Table 8 and Table 9. The power levels used during the assessments were determined including power tolerances and transmission losses. The transmitted field distributions are dependent on the used antenna. Separate calculations or measurements may therefore be necessary to establish compliance boundaries for configurations employing other external antennas chosen by the customer. For further information on RF exposure assessment methods, see [7]. The expanded uncertainty ($k=2$) is ± 2.3 dB for the underlying calculations of the power density used for assessment of the compliance boundary dimensions listed in Table 8.

Characteristics of the antennas recommended and are listed in Table 10.

The total powers fed to the antennas (including tolerance and assumed transmission loss) are given in Table 11.



Table 8-1 Box-Shaped Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for mRRUS 12 with 1 dB tolerance and 0 dB transmission loss (intended markets: Europe/Rest of world).

Mode and output power for the mRRU (external radio unit)			Dimensions of the box-shaped compliance boundary (m)							
			Distance in front of antenna/EUT		Width		Height		Distance behind antenna/EUT	
Band, antenna, installation case ⁴¹	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O	GP	O
B1 (2100), KRE 101 2141/1, Vertical	W/L	2 × 5 W	0.9	0.4	0.8	0.4	1.0	0.6	0	0
B3 (1800), KRE 101 2141/1, Vertical	W/L	2 × 5 W	0.8	0.4	0.9	0.4	1.0	0.6	0	0
B7 (2600), KRE 101 2142/1, Vertical	L	2 × 5 W	0.9	0.4	0.8	0.4	1.0	0.6	0	0
B1 (2100), KRE 101 2141/1, Horizontal	W/L	2 × 5 W	0.9	0.4	1.0	0.6	0.8	0.4	0	0
B3 (1800), KRE 101 2141/1, Horizontal	W/L	2 × 5 W	0.8	0.4	1.0	0.6	0.9	0.4	0	0
B7 (2600), KRE 101 2142/1, Horizontal	L	2 × 5 W	0.9	0.4	1.0	0.6	0.8	0.4	0	0
B1 (2100), KRE 101 1985/1, Horizontal/Vertical	W/L	2 × 5 W	0.8	0.2	0.5	0.2	1.4	1.4	<0.1	<0.1
B3 (1800), KRE 101 1985/1, Horizontal/Vertical	W/L	2 × 5 W	1.0	0.2	0.6	0.2	1.4	1.4	<0.1	<0.1
B1 (2100), KRE 101 2024/1, Vertical	W/L	2 × 5 W	0.6	0.3	1.2	0.6	0.6	0.3	0.6	0.3
B3 (1800), KRE 101 2024/1, Vertical	W/L	2 × 5 W	0.7	0.3	1.3	0.7	0.7	0.3	0.7	0.3
B7 (2600), KRE 101 2024/1, Vertical	L	2 × 5 W	0.5	0.3	0.9	0.5	0.4	0.2	0.5	0.3
B1 (2100), KRE 101 2024/1, Horizontal	W/L	2 × 5 W	0.6	0.2	1.3	0.7	0.6	0.3	0.6	0.2
B3 (1800), KRE 101 2024/1, Horizontal	W/L	2 × 5 W	0.7	0.3	1.3	0.8	0.6	0.3	0.7	0.3
B7 (2600), KRE 101 2024/1, Horizontal	L	2 × 5 W	0.5	0.4	1.0	0.7	0.4	0.2	0.5	0.4
Expanded uncertainty (k=2) 95 % for power density calculations							± 2.3dB			

⁴¹ The installation case refers to the orientation of the equipment.



Table 8-2 *Box-Shaped Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for mRBS 6501 with 1 dB tolerance and 0 dB transmission loss (intended markets: Europe/Rest of world).*

Mode and output power for the mRBS (micro-RBS)			Dimensions of the box-shaped compliance boundary (m)							
			Distance in front of antenna/EUT		Width		Height		Distance behind antenna/EUT	
Band, antenna, installation case ⁴²	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O	GP	O
B1 (2100), KRE 101 2141/1, Vertical	W/L	2 × 5 W	0.9	0.4	0.8	0.4	0.8	0.5	0	0
B3 (1800), KRE 101 2141/1, Vertical	W/L	2 × 5 W	0.8	0.4	0.8	0.4	0.8	0.5	0	0
B7 (2600), KRE 101 2142/1, Vertical	L	2 × 5 W	0.9	0.4	0.8	0.4	0.9	0.5	0	0
B1 (2100), KRE 101 2141/1, Horizontal	W/L	2 × 5 W	0.9	0.4	0.8	0.5	0.8	0.4	0	0
B3 (1800), KRE 101 2141/1, Horizontal	W/L	2 × 5 W	0.8	0.4	0.8	0.5	0.8	0.4	0	0
B7 (2600), KRE 101 2142/1, Horizontal	L	2 × 5 W	0.9	0.4	0.9	0.5	0.8	0.4	0	0
B1 (2100), KRE 101 1985/1, Horizontal/Vertical	W/L	2 × 5 W	0.8	0.2	0.5	0.2	1.4	1.4	<0.1	<0.1
B3 (1800), KRE 101 1985/1, Horizontal/Vertical	W/L	2 × 5 W	1.0	0.2	0.6	0.2	1.4	1.4	<0.1	<0.1
B7 (2600), KRE 101 2085/1, Horizontal/Vertical	L	2 × 5 W	1.0	0.1	0.6	0.2	1.4	1.4	< 0.1	< 0.1
B1 (2100), KRE 101 2024/1, Vertical	W/L	2 × 5 W	0.6	0.3	1.2	0.6	0.6	0.3	0.6	0.3
B3 (1800), KRE 101 2024/1, Vertical	W/L	2 × 5 W	0.7	0.3	1.3	0.7	0.7	0.3	0.7	0.3
B7 (2600), KRE 101 2024/1, Vertical	L	2 × 5 W	0.5	0.3	0.9	0.5	0.4	0.2	0.5	0.3
B1 (2100), KRE 101 2024/1, Horizontal	W/L	2 × 5 W	0.6	0.2	1.3	0.7	0.6	0.3	0.6	0.2
B3 (1800), KRE 101 2024/1, Horizontal	W/L	2 × 5 W	0.7	0.3	1.3	0.8	0.6	0.3	0.7	0.3
B7 (2600), KRE 101 2024/1, Horizontal	L	2 × 5 W	0.5	0.4	1.0	0.7	0.4	0.2	0.5	0.4

