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MPE test on Ericsson RBS 6501 B2

(3 appendices)

Test object

Product name: RBS 6501 B2

Product number: KRD 901 102/X, see appendix 1 for details.

See appendix 1 for the tested hardware configuration and general information.

See appendix 3 for photos.

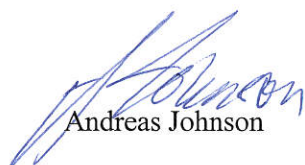
Summary

Standard	Compliant	Appendix	Remarks
FCC 47 CFR 2.1091 Radiofrequency radiation exposure evaluation: mobile devices	Yes	-	-
RSS-102 Radio Frequency Exposure compliance of Radio communication Apparatus, Issue 4	Yes	2	-
OET Bulletin 65/KDB447498 ver 05 rev 1	Yes	2	-

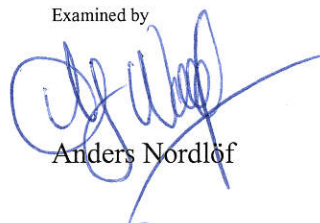
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Appendix 1

Measurement equipment

	Calibration Due	SP number
Test site Tesla	2017-01	503 881
Measurement software: Antennkalibrering V1.20	-	-
Calculation software: EMF 1.0	-	-
Laser probe AR FL7006	2014-06	901 492
Testo 625 Temperature and humidity meter	2014-06	504 188

Uncertainties

Measurement and test instrument uncertainties are described in the quality assurance documentation "SP-QD 10885". The measurement uncertainties can be found in the table below. The uncertainties are calculated with a coverage factor $k=2$ (95% level of confidence).

Standard	Method	Uncertainty
FCC 47 CFR 2.1091	RF exposure evaluation	10 %, Note

Note: Stated uncertainty refers to the calculated distance.

Compliance evaluation is based on a shared risk principle with respect to the measurement uncertainty.

Purpose of test

The tests were performed to verify that the radiofrequency exposure of the RBS 6501 meets the requirements of 47 CFR 2.1091 and RSS-102.

Description of the test object

The test object is a Radio Base Station configured in Single RAT mode for WCDMA and LTE designed to provide mobile users with a connection to a mobile network.

The test scope covers the following models of test object:

Product number: KRD 901 102/1, 100-250 VAC internal antenna
Product number: KRD 901 102/2, -48 VDC internal antenna
Product number: KRD 901 102/3, 100-250 VAC no internal antenna
Product number: KRD 901 102/4, -48 VDC no internal antenna

FCC ID TA8AKRD901102
IC: 287AB-AS901102

IC model numbers:
IC MODEL NO: AS9011021
IC MODEL NO: AS9011022
IC MODEL NO: AS9011023
IC MODEL NO: AS9011024

Appendix 1

Delivery of test object

The test object was delivered: 2014-04-04.

Test facility

The used test site (503 881) is compliant with the requirements of section 2.948 of the FCC rules and listed, registration number 93866, as a facility accepted for certification under parts 15 and 18. The site complies with RSS-Gen, Issue 3 and is accepted by Industry Canada for the performance of radiated measurements, file no: IC 3482A-1.

Reservation

The test results in this report apply only to the particular test objects as declared in the report.

Test engineers

Kexin Chen, Benyamin Mashouf, Tomas Isbring and Andreas Johnson, SP.

Test participant

None.

Appendix 1

Tested configuration

Antenna port A: 1x 37.0 dBm (1x 5 W)
 Antenna port B: 1x 37.0 dBm (1x 5 W)
 Communication: IP via electrical interface
 Power configuration: -48 VDC for KRD 901 102/2

Operational test mode

For WCDMA the RBS unit was activated for maximum transmit power transmitting test model TM5 as defined in ETSI TS 125 141/ 3GPP TS 25.141. The channel type “3GPP Reference channel 12.2 kps slotformat 10” was used in all cells with DPCH = 30. Bandwidth = 5 MHz.

The test object was configured in MIMO mode with both RF paths allocated to the following UARFCN:

UARFCN Downlink	Frequency [MHz]	Comment
9662	1932.4	Single carrier TX bottom frequency
9800	1960.0	Single carrier TX mid frequency
9938	1987.6	Single carrier TX top frequency

For LTE the RBS 6501 unit was activated for maximum transmit power transmitting test model E-TM1.1 as defined in ETSI TS 136 141/ 3GPP TS 36.141.

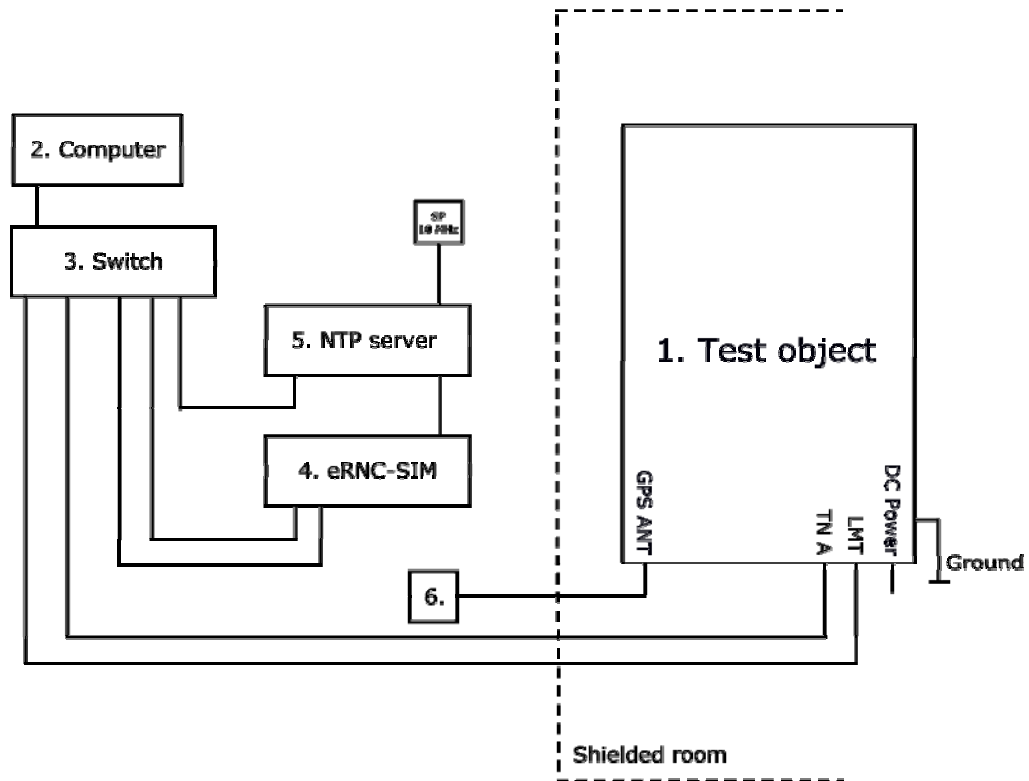
The test object was configured in MIMO mode with both RF paths allocated to the following EARFCN:

EARFCN Downlink	Frequency [MHz]	Comment
1100	1980.0	Single carrier TX top frequency in 20 MHz BW configuration

Worst case configuration for LTE is based on measurements performed on RBS 6501 B25 AC, KRD 901 125/3, which according to the client has identical hardware as the test objects in this report.

