REPORT

issued by an FCC listed Laboratory Reg. no. 93866.
The test site complies with RSS-Gen, file no: IC 3482A

Contact person
Jörgen Wassholm
Electronics
+46 10 516 57 06
jorgen.wassholm@sp.se

Date 2015-12-15 Reference 5P06895-MPE Rev.2 Page 1 (2)

Rev.2: 2016-01-14

Ericsson AB
Mats Falk
PDU HW
Lindholmspiren 11
417 56 Göteborg

MPE test on Ericsson Radio 2203 B66A

(4 appendices)

Rev. 2, 2016-01-14: Summary table has been corrected and references has been added with the applicable standards.

Test object

Product name: Radio 2203 B66A
Product number: KRC 161 553/1

See appendix 1 for the tested hardware configuration and general information.
See appendix 4 for photos.

Summary

Standard	Compliant	Appendix	Remarks
CFR 47 part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices	**Yes**	2	-
RSS-102 Radio Frequency Exposure compliance of Radio communication Apparatus	Yes	2	-
OET Bulletin 65/ KDB 447498	Yes	2	-

SP Technical Research Institute of Sweden
Electronics - EMC

Performed by

Signed by: Tomas Isbring
Reason: I am the author of this document
Date & Time: 2016-01-19 13:36:17 +01:00

Tomas Isbring

Examined by

Signed by: Krister Kilbrandt
Reason: I have reviewed this document
Date & Time: 2016-01-19 13:04:33 +01:00

Krister Kilbrandt

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Purpose of test

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

References

Measurements were done according to relevant parts of the following standards:

CFR 47 part 2, October 1st , 2014
RSS-102 Issue 5
3GPP TS 25.141, version 13.0.0
3GPP TS 36.141, version 11.11.0
KDB 447498 D01 General RF Exposure Guidance v06
OET Bulletin 65 1997

Description of the test object

The test object is a Remote Radio Unit (Radio 2203 B66A) for a LTE and WCDMA base station and designed to provide mobile users with a connection to a mobile network.

Tested configuration

RF configuration:
Antenna port A-B: 1x 37.0 dBm (5 W)
SFP module: See appendix 4 for details
OIL: Opto fibre, single mode, 10 Gbit/s
Power configuration: -48 VDC

Operational test mode

LTE:
The test object was activated for maximum transmit power. E-TM1.1 as defined in ETSI TS 136 141/ 3GPP TS 36.141 was used in all cells.

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

EARFCN Downlink	Frequency [MHz]	Symbolic name	Comment
66443	2110.7	B	TX bottom frequency in 1.4 MHz BW configuration
66461	2112.5	B	TX bottom frequency in 5 MHz BW configuration
66511	2117.5	B	TX bottom frequency in 15 MHz BW configuration
66786	2145.0	M	TX mid frequency in 1.4 MHz - 20 MHz BW configurations
67129	2179.3	T	TX top frequency in 1.4 MHz BW configuration
67111	2177.5	T	TX top frequency in 5 MHz BW configuration
67061	2172.5	T	TX top frequency in 15 MHz BW configuration

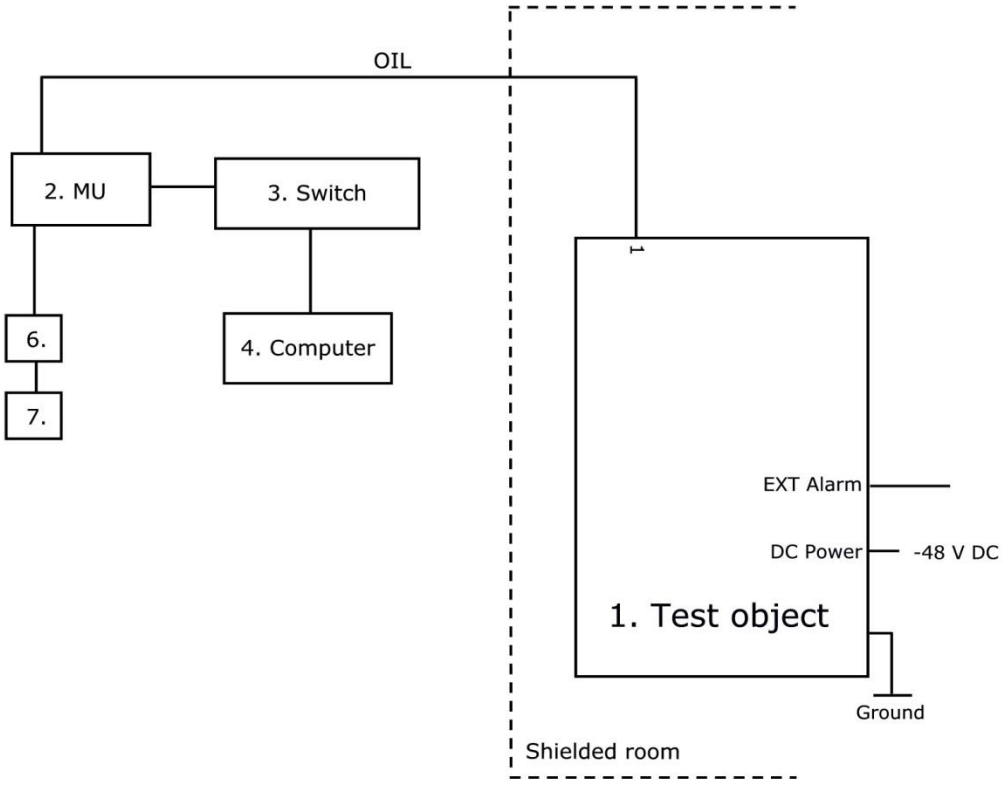
WCDMA:
The test object was activated for maximum transmit power. TM 1 (SF=128) as defined in ETSI TS 125 141/ 3GPP TS 25.141 was used in all cells. The channel type “3GPP Reference channel 12.2 ksps slotformat 10” was used in all cells with DPCH=32.