Expanded uncertainty (k=2) 95 % for power density calculations

± 2.3dB

⁴² For internal antennas and antennas mounted on the equipment, the installation case refers to the orientation of the equipment. For external antennas not mounted on the equipment, the installation case refers to the orientation of the antennas.



Table 8-3 *Box-Shaped Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for RRU 22F3 with 0.6 dB tolerance and 0.2 dB transmission loss (intended markets: Europe/Rest of world).*

Mode and output power for the RRU (micro-RBS)			Dimensions of the box-shaped compliance boundary (m)							
			Distance in front of antenna		Width		Height		Distance behind antenna	
Band, antenna, installation case ⁴³	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O	GP	O
B1 / B18 / B28 ⁴⁴ , KRE 101 2245/1, Vertical	L	2.8 W (B1: 1.2 W, B18: 0.8 W, B28: 0.8 W)	0.3	0.1	1.3	1.0	0.4	0.3	0.3	0.1
		28 W (B1: 12 W, B18: 8 W, B28: 8 W)	1.2	0.5	2.7	1.5	1.1	0.5	1.2	0.5

Expanded uncertainty (k=2) 95 % for power density calculations	± 2.3dB
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Table 8-4 *Box-Shaped Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for Radio 2203 with 1 dB tolerance and 0 dB transmission loss (intended markets: Europe/Rest of world).*

Mode and output power for the RRU (micro-RBS)			Dimensions of the box-shaped compliance boundary (m)							
			Distance in front of radio		Width		Height		Distance behind radio	
Band, antenna, installation case ⁴³	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O	GP	O
B1 (2100) KRE 101 2249/1 Vertical	W/L	2 × 5 W	1.2	0.5	1.0	0.5	0.8	0.4	0	0
B3 (1800) KRE 101 2249/1	W/L	2 × 5 W	1.1	0.5	1.0	0.5	0.8	0.4	0	0
B1 (2100), KRE 101 2024/1 Vertical	W/L	2 × 5 W	0.6	0.2	1.4	0.8	0.6	0.2	0.6	0.2
B7 (2600) KRE 101 2250/1	L/W	2 × 5 W	1.1	0.5	1.0	0.5	0.7	0.4	0	0
B8 (900) KRE 101 2199/1 Vertical	W/L	2 × 5 W	1.2	0.6	1.1	0.5	1.2	0.6	0	0
B1 (2100), KRE 101 2266/1 Vertical	W/L	2 × 5 W	0.6	0.2	1.3	0.8	0.6	0.2	0.6	0.2
B3 (1800) KRE 101 2266/1 Vertical	W/L	2 × 5 W	0.6	0.2	1.4	0.8	0.6	0.3	0.6	0.2
B7 (2600) KRE 101 2266/1	L/W	2 × 5 W	0.6	0.2	1.3	0.8	0.6	0.2	0.6	0.2
B8 (900) KRE 101 2266/1 Vertical	W/L	2 × 5 W	0.9	0.4	1.8	1	0.8	0.4	0.9	0.4

Expanded uncertainty (k=2) 95 % for power density calculations	± 2.3dB
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⁴³ For internal antennas and antennas mounted on the equipment, the installation case refers to the orientation of the equipment. For external antennas not mounted on the equipment, the installation case refers to the orientation of the antennas.

⁴⁴ This row shows the result for RRU 22F3 with simultaneous operation on B1, B18 and B28 with power ratios of 42.9 %, 28.6 % and 28.6 %, respectively. The orientation of the antennas is independent from the orientation of the RRU.



Table 8-5 *Box-Shaped Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for RRU 2208 with 1 dB tolerance and 0 dB transmission loss (intended markets: Europe/Rest of world).*

Mode and output power for the RRU (micro-RBS)			Dimensions of the box-shaped compliance boundary (m)							
			Distance in front of radio		Width		Height		Distance behind radio	
Band, antenna, installation case ⁴⁵	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O	GP	O
B41 (TD 2500), KRE 101 2250/2	L	2 × 1 W	0.5	0.2	0.5	0.2	0.3	0.2	0.0	0.0
		2 × 10 W	1.6	0.7	1.4	0.7	0.8	0.4	0.0	0.0

Expanded uncertainty (k=2) 95 % for power density calculations	± 2.3dB
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Table 8-6 *Box-Shaped Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for mRRUS 61 with 1 dB tolerance and 0 dB transmission loss (intended markets: Europe/Rest of world).*

Mode and output power for the mRRU (external radio unit)			Dimensions of the box-shaped compliance boundary (m)							
			Distance in front of antenna/EUT		Width		Height		Distance behind antenna/EUT	
Band, antenna, installation case ⁴⁶	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O	GP	O
B38 (2600), KRE 101 2142/2, Vertical	L	2 × 5 W	0.7	0.3	0.7	0.3	0.8	0.5	<0.1	<0.1

Expanded uncertainty (k=2) 95 % for power density calculations	± 2.3dB
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⁴⁵ The installation case refers to the orientation of the equipment.