Appendix 1

Test setup: WCDMA



1.	RBS 6501 B2 DC, KRD 901 102/2, rev. R1A, s/n: CB4T167906 Software: CXP 902 3291, rev. R2B34
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Functional test equipment:

2.	Computer, Advantec 610H, BAMS – 1000785553
3.	Switch H3C S5120, BAMS – 1001051254
4.	eRNC-SIM, BAMS – 1001131781
5.	NTP server Symmetricom, BAMS – 1000486040
6.	GPS Active Antenna, KRE 101 2082/1

Integrated antenna

Directional antenna, KRE 101 2141/1, rev. R1C, s/n: T89U102776

Representing version: KRD 901 102/2

Semi-integrated omni antenna

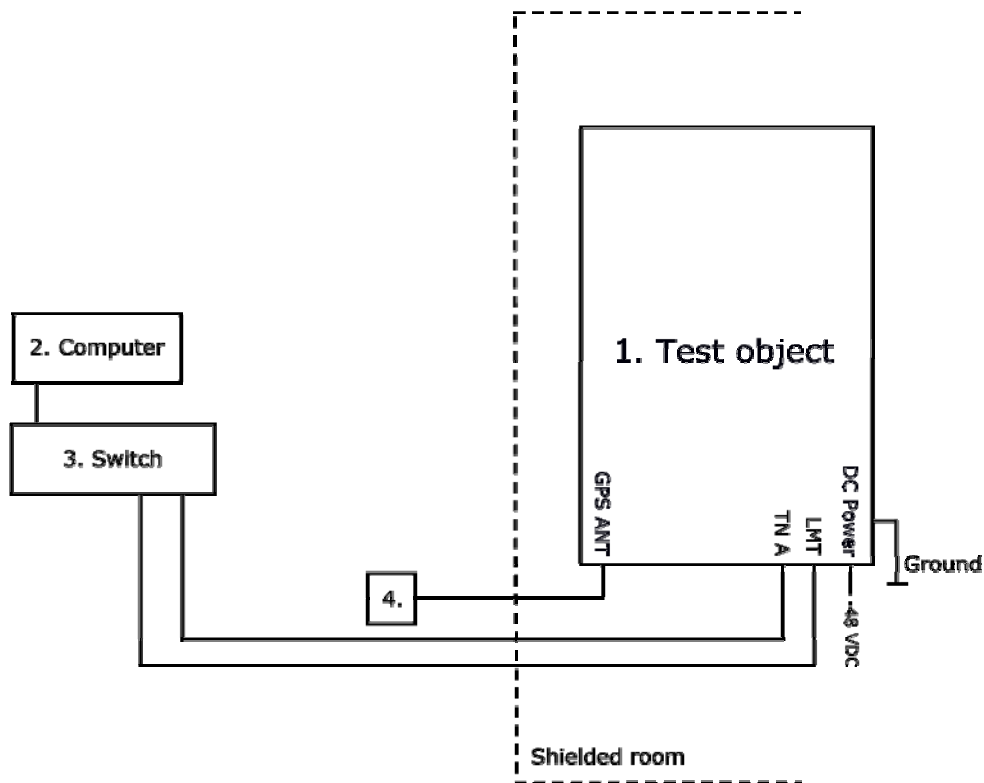
VPol Omni, KRE 101 2233/1, s/n: DEG2731542

VPol Omni, KRE 101 2233/1, s/n: DEG2731546

Representing version: KRD 901 102/4

Appendix 1

Test setup: LTE



1.	RBS 6501 B2 DC, KRD 901 102/2, rev. R1A, s/n: CB4T007167 Software: CXP 102 051/19, rev. R37AL
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Functional test equipment:

2.	Computer HP EliteBook 8540w BAMS – 1001052042
3.	Switch Netgear GS108E
4.	GPS Active Antenna, KRE 101 2082/1

Integrated antenna

Directional antenna, KRE 101 2141/1, rev. R1C, s/n: T89U102776

Representing version: KRD 901 102/2

Semi-integrated omni antenna

VPol Omni, KRE 101 2233/1, s/n: DEG2731542

VPol Omni, KRE 101 2233/1, s/n: DEG2731546

Representing version: KRD 901 102/4

Appendix 1

Interface:	Type of port:
Power: -48 VDC	DC Power
-48 VDC output power	DC Power
TNA, RJ45 interface	Telecom
TNB, Optical interface	Telecom
EC bus and Ext Alarm	Signal
GPS	Signal
Ground wire	Ground

Appendix 2

RF exposure evaluation: 2.1091 Mobile devices / RSS-102 4.2

Date	Temperature	Humidity
2014-04-25	22 °C ± 3 °C	22 % ± 5 %
2014-04-28	22 °C ± 3 °C	31 % ± 5 %
2014-04-29	21 °C ± 3 °C	33 % ± 5 %
2014-04-30	23 °C ± 3 °C	33 % ± 5 %

Procedure

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

Test setup and procedure

1. The test object is measured in twelve directions (in 30° steps) with the field probe continuously scanning from 0.1 – 2 m in height.
2. Measuring distance was 20 cm from the centre of the test object, step 1 is repeated with a distance increment of 20 cm until the measured field strength is compliant.