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

UARFCN Downlink	Frequency [MHz]	Symbolic name	Comment
1537	2112.4	B	Single carrier TX bottom frequency
1638	2132.6	M	Single carrier TX band mid frequency
1738	2152.6	T	Single carrier TX top frequency

All RX frequencies were configured 400 MHz below the corresponding TX frequency according to the applicable duplex offset for the operating band.

Test setup LTE:



1.	Radio 2203 B66A with antenna, see appendix 3 for details FCC ID TA8AKRC161553-1 and IC 287AB-AS1615531

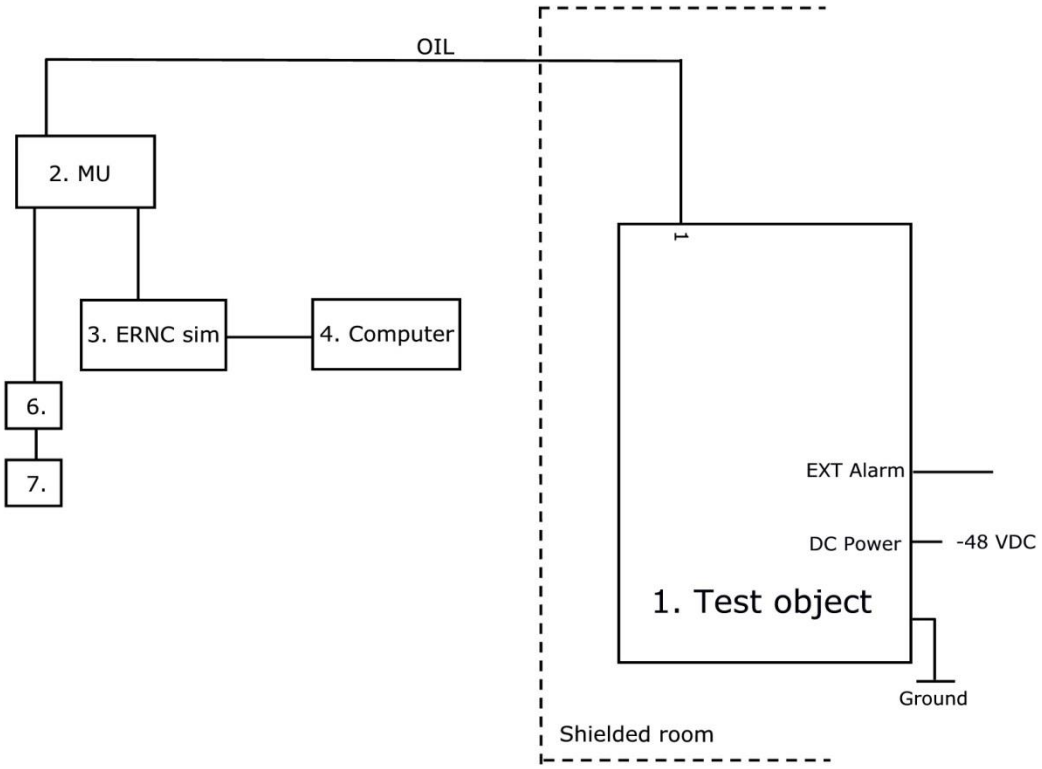
Associated equipment:

2.	RBS 6601 Main Unit: SUP 6601, 1/BFL 901 009/4, rev. R1E, s/n: BR82182832 DUS 41 01, KDU 137 624/1, rev. R3C, s/n: SC826307253 SW: CXP 102 051/24, rev. R13SN
6.	GPS 02 01, NCD 901 41/1, rev. R1D, s/n: TU8KH75515
7.	GPS Active Antenna, KRE 101 2082/1

Functional test equipment:

3.	Switch Neatgear ProSafe GSM7224, BAMS – 1000850754
4.	HP Z230 Workstation, BAMS – 1001561287

Test setup WCDMA:



1.	Radio 2203 B66A with antenna, see appendix 3 for details FCC ID TA8AKRC161553-1 and IC 287AB-AS1615531

Associated equipment:

2.	RBS 6601 Main Unit: SUP 6601, 1/BFL 901 009/4, rev. R1E, s/n: BA88186222 DUW 41 01, KDU 127 174/4, rev. R2E, S/N: TU8XQ61965 SW: CXP 902 3291, rev. R5MB46
6.	GPS 02 01, NCD 901 41/1, rev. R1D, s/n: TU8KH75515
7.	GPS Active Antenna, KRE 101 2082/1

Functional test equipment:

3.	ERNC-SIM 065, BAMS-1000579038 Switch Neatgear ProSafe GSM7224, BAMS – 1000850754
4.	HP Z230 Workstation, BAMS – 1001561277

Interface:	**Type of port:**
Power: -48 VDC	DC Power
1, optical interface	Signal
2, optical interface, not in use	Signal
Ext Alarm, unshielded multi wire	Signal
Ground wire	Ground

Measurement equipment

	Calibration Due	SP number
Test site Tesla	2017-01	503 881
Measurement software: Antennkalibrering V1.23	-	-
Calculation software: EMF V1.5	-	-
Laser probe AR FL7018	2016-03	902 280
Testo 625 Temperature and humidity meter	2017-06	504 188

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.

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 and RSS-102	RF exposure evaluation	10 %, Note

Note: Stated uncertainty refers to the calculated distance.

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

Reservation

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

Delivery of test object

The test object was delivered: 2015-10-22.

Test engineers

Tomas Isbring, Patric Augustsson and Rolf Kühn, SP.

Test participant

None.

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

Date	Temperature	Humidity
2015-11-09	23 °C ± 3 °C	35 % ± 5 %
2015-11-10	23 °C ± 3 °C	41 % ± 5 %
2015-11-11	23 °C ± 3 °C	40 % ± 5 %
2015-11-12	23 °C ± 3 °C	35 % ± 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 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 measurements were scaled according to:

1. highest possible output power with regard to declared tolerance.

2. field probe characteristics with respect to the modulated signal at different levels of the field strength.