⁴⁶ The installation case refers to the orientation of the equipment.



Table 9-1 *Box-Shaped Compliance Boundary Dimensions for General Public/Uncontrolled (GP) Exposure for mRRUS with 1 dB tolerance and 0 dB transmission loss (intended markets: USA/Canada).*

Mode and output power for the RRU (external radio unit)			Dimensions of the box-shaped compliance boundary (m)			
			Distance in front of antenna/EUT	Width	Height	Distance behind antenna/EUT
Band, antenna, installation case ⁴⁷	Standard	Nominal output power from the radio	GP	GP	GP	GP
B2 (1900), KRE 101 2141/1, Vertical	W/L	2 × 5 W	0.8	0.8	0.9	0.2
B2 (1900), KRE 101 2141/1, Horizontal	W/L	2 × 5 W	0.7	0.9	0.8	0.2
B2 (1900), KRE 101 2233/1, Vertical	W/L	2 × 5 W	0.4	0.7	0.7	0.4
B2 (1900), KRE 101 2233/1, Horizontal	W/L	2 × 5 W	0.4	0.9	0.9	0.4
B4 (2100), KRE 101 2141/1, Vertical	W/L	2 × 5 W	1.0	0.9	0.9	0.2
B4 (2100), KRE 101 2141/1, Horizontal	W/L	2 × 5 W	0.8	0.9	0.9	0.2
B4 (2100), KRE 101 2024/1, Vertical	W/L	2 × 5 W	0.4	0.7	0.7	0.4
B4 (2100), KRE 101 2024/1, Horizontal	W/L	2 × 5 W	0.5	0.9	0.9	0.5
B7 (2600), KRE 101 2142/1, Vertical	L	2 × 5 W	0.5	0.7	0.9	0.2
B7 (2600), KRE 101 2142/1, Horizontal	L	2 × 5 W	0.5	0.9	0.7	0.2
B7 (2600), KRE 101 2024/1, Vertical	L	2 × 5 W	0.3	0.7	0.7	0.3
B7 (2600), KRE 101 2024/1, Horizontal	L	2 × 5 W	0.3	0.9	0.9	0.3
B12 (700), KRE 101 2134/1, Vertical	L	2 × 5 W	1.0	0.8	0.9	0.2
B12 (700), KRE 101 2134/1, Horizontal	L	2 × 5 W	1.0	0.9	0.8	0.2
B12 (700), KRE 101 2245/1, Horizontal	L	2 × 5 W	0.5	1.1	1.1	0.5
B13 (750), KRE 101 2135/1, Vertical	L	2 × 5 W	1.1	1.0	1.0	0.2
B13 (750), KRE 101 2135/1, Horizontal	L	2 × 5 W	1.2	1.0	1.0	0.2
B13 (750), KRE 101 2245/1, Horizontal	L	2 × 5 W	0.6	1.2	1.2	0.6

⁴⁷ The installation case refers to the orientation of the equipment.



Table 9-2 Box-Shaped Compliance Boundary Dimensions for General Public/Uncontrolled (GP) Exposure for mRBS with 1 dB tolerance and 0 dB transmission loss (intended markets: USA/Canada). (continues on next page).

Mode and output power for the mRBS (micro-RBS)			Dimensions of the box-shaped compliance boundary (m)			
			Distance in front of antenna/EUT	Width	Height	Distance behind antenna/EUT
Band, antenna, installation case ⁴⁸	Standard	Nominal output power from the radio	GP	GP	GP	GP
B2 (1900), KRE 101 2141/1, Vertical	W/L	2 × 5 W	1.0	0.9	1.0	0.2
B2 (1900), KRE 101 2141/1, Horizontal	W/L	2 × 5 W	0.9	1.0	0.9	0.2
B2 (1900), KRE 101 2233/1, Vertical	W/L	2 × 5 W	0.6	0.8	0.8	0.6
B2 (1900), KRE 101 2233/1, Horizontal	W/L	2 × 5 W	0.4	1.0	1.0	0.4
B4 (2100), KRE 101 2141/1, Vertical	W/L	2 × 5 W	0.8	0.9	0.9	0.2
B4 (2100), KRE 101 2141/1, Horizontal	W/L	2 × 5 W	0.8	0.9	0.9	0.2
B4 (2100), KRE 101 2024/1, Vertical	W/L	2 × 5 W	0.4	0.7	0.7	0.4
B4 (2100), KRE 101 2024/1, Horizontal	W/L	2 × 5 W	0.3	0.9	0.9	0.3
B7 (2600), KRE 101 2142/1, Vertical	L	2 × 5 W	0.6	0.8	0.9	0.2
B7 (2600), KRE 101 2142/1, Horizontal	L	2 × 5 W	0.5	0.9	0.8	0.2
B7 (2600), KRE 101 2024/1, Vertical	L	2 × 5 W	0.3	0.8	0.8	0.3
B7 (2600), KRE 101 2024/1, Horizontal	L	2 × 5 W	0.3	0.9	0.9	0.3
B12 (700), KRE 101 2134/1, Vertical	L	2 × 5 W	1.0	0.9	0.9	0.2
B12 (700), KRE 101 2134/1, Horizontal	L	2 × 5 W	1.1	0.9	0.9	0.2
B12 (700), KRE 101 2245/1, Horizontal	L	2 × 5 W	0.5	1.1	1.1	0.5
B13 (750), KRE 101 2135/1, Vertical	L	2 × 5 W	1.0	1.1	0.9	0.2
B13 (750), KRE 101 2135/1, Horizontal	L	2 × 5 W	1.1	0.9	1.1	0.2
B13 (750), KRE 101 2245/1, Horizontal	L	2 × 5 W	0.6	1.2	1.2	0.6

⁴⁸ The installation case refers to the orientation of the equipment.