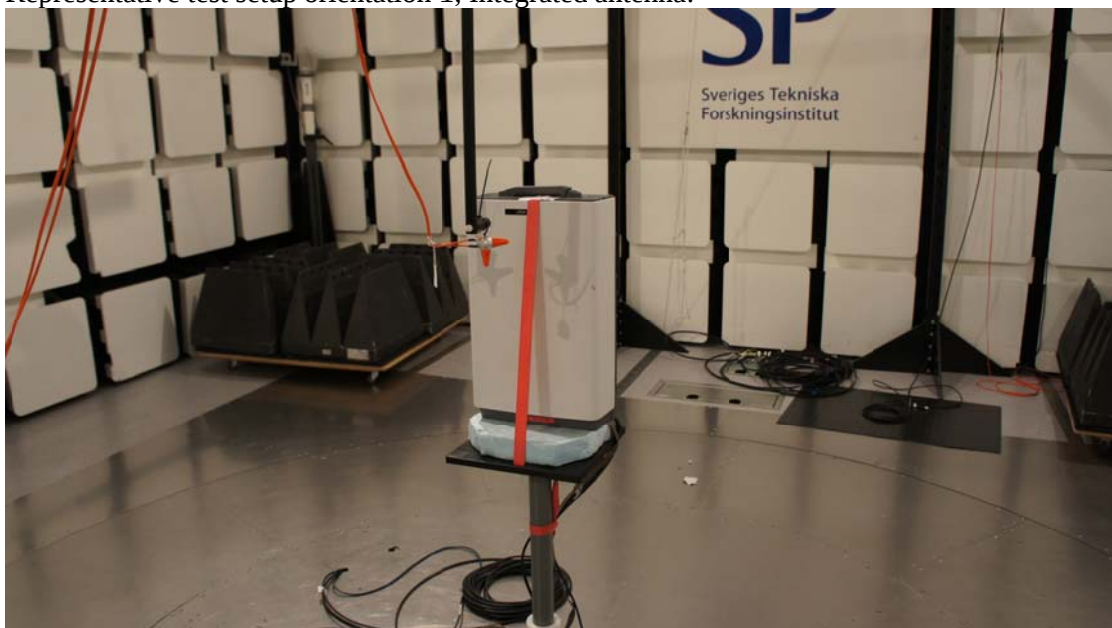
The distance for compliance for Adult is derived from spatial average over the full scan height. The distance for compliance for Child is derived from spatial average over ± 45 cm from the height where the highest level was detected.

The nominal power stated by the manufacturer is 2x 5 W (2x 37 dBm), with the tolerance of ± 1 dB. For WCDMA the measured output power was 5.1 W (37.1 dBm) for mid frequency and 4.9 W (36.9 dBm) for top frequency. Therefore the calculation was adjusted by 0.9 dBm for mid frequency and 1.1 dBm for top frequency to cover the highest possible output power. For LTE the measured output power was 4.8 W (36.8 dBm). Therefore the calculation was adjusted by 1.2 dBm to cover the highest possible output power.

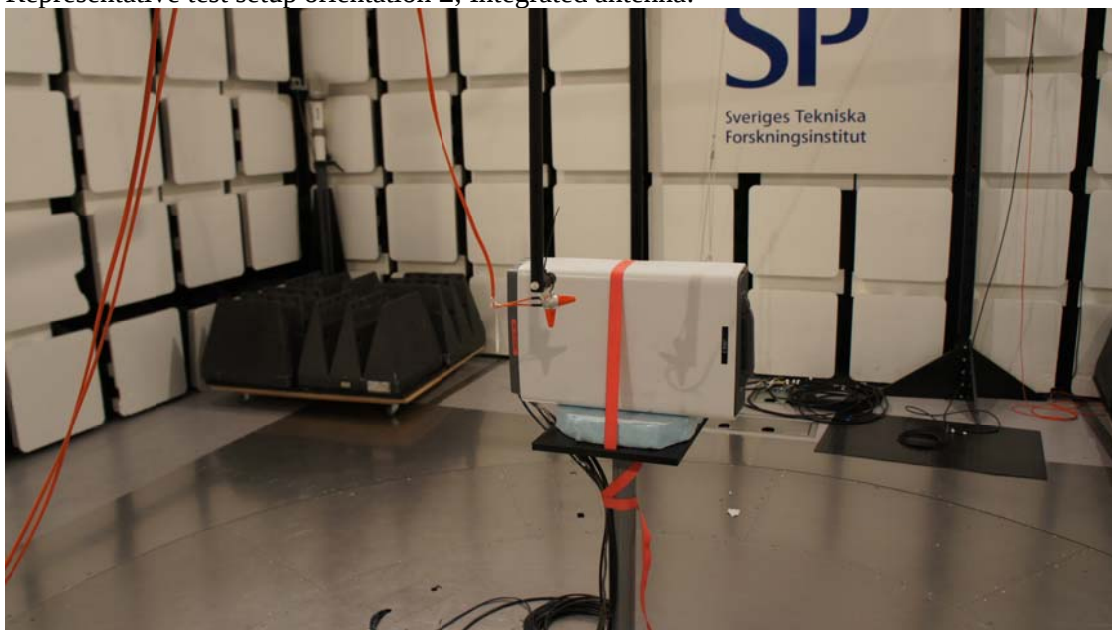
The measurements were made with an Integrated antenna and a Semi-integrated omni antenna.

Appendix 2

Representative test setup orientation 1, Integrated antenna:

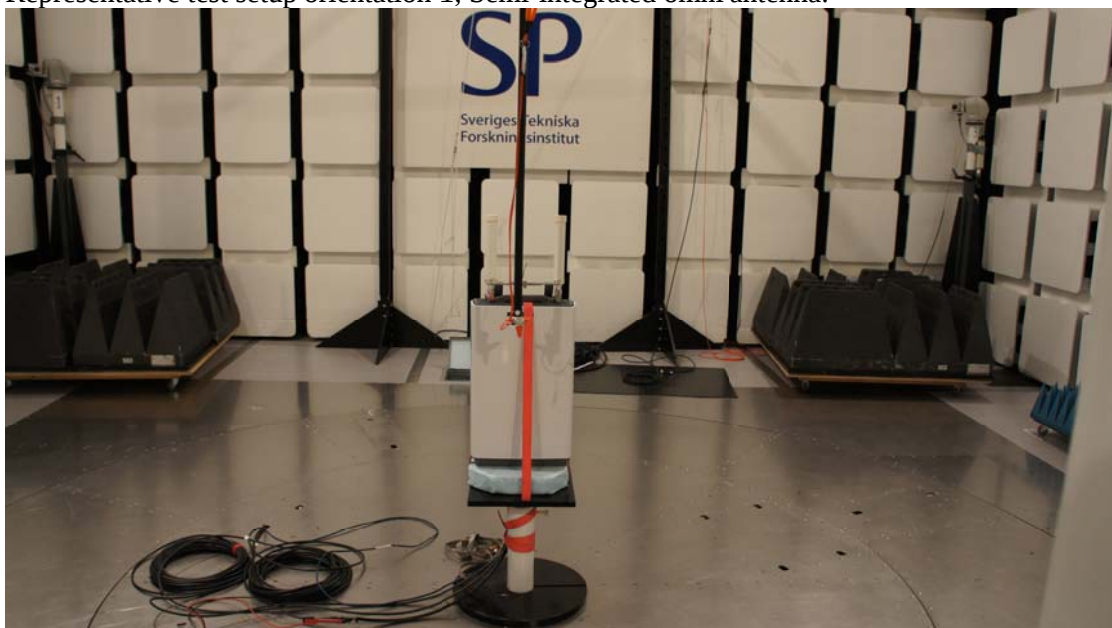


Representative test setup orientation 2, Integrated antenna:

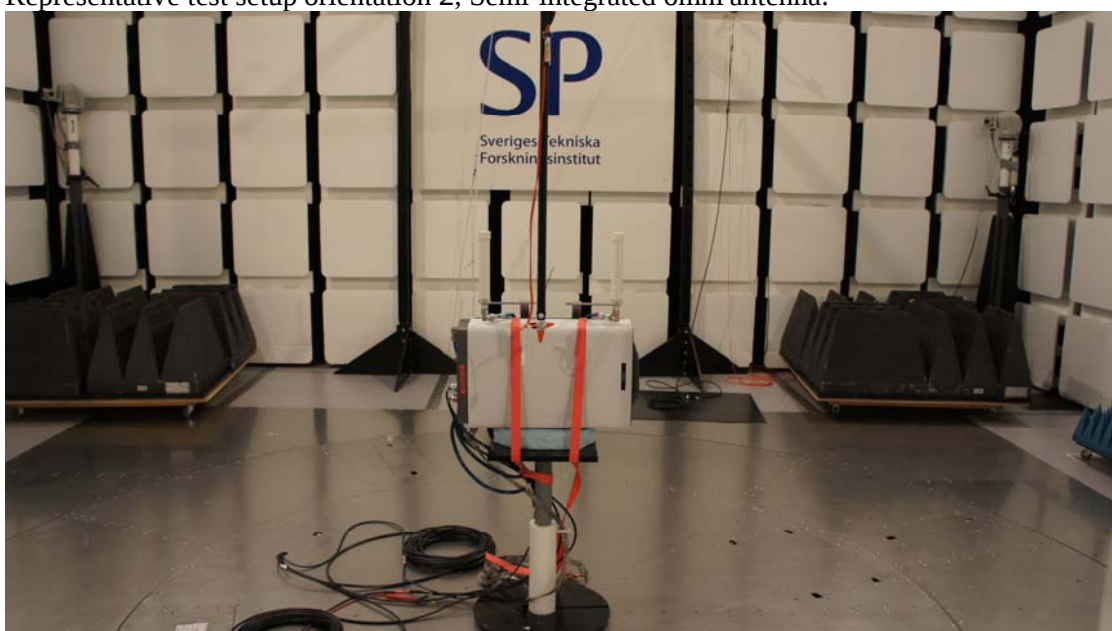


Appendix 2

Representative test setup orientation 1, Semi-integrated omni antenna:



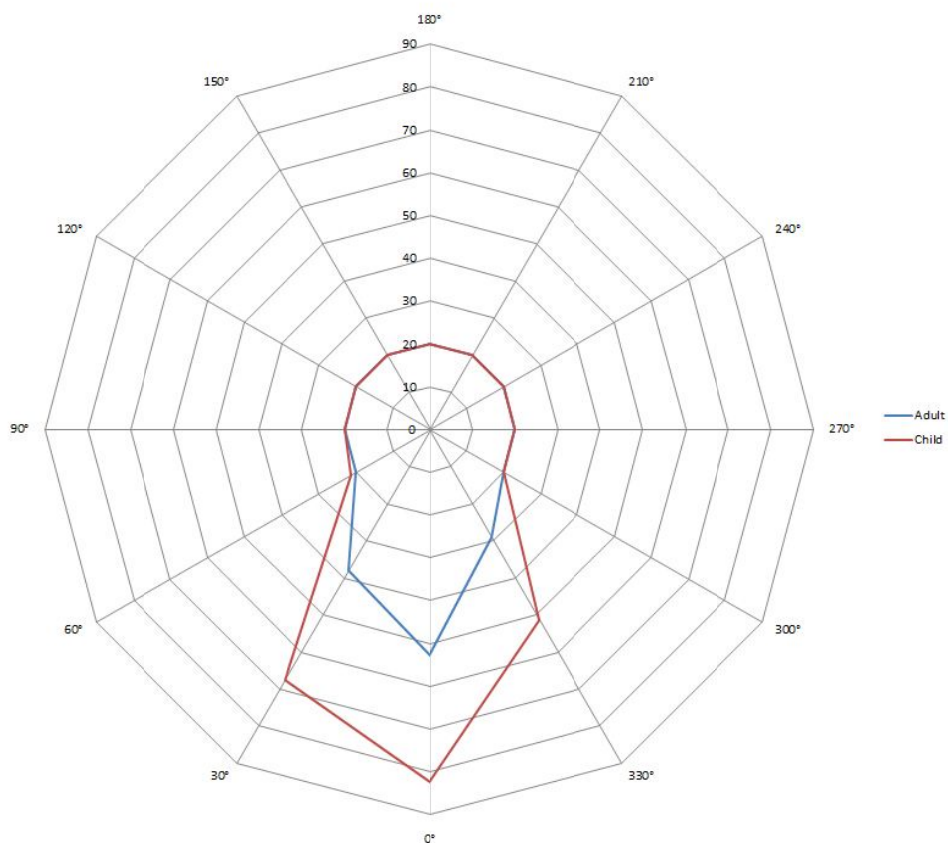
Representative test setup orientation 2, Semi-integrated omni antenna:



Appendix 2

Results WCDMA

Orientation 1: Integrated antenna, worst case: Top frequency



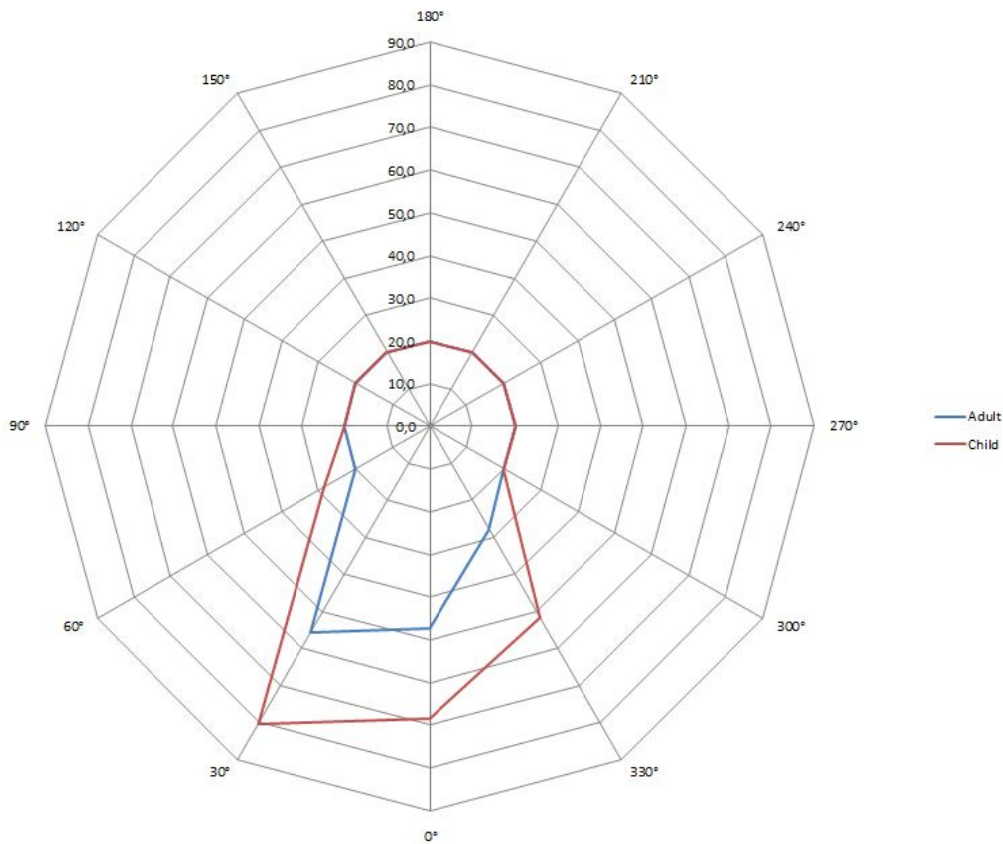
Note: The test object was placed with the front side facing 0° and the back side facing 180° as shown in the test setup photo.