The nominal power stated by the manufacturer is 2x 5 W (2x 37 dBm), with a tolerance of +0.6 dB/ -2.0 dB. The measured output power was as follows:

LTE 1.4 MHz, TX mid frequency: 4.5 W (36.5 dBm)
LTE 5 MHz, TX mid frequency: 4.5 W (36.5 dBm)
LTE 15 MHz, TX bottom frequency: 4.6 W (36.6 dBm)
WCDMA, TX mid frequency: 4.9 W (36.9 dBm)

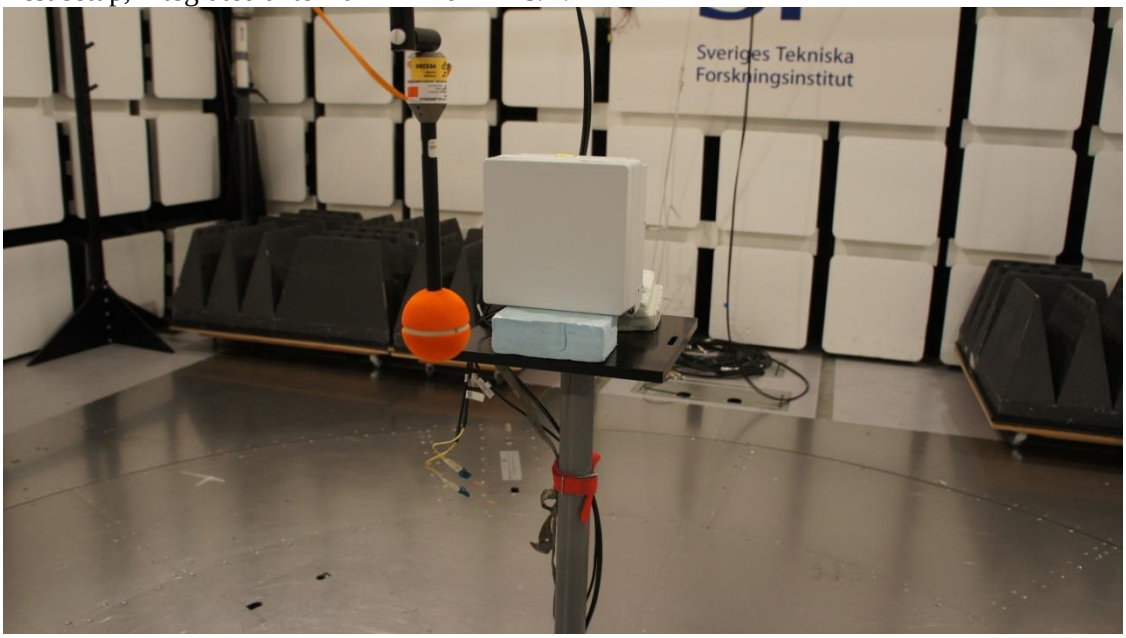
The measurements were therefore adjusted by the following corrections to cover the highest possible output power:

LTE 1.4 MHz, TX mid frequency: 1.1 dBm
LTE 5 MHz, TX mid frequency: 1.1 dBm
LTE 15 MHz, TX bottom frequency: 1.0 dBm
WCDMA, TX mid frequency: 0.7 dBm

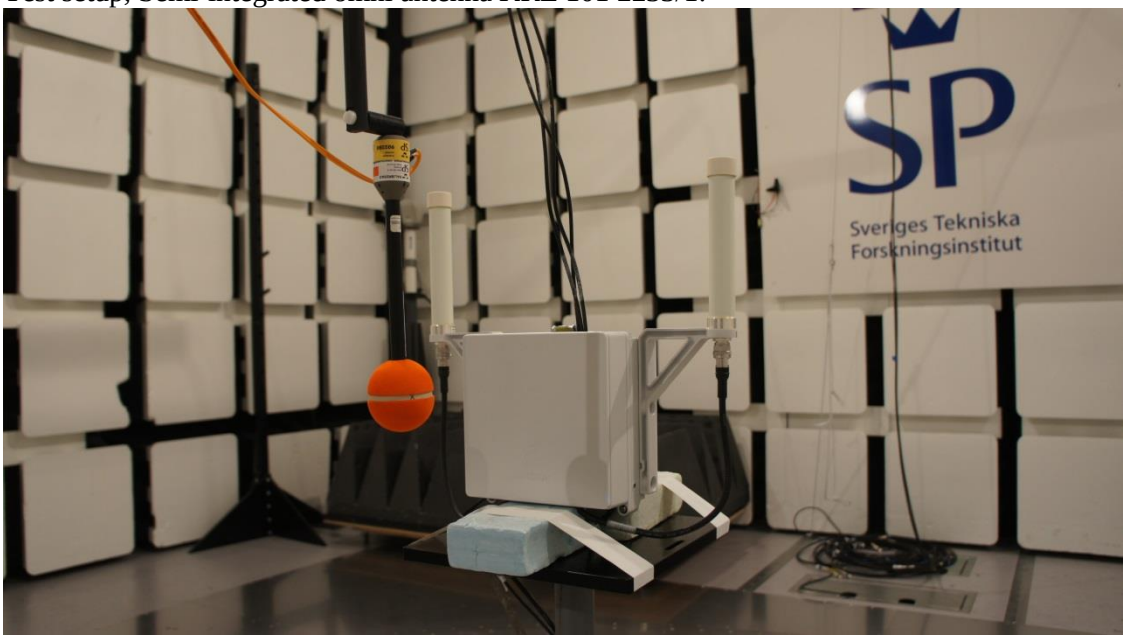
The measurement were made with an Integrated and two types of Semi-integrated omni antennas.

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.