Table 9-2 (continued from the previous page) Box-Shaped Compliance Boundary Dimensions for General Public/Uncontrolled (GP) Exposure for mRBS with 1 dB tolerance and 0 dB transmission loss (intended markets: USA/Canada)

Mode and output power for the mRBS (micro-RBS)			Dimensions of the box-shaped compliance boundary (m)			
			Distance in front of antenna/EUT	Width	Height	Distance behind antenna/EUT
Band, antenna, installation case ⁴⁸	Standard	Nominal output power from the radio	GP	GP	GP	GP
B25 (1900), KRE 101 2141/1, Vertical	L	2 × 5 W	0.9	0.8	0.9	0.2
B25 (1900), KRE 101 2141/1, Horizontal	L	2 × 5 W	0.9	0.9	0.8	0.2
B25 (1900), KRE 101 2233/1, Vertical	L	2 × 5 W	0.5	0.9	0.9	0.5
B25 (1900), KRE 101 2233/1, Horizontal	L	2 × 5 W	0.4	1.0	1.0	0.4

Table 9-3 Box-Shaped Compliance Boundary Dimensions for General Public/Uncontrolled (GP) Exposure for Radio 2203 with 0.6 dB tolerance and 0 dB transmission loss (intended market: USA)

Mode and output power for the mRRU (micro-RRU)			Dimensions of the box-shaped compliance boundary (m)			
			Distance in front of antenna/EUT	Width	Height	Distance behind antenna/EUT
Band, antenna, installation case ⁴⁸	Standard	Nominal output power from the radio	GP	GP	GP	GP
B2/25 (1900) KRE 101 2249/1, Vertical	W/L	2 × 5 W	0.7	0.6	0.6	0.2
B2/25 (1900) KRE 101 2233/1, Vertical	W/L	2 × 5 W	0.3	0.9	0.9	0.3
B2/25 (1900) KRE 101 2245/1, Vertical	W/L	2 × 5 W	0.3	0.9	0.9	0.3
B5 (850) KRE 101 2199/1, Vertical	W/L	2 × 5 W	0.7	0.6	0.6	0.2
B5 (850) KRE 101 2233/1, Vertical	W/L	2 × 5 W	0.3	1.0	1.0	0.4
B66A (2100), KRE 101 2249/1, Vertical	W ⁴⁹ /L	2 × 5 W	0.8	0.6	0.6	0.2
B66A (2100), KRE 101 2233/1, Vertical	W ⁴⁹ /L	2 × 5 W	0.2	0.9	0.9	0.3
B66A (2100), KRE 101 2245/1, Vertical	W ⁴⁹ /L	2 × 5 W	0.3	0.9	0.9	0.3

⁴⁹ For WCDMA/UMTS the Radio 2203 B66A is limited to B4 frequencies.



Table 9-4 Box-Shaped Compliance Boundary Dimensions for General Public/Uncontrolled (GP) Exposure for Radio 2203 with 0.6 dB tolerance and 0 dB transmission loss (intended market: Canada)

Mode and output power for the mRRU (micro-RRU)			Dimensions of the box-shaped compliance boundary (m)			
			Distance in front of antenna/EUT	Width	Height	Distance behind antenna/EUT
Band, antenna, installation case ⁴⁸	Standard	Nominal output power from the radio	GP	GP	GP	GP
B2/25 (1900) KRE 101 2249/1, Vertical	W/L	2 × 5 W	1.2	1.0	1.0	0.2
B2/25 (1900) KRE 101 2233/1, Vertical	W/L	2 × 5 W	0.4	1.0	1.0	0.5
B2/25 (1900) KRE 101 2245/1, Vertical	W/L	2 × 5 W	0.4	1.1	1.1	0.5
B5 (850) KRE 101 2199/1, Vertical	W/L	2 × 5 W	1.2	1.0	1.0	0.2
B5 (850) KRE 101 2233/1, Vertical	W/L	2 × 5 W	0.6	1.6	1.6	0.8
B7 (2600) KRE 101 2250/1 Vertical	W/L	2 × 5 W	1.1	0.9	0.9	0.2
B7 (2600) KRE 101 2233/1 Vertical	W/L	2 × 5 W	0.3	0.9	0.9	0.4
B7 (2600) KRE 101 2245/1 Vertical	W/L	2 × 5 W	0.3	0.9	0.9	0.3
B66A (2100), KRE 101 2249/1, Vertical	W ⁴⁹ /L	2 × 5 W	1.4	1.0	1.0	0.2
B66A (2100), KRE 101 2233/1, Vertical	W ⁴⁹ /L	2 × 5 W	0.5	1.1	1.1	0.5
B66A (2100), KRE 101 2245/1, Vertical	W ⁴⁹ /L	2 × 5 W	0.6	1.1	1.1	0.6

Table 10-1 Characteristics for the tested internal antennas used with mRRUS, mRBS, RRU 2208, and Radio 2203.