Direction	Distance for compliance (cm).	
	Adult	Child
0°	52.9	82.3
30°	38.0	67.7
60°	20.0	21.2
90°	20.0	20.0
120°	20.0	20.0
150°	20.0	20.0
180°	20.0	20.0
210°	20.0	20.0
240°	20.0	20.0
270°	20.0	20.0
300°	20.0	23.3
330°	29.2	51.4

Note: The distance for compliance of every direction in the table above is calculated from the chassis of the test object.

Appendix 2

Orientation 2: Integrated antenna, worst case: Top frequency



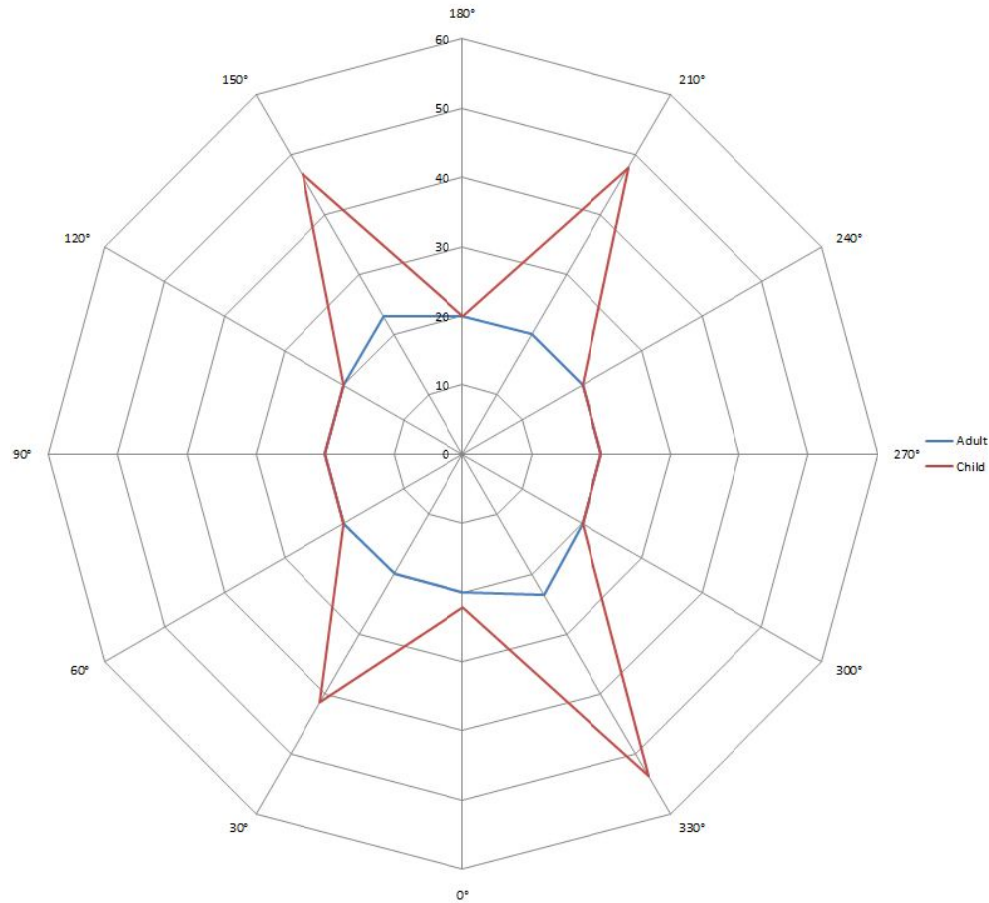
Note: The test object was placed with the front side facing 0° and the handle facing 270° as shown in the test setup photo.

Direction	Distance for compliance (cm).	
	Adult	Child
0°	47.3	68.5
30°	55.7	80.4
60°	20.0	28.5
90°	20.0	20.0
120°	20.0	20.0
150°	20.0	20.0
180°	20.0	20.0
210°	20.0	20.0
240°	20.0	20.0
270°	20.0	20.0
300°	20.0	20.0
330°	27.9	51.8

Note: The distance for compliance of every direction in the table above is calculated from the chassis of the test object.

Appendix 2

Orientation 1: Semi-integrated omni antenna, worst case: Mid frequency



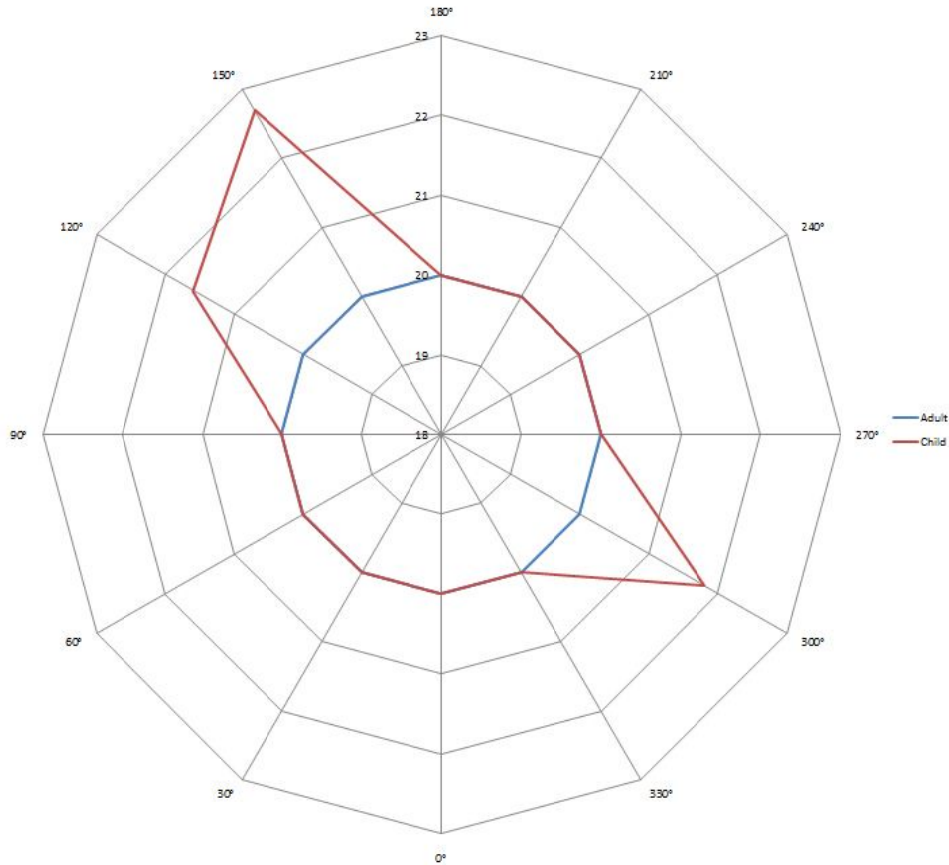
Note The test object was placed with the front facing 0° and the back side facing 180° as shown in the test setup photo.