Test setup, Integrated antenna KRE 101 2249/1:

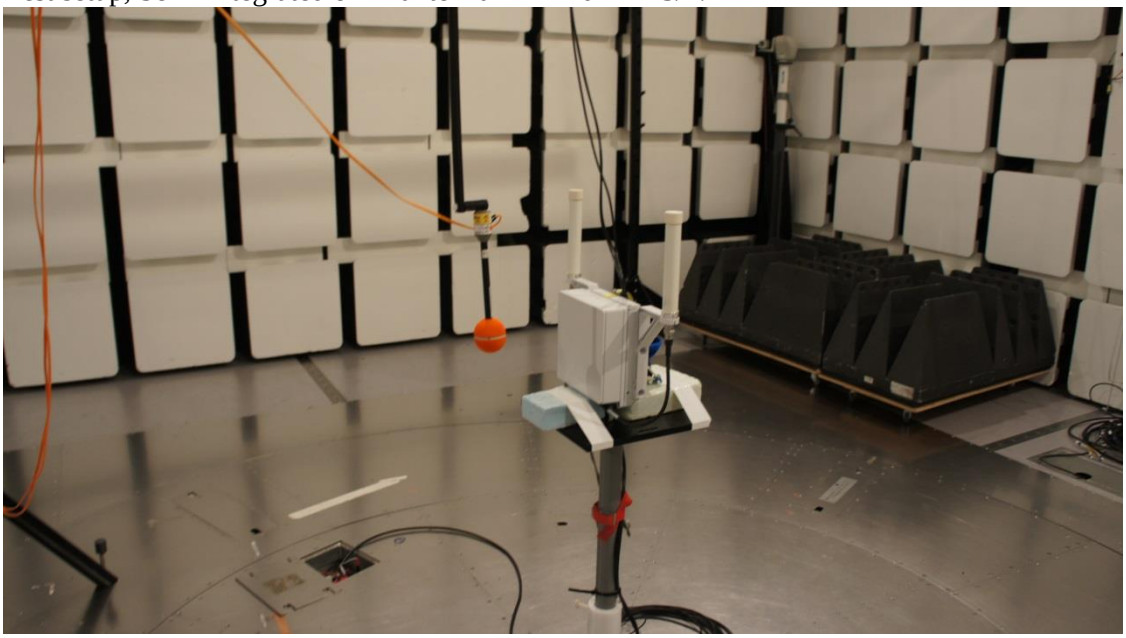


Test setup, Semi-integrated omni antenna KRE 101 2233/1:



Appendix 2

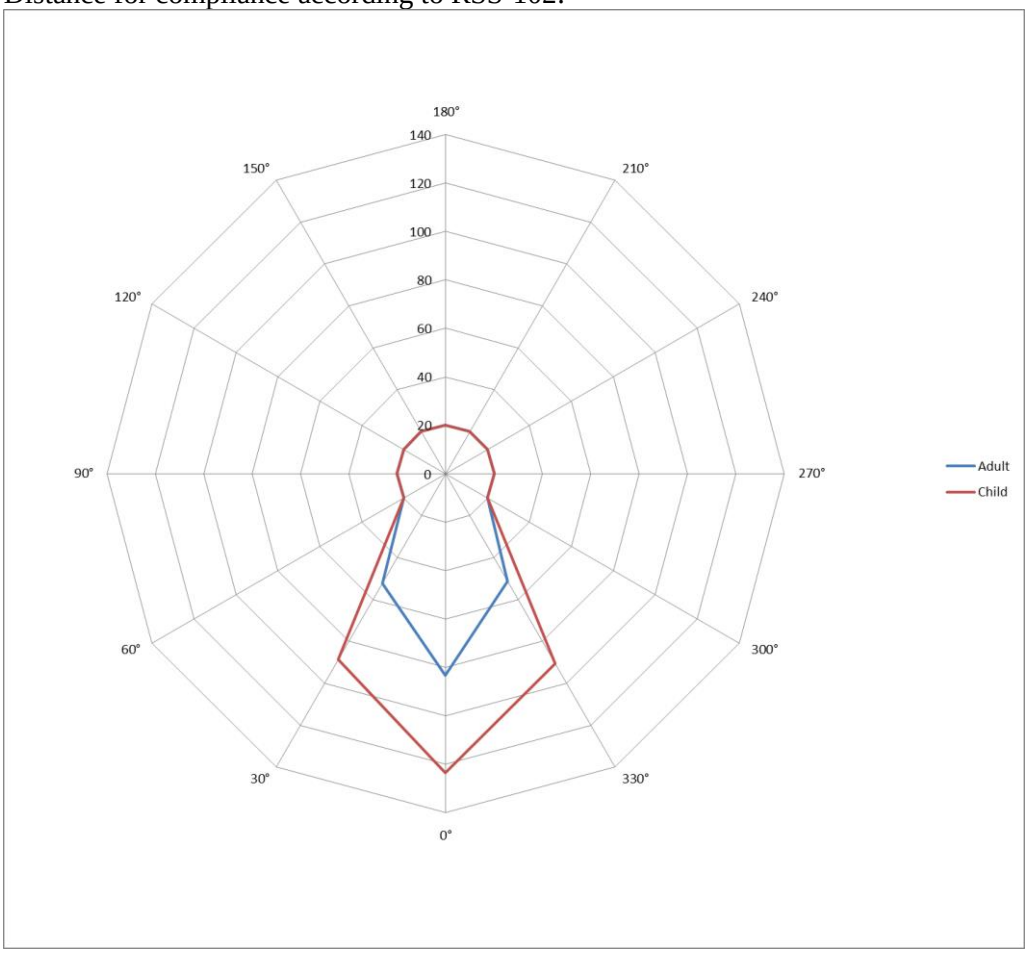
Test setup, Semi-integrated omni antenna KRE 101 2245/1:



Results

Integrated antenna KRE 101 2249/1, worst case: LTE 15 MHz, TX bottom frequency

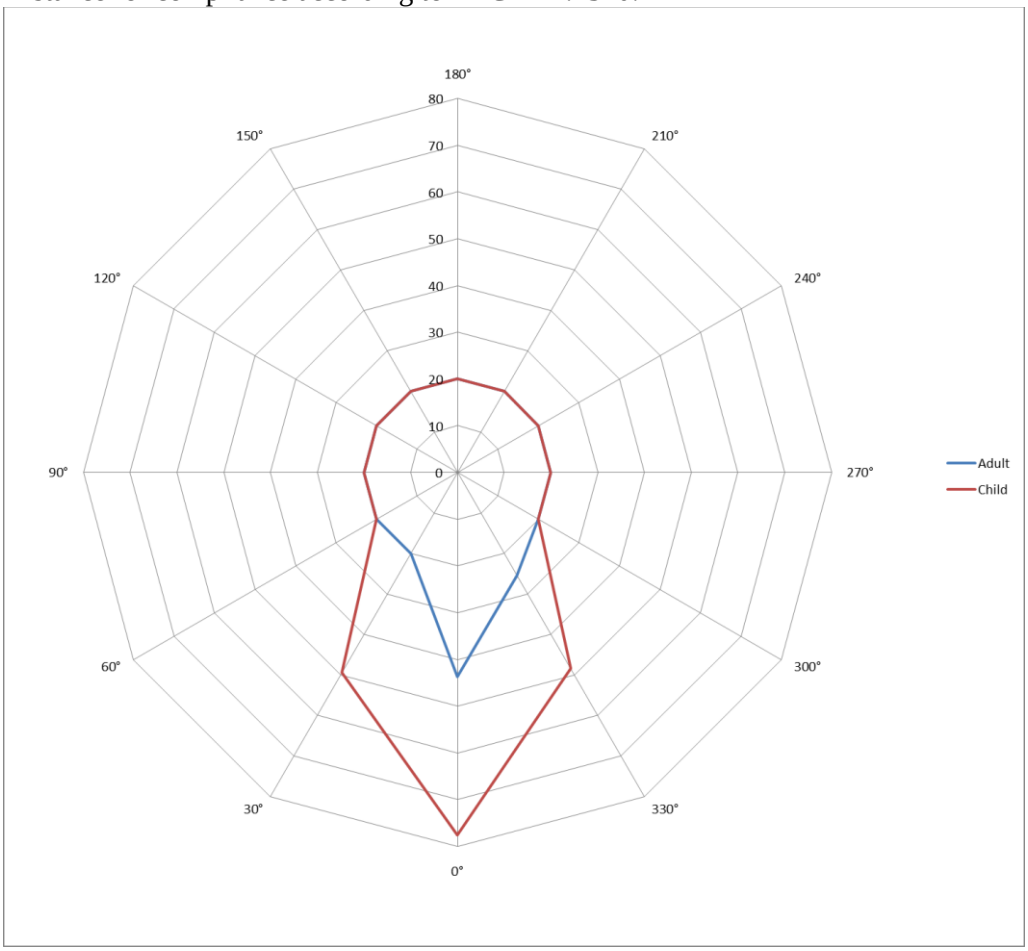
Distance for compliance according to RSS-102:



	Distance for compliance (cm).	
Direction	Adult	Child
0°	83.5	123.6
30°	52.5	88.8
60°	20.0	20.0
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°	51.4	90.7

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

Distance for compliance according to 47 CFR 1.1310:

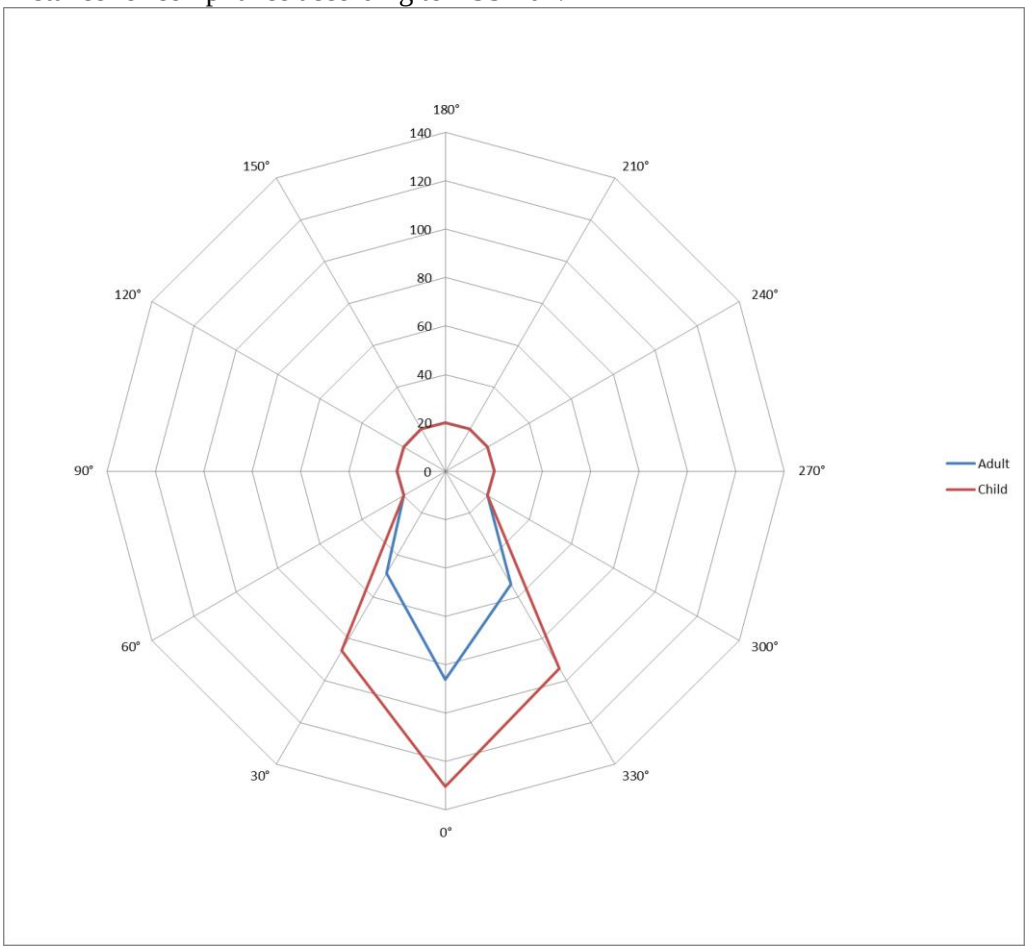


	Distance for compliance (cm).	
Direction	Adult	Child
0°	43.8	77.6
30°	20.0	49.4
60°	20.0	20.0
90°	20.0	20.0
120°	20.0	20.0
150°	20.0	20.0
180°	20.0	20.0
210°	20.0	20.0
240°	20.0	20.0
270°	20.0	20.0
300°	20.0	20.0
330°	25.5	48.5