Antenna specifications	Internal X-pol sector coverage antenna (KRE 101 2141/1)	Internal X-pol sector coverage antenna (KRE 101 2135/1)	Internal X-pol sector coverage antenna (KRE 101 2142/1)	Internal X-pol sector antenna (KRE 101 2134/1)	Internal X-pol sector antenna (KRE 101 2142/2)
Antenna dimensions (m)	—	—	—	—	—
Half-power beam width (degrees)	68 – 81	79 – 92	93 – 108	86 - 106	76 - 96
Antenna gain (dBi)	5.8 – 7.9	5.3 – 6.6	4.8 – 5.4	5.2 – 6.7	6.8 – 6.1
Down tilt (degrees)	—	—	—	—	—
Tested bands	B1, B2, B3, B4, B25	B13	B7	B12	B38



Antenna specifications	Internal X-pol sector coverage antenna (KRE 101 2150/2)	Internal X-pol sector coverage antenna (KRE 101 2249/1)	Internal X-pol sector coverage antenna (KRE 101 2199/1)	Internal X-pol sector coverage antenna (KRE 101 2250/1)
Antenna dimensions (m)	—	—	—	—
Half-power beam width (degrees)	65 ± 10	85	—	82 ± 13
Antenna gain (dBi)	> 10	> 7.5	6.5	> 7.5
Down tilt (degrees)	—	8	—	8
Tested bands	B41	B1, B2, B3, B25, B66A	B8, B5	B7

Table 10-2 Characteristics for the tested external antennas used with mRRUS, mRBS, RRU 2208 and Radio 2203.

Antenna specifications	External X-pol sector coverage antenna (KRE 101 2085/1)	External X-pol sector coverage antenna (KRE 101 1985/1)	External V-pol omni-directional antenna (KRE 101 2024/1)	External V-pol omni-directional antenna (KRE 101 2245/1)	External V-pol omni-directional antenna (KRE 101 2233/1)
Antenna dimensions (m)	Height: 1.4	Height: 1.3	Height: 0.12	Height: 0.2	Height: 0.19
Half-power beam width (degrees)	58	64 – 68	omni	omni	omni
Antenna gain (dBi)	19.0	17.7 - 18	2	2	2
Down tilt (degrees)	0	0	—	—	—
Tested bands	B7	B1, B3	B1, B3, B4, B7	B2, B7, B12, B13, B25, B66A	B2, B7, B25, B66A

Antenna specifications	External V-pol omni-directional antenna (KRE 101 2266/1)
Antenna dimensions (m)	Height: 0.19
Half-power beam width (degrees)	omni
Antenna gain (dBi)	2
Down tilt (degrees)	—
Tested bands	B1, B3, B7, B8



Table 10-3 Characteristics for the tested antennas used with RRU 22F3.

Antenna specifications	External V-pol omni-directional antenna (KRE 101 2245/1)
Antenna dimensions (m)	Height: 0.2
Half-power beam width (degrees)	omni
Antenna gain (dBi)	2
Down tilt (degrees)	—
Tested bands	B1, B18, B28

Table 11-1 Total Power to the mRRUS, mRBS, RRU 2208, and Radio 2203 antennas.

Band	Standard	Nominal output power from the radio (dBm/W)	Total power delivered to antenna (dBm/W)
B1 (2100)	W/L	40 / 10	41 / 12.6
B2 (1900)	W/L	40 / 10	41 / 12.6
B3 (1800)	W/L	40 / 10	41 / 12.6
B4 (2100)	W/L	40 / 10	41 / 12.6
B5 (850)	W/L	40 / 10	40.6 / 11.5
B7 (2600)	L	40 / 10	41 / 12.6
B8 (900)	W/L	40 / 10	41 / 12.6
B12 (700)	L	40 / 10	41 / 12.6
B13 (750)	L	40 / 10	41 / 12.6
B25 (1900)	W/L	40 / 10	41 / 12.6
B38 (2600)	L	40 / 10	41 / 12.6
B41 (TD 2500)	L	33 / 2.0	34 / 2.5
		43 / 20	44 / 25
B66A (2100)	W/L	40 / 10	40.6 / 11.5

*Table 11-2 Total Power to the RRU 22F3 antennas.*

Band	Standard	Nominal output power from the radio (dBm/W)	Total power delivered to antenna (dBm/W)
B1 (2100)	L	12 / 40.8 ⁵⁰	13 / 41.2 ⁵⁰
B18 (800)	L	8.0 / 39.0 ⁵⁰	8.7 / 39.4 ⁵⁰
B28 (700)	L	8.0 / 39.0 ⁵⁰	8.7 / 39.4 ⁵⁰

⁵⁰ This row shows the result for RRU 22F3 with simultaneous operation on B1, B18 and B28 with power ratios of 42.9 %, 28.6 % and 28.6 %, respectively.



2.3 Pico RBS

For EU and markets other than US and Canada, box-shaped compliance boundaries have been determined with the front and back compliance distances defined from the equipment casing as shown in Figure 5. The widths and heights are specified including the dimensions of the product.

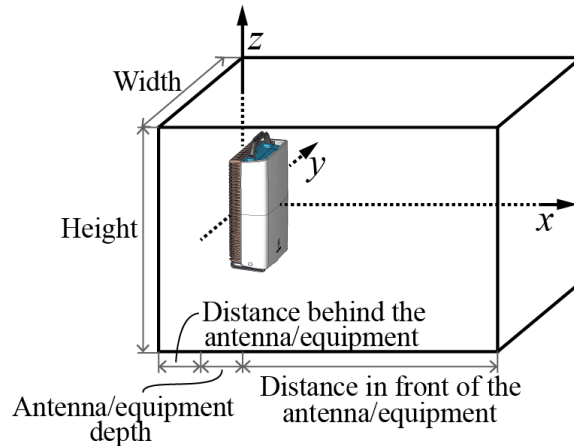


Figure 5. Box-shaped Compliance Boundary. The front and back compliance distances are defined from the equipment casing.