Direction	Distance for compliance (cm).	
	Adult	Child
0°	20.0	22.1
30°	20.0	41.5
60°	20.0	20.0
90°	20.0	20.0
120°	20.0	20.0
150°	23.0	46.7
180°	20.0	20.0
210°	20.0	47.9
240°	20.0	20.0
270°	20.0	20.0
300°	20.0	20.0
330°	23.5	53.8

Note: The distance for compliance of every direction in the table above is calculated from the chassis of the test object.

Appendix 2

Orientation 2: Semi-integrated omni antenna, worst case: Top frequency



Note: The test object was placed with the front side facing 0° and the handle facing 270° as shown in the test setup photo.

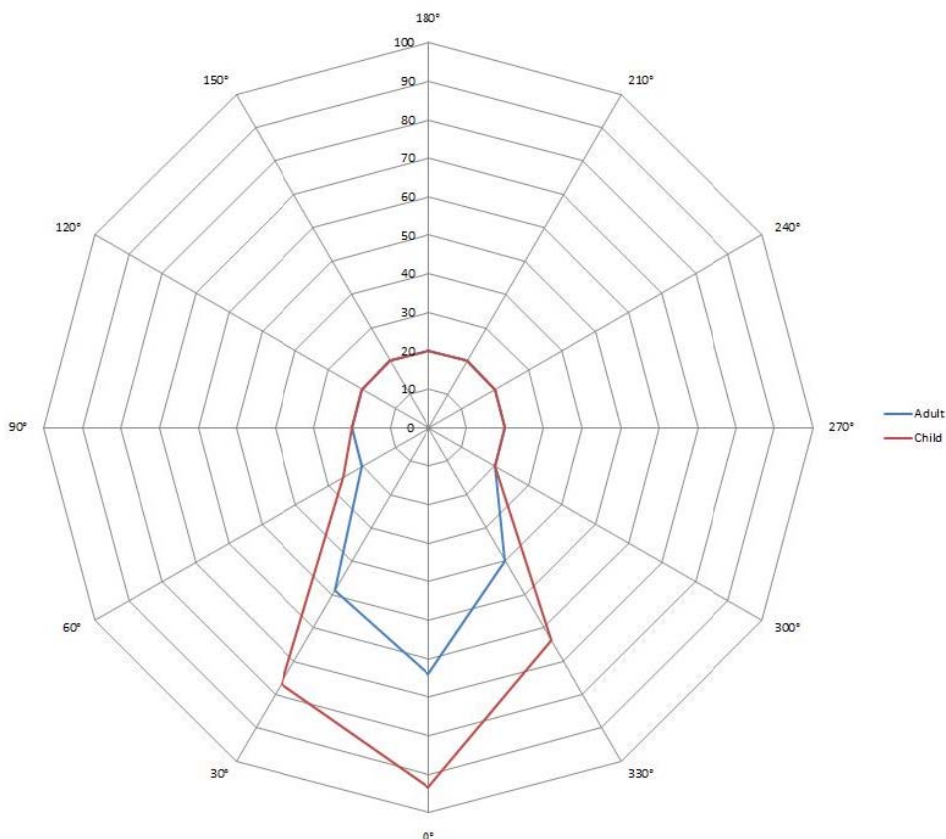
Direction	Distance for compliance (cm).	
	Adult	Child
0°	20.0	20.0
30°	20.0	20.0
60°	20.0	20.0
90°	20.0	20.0
120°	20.0	21.6
150°	20.0	22.7
180°	20.0	20.0
210°	20.0	20.0
240°	20.0	20.0
270°	20.0	20.0
300°	20.0	21.8
330°	20.0	20.0

Note: The distance for compliance of every direction in the table above is calculated from the chassis of the test object.

Appendix 2

Results LTE

Orientation 1: Integrated antenna, worst case: 20 MHz Top frequency



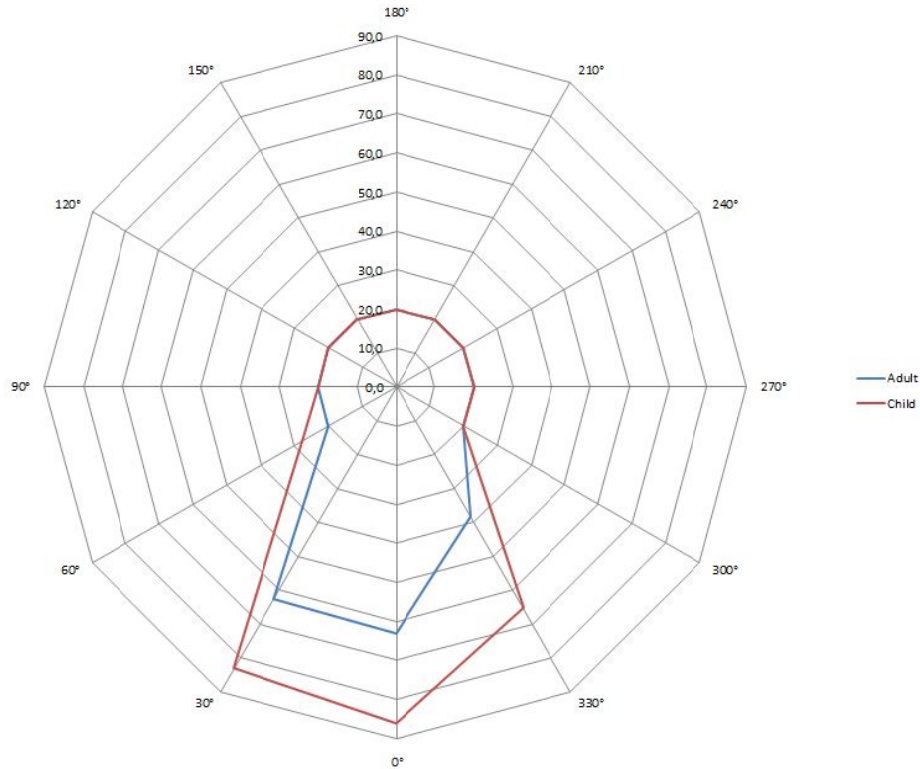
Note: The test object was placed with the front side facing 0° and the back side facing 180° as shown in the test setup photo.