For ceiling mounted external antennas, cylinder-shaped compliance boundaries have been determined with the front, back and radial compliance distances defined relative to the equipment casing as shown in Figure 6.

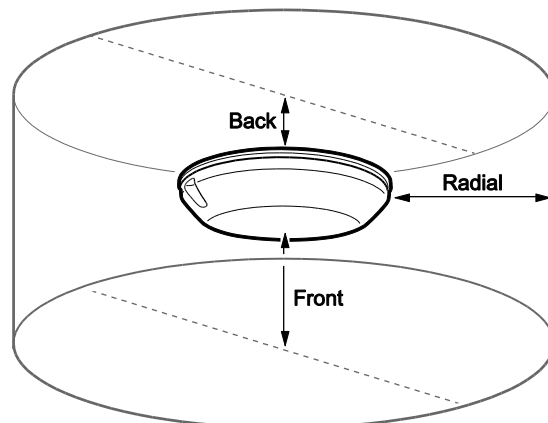


Figure 6. Cylinder-shaped Compliance Boundary. The compliance distances are defined relative to the equipment casing.

The resulting compliance boundary dimensions in meters are shown in Table 12. The power levels used during the assessments were determined including power tolerances and transmission losses where applicable. The expanded uncertainty ($k=2$) for the underlying specific absorption rate (SAR) and field strength measurements is less than $\pm 30\%$.

The nominal power levels (excluding tolerances) are given in Table 13.



According to FCC and Industry Canada requirements, of relevance for the US and Canadian markets, a Pico RBS is to be classified as a mobile device with an intended separation distance to the user or nearby persons of at least 20 cm. Conducted EMF tests have confirmed that the exposure levels are below the exposure limits at 20 cm separation distance for the assessed internal and external antennas used individually or combined, see Table 14.

Table 12-1 Box-Shaped Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for RBS 6401 with the internal antenna KRE 101 2139/1 with 0.6 dB power tolerance and 0 dB transmission loss. (Intended markets: Europe/Rest of world (RoW)).

Mode and output power for the RBS (radio base station)			Dimensions of the box-shaped compliance boundary (m)							
			Distance in front of EUT		Width		Height		Distance behind EUT	
3GPP band	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O	GP	O
B1 (2100)	W	2 × 1 W	0.20	0.06	0.26 ⁵¹	0.26 ⁵¹	0.42 ⁵²	0.42 ⁵²	0	0
B1 (2100)	W	2 × 1 W	0.20	0.06	0.26 ⁵¹	0.26 ⁵¹	0.42 ⁵²	0.42 ⁵²	0	0
	WiFi 2.4 GHz	0.1 W								
	WiFi 5 GHz	0.25 W								
B1 (2100)	L	2 × 1 W	0.20	0.03	0.26 ⁵¹	0.26 ⁵¹	0.42 ⁵²	0.42 ⁵²	0	0
B1 (2100)	L	2 × 1 W	0.20	0.03	0.26 ⁵¹	0.26 ⁵¹	0.42 ⁵²	0.42 ⁵²	0	0
	WiFi 2.4 GHz	0.1 W								
	WiFi 5 GHz	0.25 W								
B2 (1900)	W	2 × 1 W	0.20	0.06	0.26 ⁵¹	0.26 ⁵¹	0.42 ⁵²	0.42 ⁵²	0	0
B2 (1900)	W	2 × 1 W	0.20	0.06	0.26 ⁵¹	0.26 ⁵¹	0.42 ⁵²	0.42 ⁵²	0	0
	WiFi FCC-RoW 2.4 GHz	0.1 W								
	WiFi FCC-RoW 5 GHz	0.25 W								
B2 (1900)	L	2 × 1 W	0.20	0.03	0.26 ⁵¹	0.26 ⁵¹	0.42 ⁵²	0.42 ⁵²	0	0
B2 (1900)	L	2 × 1 W	0.20	0.03	0.26 ⁵¹	0.26 ⁵¹	0.42 ⁵²	0.42 ⁵²	0	0
	WiFi FCC-RoW 2.4 GHz	0.1 W								
	WiFi FCC-RoW 5 GHz	0.25 W								
Expanded uncertainty (k=2) 95 % for SAR and field strength measurements							< 30%			

⁵¹ Same as product width. This implies that there is no compliance distance to the side of the product.

⁵² Same as product height. This implies that there is no compliance distance above or below the product.



Table 12-2 Box-Shaped Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for RBS 6402 with the internal antenna KRE 105 660/1 with 0.6 dB power tolerance and 0 dB transmission loss. (Intended markets: Europe/Rest of world (RoW)).

Mode and output power for the RBS (radio base station)			Dimensions of the box-shaped compliance boundary (m)							
			Distance in front of EUT		Width		Height		Distance behind EUT	
3GPP/ Wi-Fi band & hardware configuration type	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O	GP	O
B1 (2100) without fan module	W	2 × 0.25 W	0	0	0.28 ⁵¹	0.28 ⁵¹	0.17 ⁵²	0.17 ⁵²	0	0
B1 (2100) with fan module	W	2 × 0.25 W	0	0	0.28 ⁵¹	0.28 ⁵¹	0.19 ⁵²	0.19 ⁵²	0	0
B7 (2600) without fan module	L	2 × 0.25 W	0	0	0.28 ⁵¹	0.28 ⁵¹	0.17 ⁵²	0.17 ⁵²	0	0
B7 (2600) with fan module	L	2 × 0.25 W	0	0	0.28 ⁵¹	0.28 ⁵¹	0.19 ⁵²	0.19 ⁵²	0	0
B1 (2100), B3 (1800) or B7 (2600) combined with B1 (2100), B3 (1800) or B7 (2600)	L	4 × 0.25 W	0.02	0.01	0.31	0.30	0.21	0.21	0	0
B1 (2100), B3 (1800) or B7 (2600) combined with B46A (5200), or B46D (5800)	L	2 × 0.25 W (B1, B3, B7) 2 × 0.025 W (B46A) 2 × 0.13 W (B46D)	0.01	0	0.30	0.28 ⁵¹	0.19 ⁵²	0.19 ⁵²	0	0
B1 (2100), B3 (1800) or B7 (2600) combined with B1 (2100), B3 (1800) or B7 (2600) and Wi-Fi 2 GHz and Wi-Fi 5GHz	L Wi-Fi 2 GHz Wi-Fi 5 GHz	4 × 0.25 W 3 × 0.40 W 3 × 0.50 W	0.02	0.01	0.30	0.29	0.20	0.20	0	0

Expanded uncertainty (k=2) 95 % for SAR and field strength measurements

< 30%

Table 12-3 Dimensions of the cylinder-shaped compliance boundary for general public (GP) and occupational (O) exposure for the RBS 6402 with the external cellular antennas with 0.6 dB output power tolerance and connected with the supplied transmission cable. (Intended markets: Europe/Rest of world (RoW)).

Mode and output power for the equipment under test (EUT)			Dimensions of the cylinder-shaped compliance boundary (m)					
			Distance in front of EUT		Distance in radial direction		Distance behind EUT	
3GPP band	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O
B1 (2100)	W/L	2 × 0.25 W	0	0	0	0	0	0
B3 (1800)	L	2 × 0.25 W	0	0	0	0	0	0
B7 (2600)	L	2 × 0.25 W	0	0	0	0	0	0



Table 13-1 RBS 6401 Nominal Power Levels.

Band	Standard	Nominal output power from the radio (dBm/W)
B1 (2100)	W/L	33/2
B2, B25 (1900)	W/L	33/2
B1 (2100)	WiFi, 2.4 GHz FCC- RoW	20/0.1
B1 (2100)	WiFi, 5 GHz FCC- RoW	24/0.25 ⁵³
B2, B25 (1900)	WiFi, 2.4 GHz FCC- RoW	20/0.1
B2, B25 (1900)	WiFi, 5 GHz FCC- RoW	24/0.25 ⁵³

⁵³ The power level provided corresponds to the maximum power among the available bands.



Table 13-2 RBS 6402 Nominal Power Levels.

Band	Standard	Nominal output power from the radio (dBm/W)
B1 (2100)	W/L	27/0.5 ⁵⁴
B2 (1900)	W	27/0.5 ⁵⁴
B2,25 (1900)	L	27/0.5 ⁵⁴
B2,25 (1900)	L	30/1 ⁵⁵
B3 (1800)	L	27/0.5 ⁵⁶
B4(2100)	W/L	27/0.5 ⁵⁴
B4(2100)	L	30/1 ⁵⁵
B7 (2600)	L	27/0.5 ⁵⁴
B7 (2600)	L	30/1 ⁵⁵
B1 (2100), B3 (1800) or B7 (2600) combined with B1 (2100), B3 (1800) or B7 (2600)	L	30/1 ⁵⁵
B2,25 (1900), B4 (2100) or B7 (2600) combined with B46A (5200)	L	28.8/0.75
B2,25 (1900), B4 (2100) or B7 (2600) combined with B46D (5700)	L	28.8/0.75
B1 (2100), B3 (1800) or B7 (2600) combined with B46A (5200)	L	27.4 / 0.55
B1 (2100), B3 (1800) or B7 (2600) combined with B46D (5800)	L	28.8 / 0.75
B1 (2100), B3 (1800) or B7 (2600) combined with B1 (2100), B3 (1800) or B7 (2600) and Wi-Fi 2 GHz and Wi-Fi 5GHz	L + Wi-Fi	31/1.27 ⁵⁷
B2,25 (1900), B4 (2100) or B7 (2600) combined with B2,25 (1900), B4 (2100) or B7 (2600) and Wi-Fi 2 GHz and Wi-Fi 5GHz	L + Wi-Fi	31/1.27 ⁵⁷

⁵⁴ This output power value corresponds to the EUT with one RF card installed or to the configuration with an external antenna.

⁵⁵ This output power value corresponds to the EUT with both RF cards installed.

⁵⁶ This output power value corresponds to the configuration with an external antenna.

⁵⁷ This output power values corresponds to the configuration with two cellular band RF-cards and one Wi-Fi RF-card.



Table 14-1 Characteristics for the tested antennas used with RBS 6401 for the compliance tests with compliance confirmed at 20 cm separation distance.

Antenna specifications	Internal X-pol sector coverage antenna (KRE 101 2139/1)	External V-pol omni-directional antenna (KRE 101 2024/1)
Antenna dimensions (m)	—	Height: 0.12
Half-power beam width (degrees)	62 – 105	omni
Antenna gain (dBi)	6.4-8.3	2
Tested bands	B1, B2, B25	B2, B25

Table 14-2 Characteristics for the tested antennas used with RBS 6402 for the compliance tests with compliance confirmed at 20 cm separation distance.