Direction	Distance for compliance (cm).	
	Adult	Child
0°	64.0	93.5
30°	48.8	76.7
60°	20.0	25.4
90°	20.0	20.0
120°	20.0	20.0
150°	20.0	20.0
180°	20.0	20.0
210°	20.0	20.0
240°	20.0	20.0
270°	20.0	20.0
300°	20.0	20.0
330°	40.0	63.9

Note: The distance for compliance of every direction in the table above is calculated from the chassis of the test object.

Appendix 2

Orientation 2: Integrated antenna, worst case: 20 MHz Top frequency



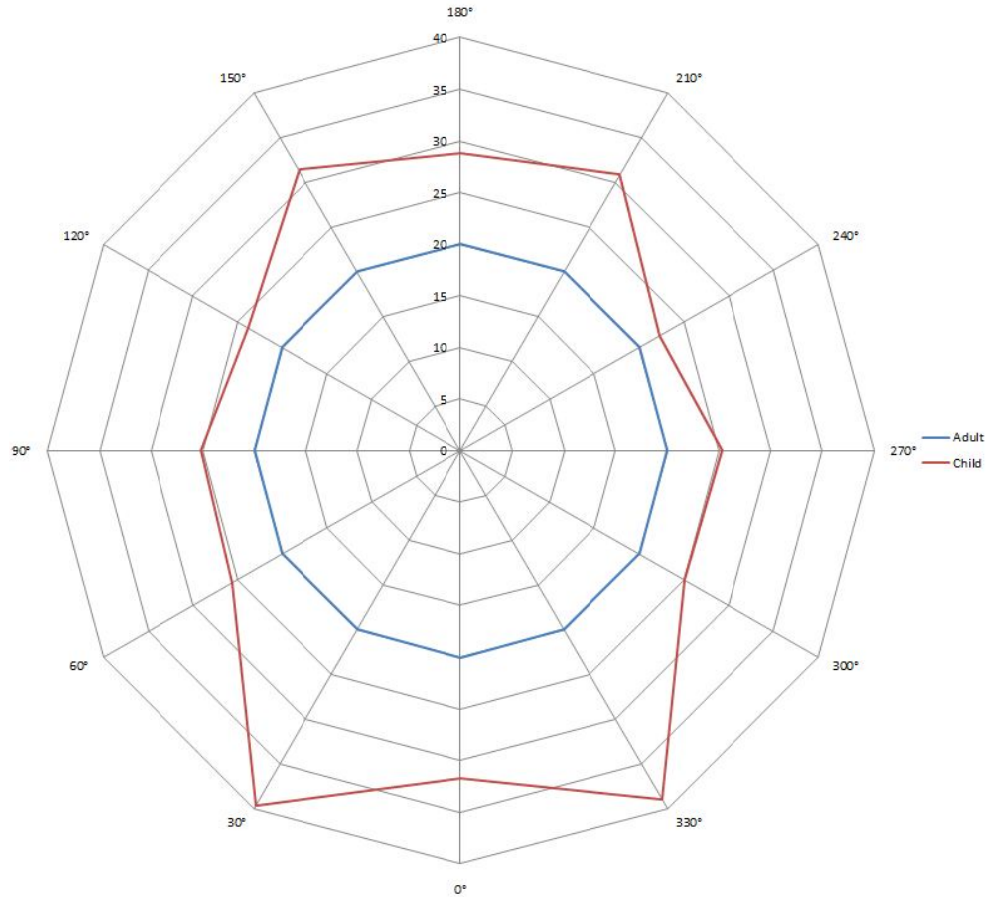
Note: The test object was placed with the front side facing 0° and the handle facing 270° as shown in the test setup photo.

Direction	Distance for compliance (cm).	
	Adult	Child
0°	63.1	86.2
30°	62.6	83.1
60°	20.0	27.8
90°	20.0	20.0
120°	20.0	20.0
150°	20.0	20.0
180°	20.0	20.0
210°	20.0	20.0
240°	20.0	20.0
270°	20.0	20.0
300°	20.0	20.0
330°	38.4	65.3

Note: The distance for compliance of every direction in the table above is calculated from the chassis of the test object.

Appendix 2

Orientation 1: Semi-integrated omni antenna, worst case: 20 MHz Top frequency



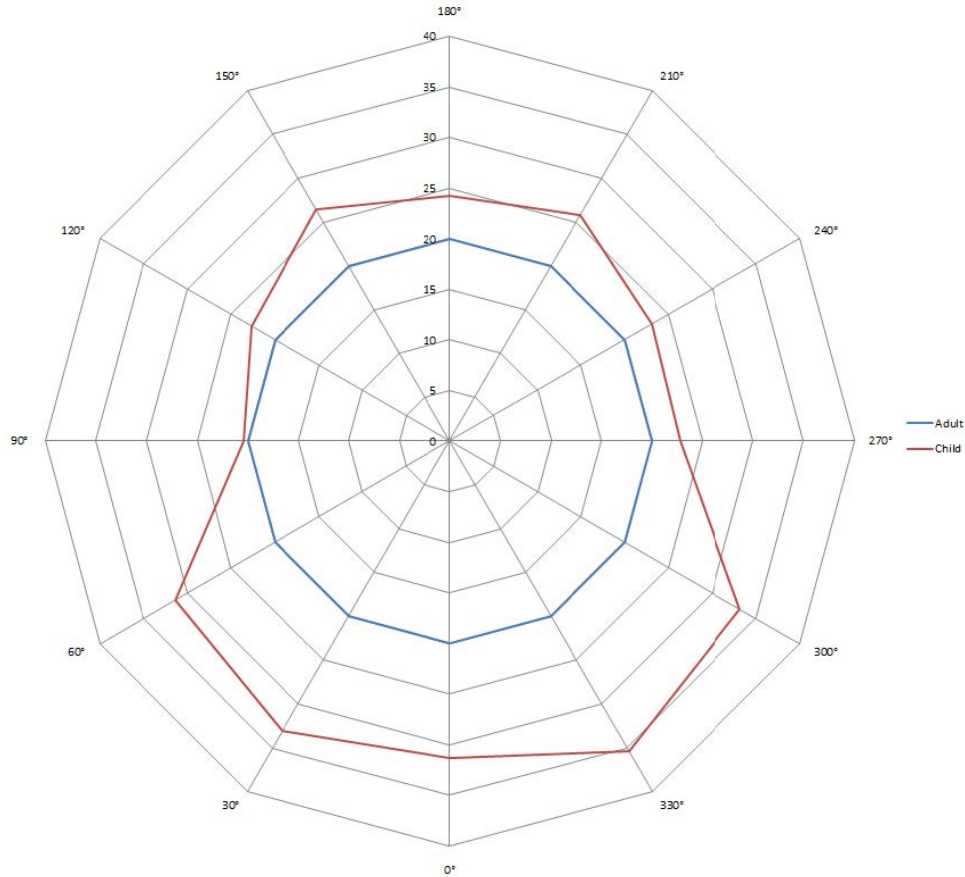
Note The test object was placed with the front facing 0° and the back side facing 180° as shown in the test setup photo.