Antenna specifications	Internal PIFA antenna (KRE 105 660/1)	Internal antenna (KRE 105 211/1)	Internal antenna (KRE 105 211/2)	External H/V linearly polarized antenna (Laird CMD69273)
Antenna dimensions (m)	—	—	—	Diameter 219 mm x Height 94mm / Height extending beneath the ceiling 44 mm
Half-power beam width (degrees)	—	—	—	—
Antenna gain (dBi)	4.5 (Max)	6 (Max)	6 (Max)	5.0 B2/B4/B25 5.6 B7
Tested bands	B2 ,B4, B7, B25	B46A, B46D, Wi-Fi 2.4 GHz, Wi-Fi 5 GHz	Wi-Fi 2.4 GHz, Wi-Fi 5 GHz	B2, B4, B7, B25



2.4 Radio Dot System

For EU and markets other than US and Canada, cylinder-shaped compliance boundaries have been determined with the front, back and radial compliance distances defined relative to the equipment casing as shown in Figure 7.

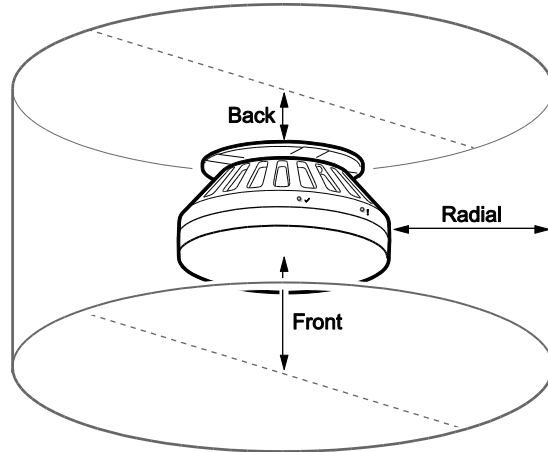


Figure 7. Cylinder-shaped Compliance Boundary. The compliance distances are defined relative to the equipment casing.

The resulting compliance boundary dimensions for the Radio Dot, in meters, are shown in Table 15. A distance of zero means that compliance has been demonstrated at the surface of the product. The power levels used during the assessments were determined including power tolerances and transmission losses. The expanded uncertainty (k=2) for the underlying SAR is less than ±30%.

Table 15 Cylinder-Shaped Compliance Boundary Dimensions for General Public (GP) and Occupational (O) Exposure for the Radio Dot. A 2 dB power tolerance and 0 dB transmission loss was used. (intended markets: Europe/Rest of world (RoW)).

Mode and output power for the RBS (radio base station)			Dimensions of the cylinder-shaped compliance boundary (m)					
			Distance in front of EUT		Radial		Distance behind EUT	
3GPP band	Standard	Nominal output power from the radio	GP	O	GP	O	GP	O
B1 (2100)	W/L	2 × 0.05 W	0.0	0.0	0.0	0.0	0.0	0.0
B3 (1800)	L	2 × 0.05 W	0.0	0.0	0.0	0.0	0.0	0.0
B7 (2600)	L	2 × 0.05 W	0.0	0.0	0.0	0.0	0.0	0.0
B40 (2300)	L	2 × 0.05 W	0.0	0.0	0.0	0.0	0.0	0.0

The total power fed to the antennas for RD 2242 (including tolerance and assumed transmission loss) is given in Table 16.



Table 16 *RD 2242 Nominal Power Levels.*

Band	Standard	Nominal output power from the radio (dBm/W)	Total power delivered to the antennas (dBm/W)
B1 (2100)	W/L	20 / 0.1	22 / 0.16
B2 (1900)	W/L	20 / 0.1	22 / 0.16
B3 (1800)	L	20 / 0.1	22 / 0.16
B4 (2100)	L	20 / 0.1	22 / 0.16
B5 (850)	L	20 / 0.1	22 / 0.16
B7 (2600)	L	20 / 0.1	22 / 0.16
B13 (700)	L	20 / 0.1	22 / 0.16
B17a (700)	L	20 / 0.1	22 / 0.16
B40 (2300)	L	20 / 0.1	22 / 0.16

According to FCC and Industry Canada requirements, of relevance for the US and Canadian markets, a Radio Dot may be classified as a mobile device with an intended separation distance to the user or nearby persons of at least 20 cm. Conducted EMF tests have confirmed that the RF exposure levels are below the exposure limits at 20 cm separation distance for the assessed internal antenna, see Table 17.

Table 17 *Characteristics for the tested antennas used with RD 2242 for the compliance tests with compliance confirmed at 20 cm separation distance.*

Antenna specifications	Tested bands	Maximum antenna gain (dBi)
Internal sector coverage antenna (KRE 101 2191/2)	B2	3
Internal sector coverage antenna (KRE 101 2191/2)	B4	2.5
Internal sector coverage antenna (KRE 101 2187/1)	B5	-0.4
Internal sector coverage antenna (KRE 101 2185/1)	B13	-2.0
Internal sector coverage antenna (KRE 101 2184/2)	B17a	-2.6



References

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- [2] FCC, Code of Federal Regulations CFR title 47, part 1.1310 “Radiofrequency radiation exposure limits”, Federal Communications Commission (FCC), August 1997.
- [3] Industry Canada, Radio Standard Specification (RSS) 102, “Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)”, 2015.
- [4] CENELEC EN 50383, “Basic standard for the calculation and measurement of electromagnetic field strength and SAR related to human exposure from radio base stations and fixed terminal stations for wireless telecommunication systems (110 MHz – 40 GHz)”, European Committee for Electrotechnical Standardization (CENELEC), August 2010.
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- [7] Ericsson, “Radio Frequency Electromagnetic Fields”, Safety Information, 124 46-EN/LZT 720 0399.