Direction	Distance for compliance (cm).	
	Adult	Child
0°	20.0	31.7
30°	20.0	39.7
60°	20.0	25.6
90°	20.0	25.1
120°	20.0	23.8
150°	20.0	31.4
180°	20.0	28.8
210°	20.0	30.9
240°	20.0	22.3
270°	20.0	25.3
300°	20.0	25.0
330°	20.0	39.0

Note: The distance for compliance of every direction in the table above is calculated from the chassis of the test object.

Appendix 2

Orientation 2: Semi-integrated omni antenna, worst case: 20 MHz Top frequency



Note: The test object was placed with the front side facing 0° and the handle facing 270° as shown in the test setup photo.

Direction	Distance for compliance (cm).	
	Adult	Child
0°	20.0	31.3
30°	20.0	33.1
60°	20.0	31.4
90°	20.0	20.4
120°	20.0	22.6
150°	20.0	26.4
180°	20.0	24.2
210°	20.0	25.8
240°	20.0	23.1
270°	20.0	22.8
300°	20.0	33.2
330°	20.0	35.4

Note: The distance for compliance of every direction in the table above is calculated from the chassis of the test object.

Appendix 2

Limits

According to 47 CFR 1.1310.

(B) Limits for General Population/Uncontrolled Exposure

Frequency range (MHz)	Electric field strength [E] (V/m)	Magnetic field strength [H] (A/m)	Power density [S] (mW/cm ²)	Averaging time E ² , H ² or S (minutes)
1500-100000	-	-	1.0	(Note 1)

According to RSS-102 4.2

RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency range (MHz)	Electric field strength [E] (V/m)	Magnetic field strength [H] (A/m)	Power density [S] (W/m ²)	Averaging time E ² , H ² or S (minutes)
1500-15000	-	-	10	(Note 1)

Note 1: The test was executed with the test object configured for maximum output power to represent worst case. Therefore no averaging time measurement was made.

Complies?	Yes
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Appendix 3

Representative photos of test object

Front side with cover:



Front side without cover:



Front side without Integrated antenna:

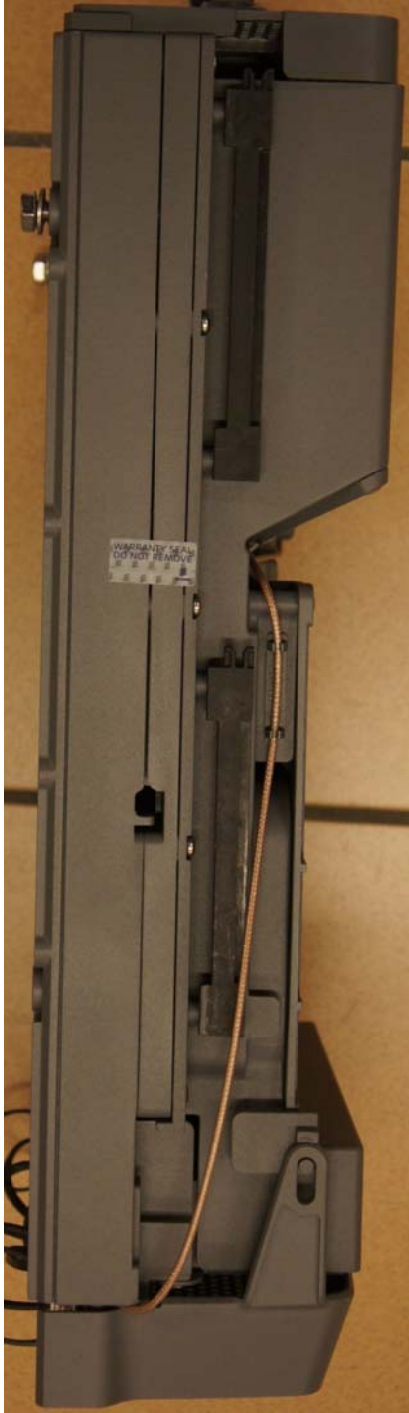


Back side :



Appendix 3

Right side without Integrated antenna:

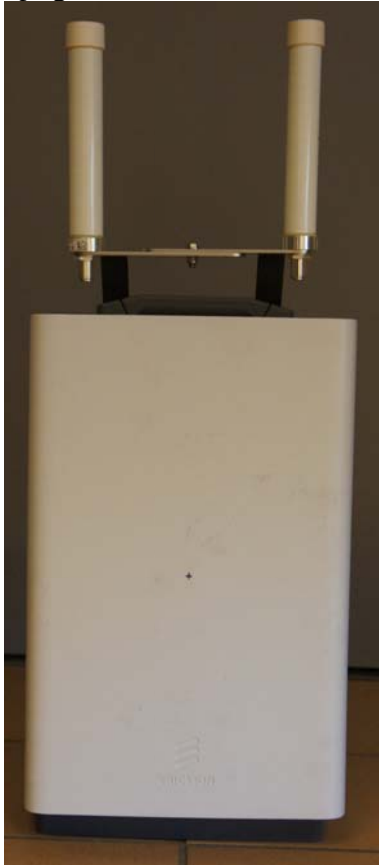


Left side without Integrated antenna:



Appendix 3

Front side with
Semi-integrated omni antenna,
upright mounted



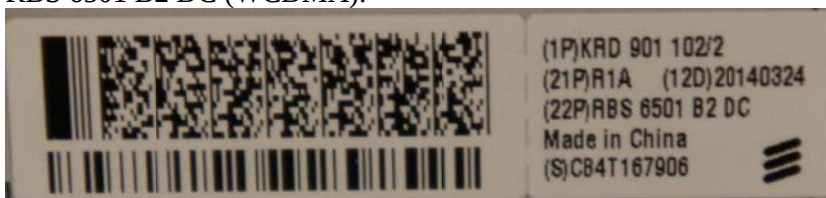
Front side with
Semi-integrated omni antenna,
side mounted



Appendix 3

Labels:

RBS 6501 B2 DC (WCDMA):



RBS 6501 B2 DC (LTE):



Integrated antenna:



Appendix 3

Semi-integrated omni antennas

Antenna 1



Antenna 2