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

Integrated antenna KRE 101 2249/1, worst case: WCDMA, TX mid frequency

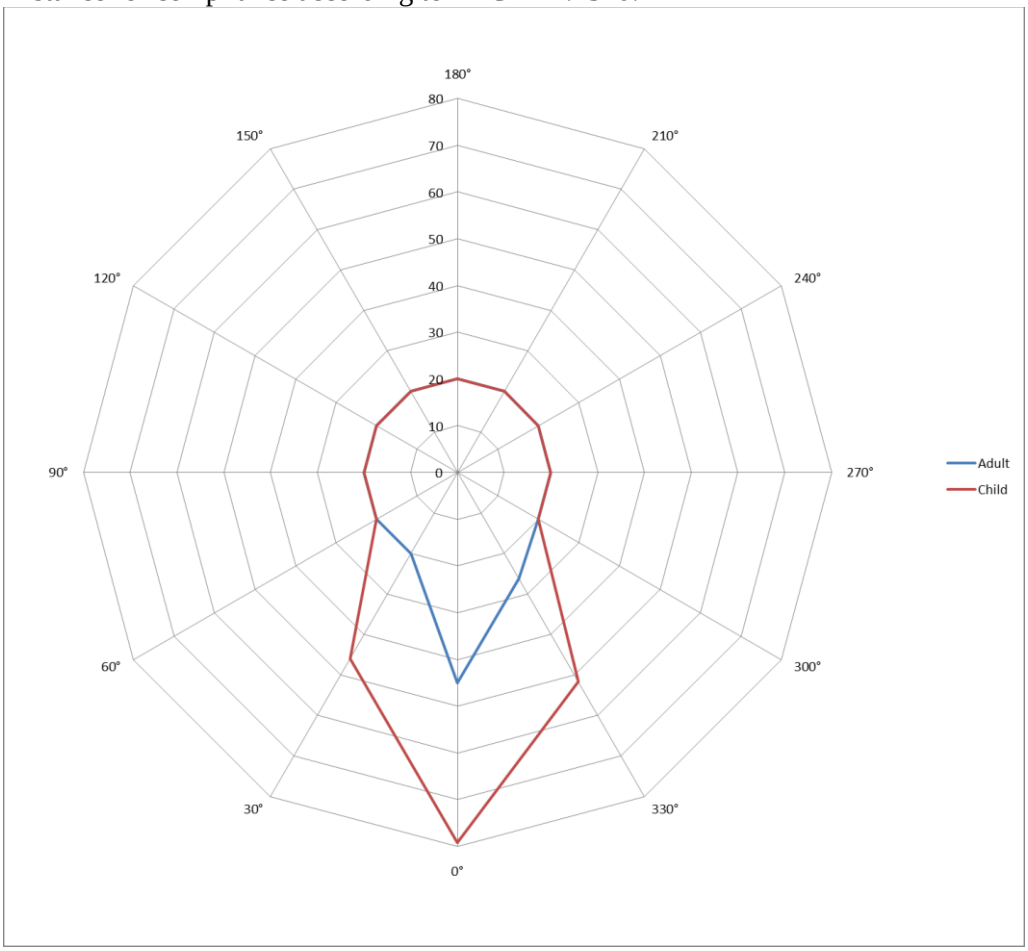
Distance for compliance according to RSS-102:



	Distance for compliance (cm).	
Direction	Adult	Child
0°	86.1	130.6
30°	48.6	85.7
60°	20.0	20.0
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°	54.1	94.2

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

Distance for compliance according to 47 CFR 1.1310:

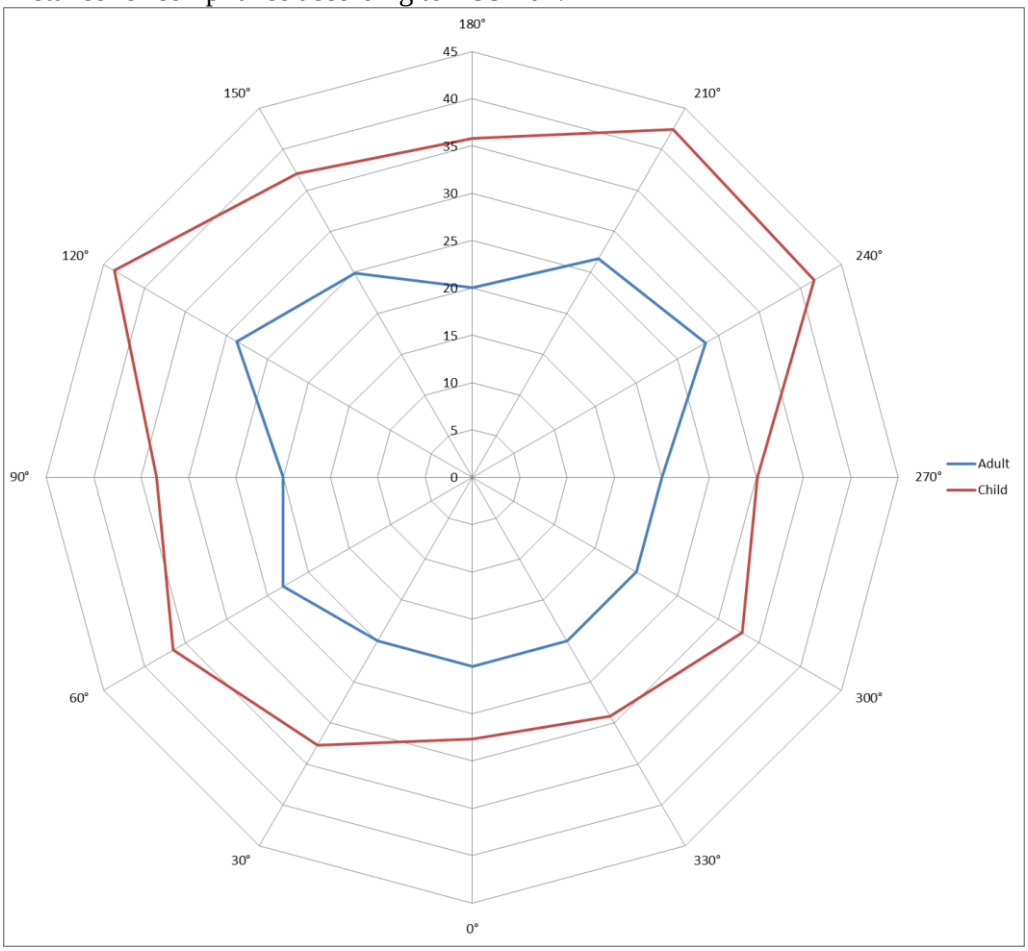


	Distance for compliance (cm).	
Direction	Adult	Child
0°	45.1	79.2
30°	20.0	46.0
60°	20.0	20.0
90°	20.0	20.0
120°	20.0	20.0
150°	20.0	20.0
180°	20.0	20.0
210°	20.0	20.0
240°	20.0	20.0
270°	20.0	20.0
300°	20.0	20.0
330°	26.1	51.7

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

Semi-integrated omni antenna KRE 101 2233/1, worst case: LTE 1.4 MHz, TX mid frequency

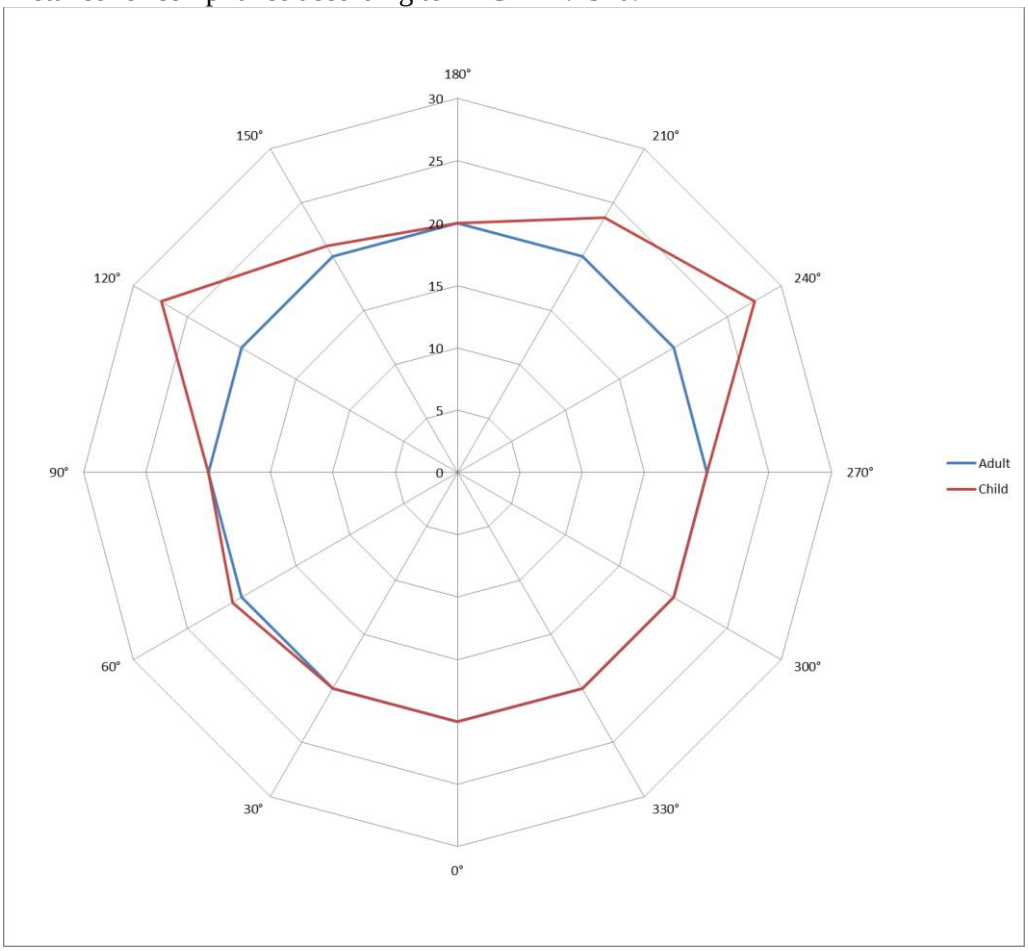
Distance for compliance according to RSS-102:



	Distance for compliance (cm).	
Direction	Adult	Child
0°	20.0	27.7
30°	20.0	32.7
60°	23.1	36.5
90°	20.0	33.4
120°	28.7	43.7
150°	24.9	37.0
180°	20.0	35.8
210°	26.7	42.5
240°	28.4	41.6
270°	20.0	30.1
300°	20.0	32.9
330°	20.0	29.2

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

Distance for compliance according to 47 CFR 1.1310:

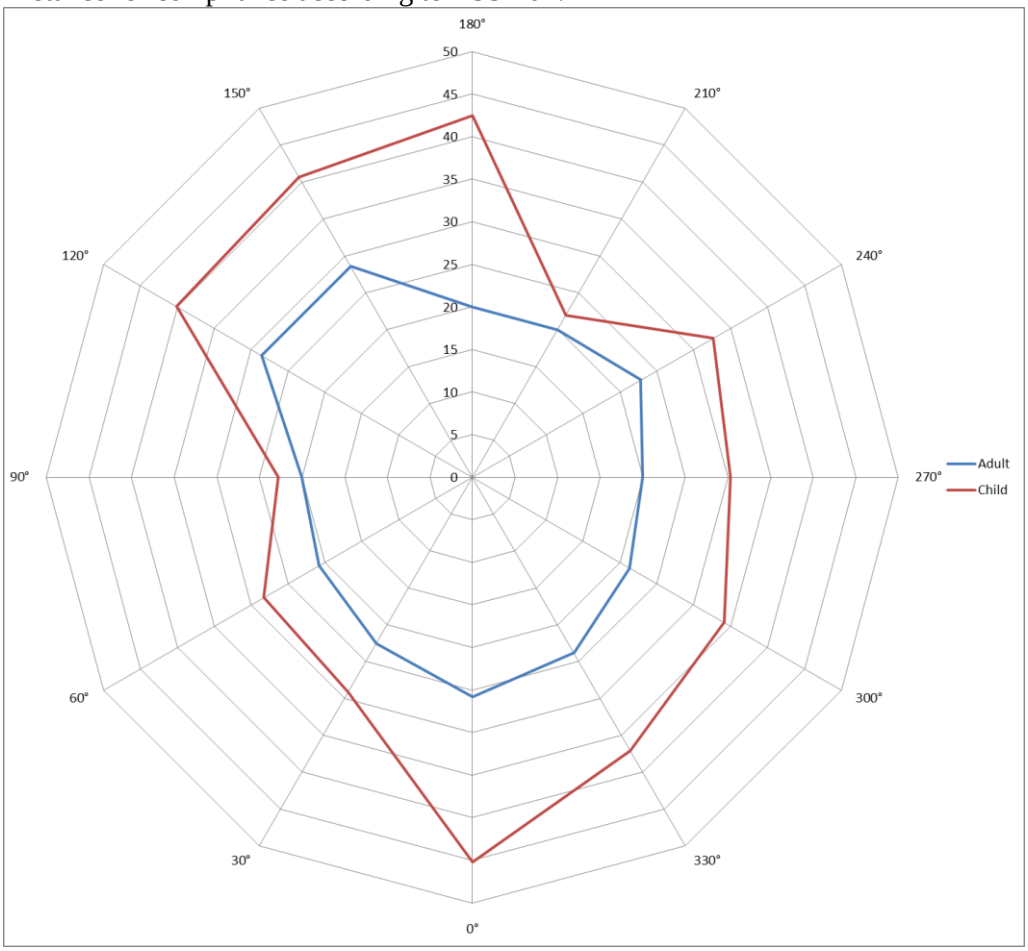


	Distance for compliance (cm).	
Direction	Adult	Child
0°	20.0	20.0
30°	20.0	20.0
60°	20.0	20.8
90°	20.0	20.0
120°	20.0	27.4
150°	20.0	21.0
180°	20.0	20.0
210°	20.0	23.6
240°	20.0	27.5
270°	20.0	20.0
300°	20.0	20.0
330°	20.0	20.0

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

Semi-integrated omni antenna KRE 101 2233/1, worst case: WCDMA, TX mid frequency

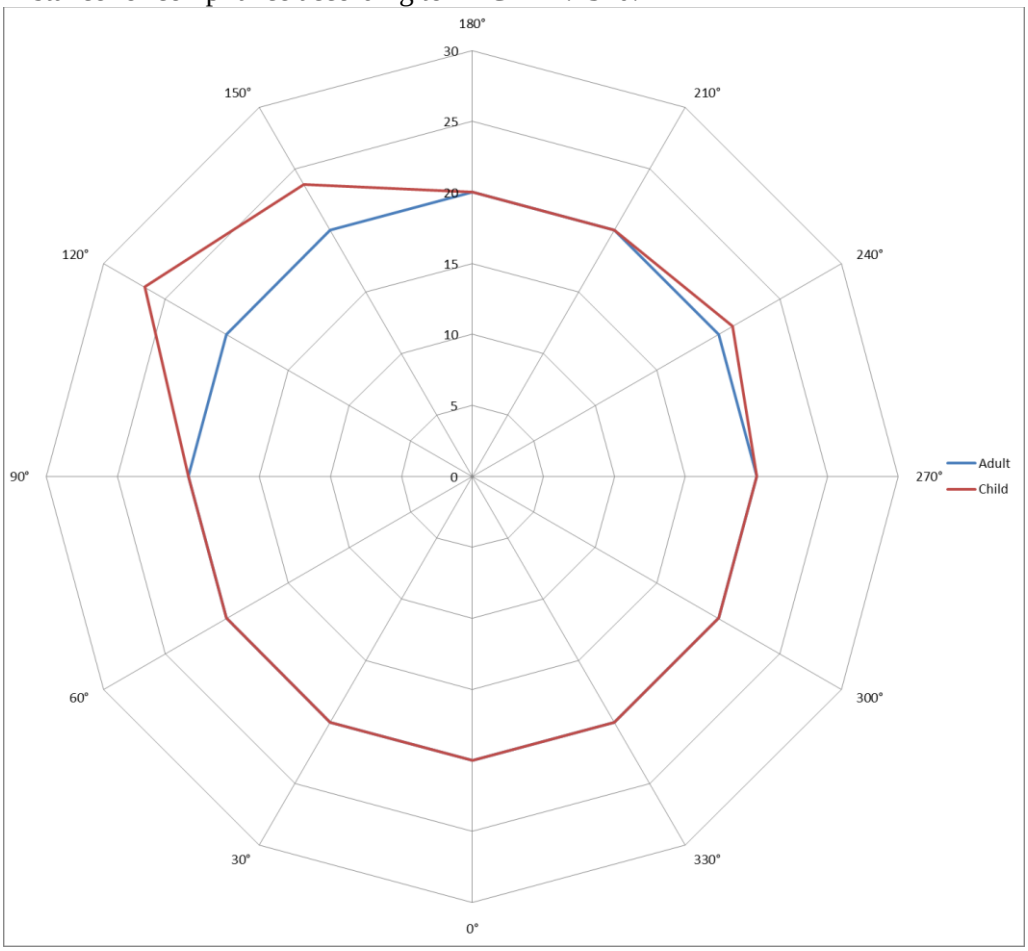
Distance for compliance according to RSS-102:



	Distance for compliance (cm).	
Direction	Adult	Child
0°	25.8	45.2
30°	22.6	29.2
60°	20.8	28.3
90°	20.0	22.8
120°	28.5	40.1
150°	28.6	40.7
180°	20.0	42.5
210°	20.0	22.0
240°	22.8	32.6
270°	20.0	30.3
300°	21.3	34.1
330°	23.8	37.1

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

Distance for compliance according to 47 CFR 1.1310:

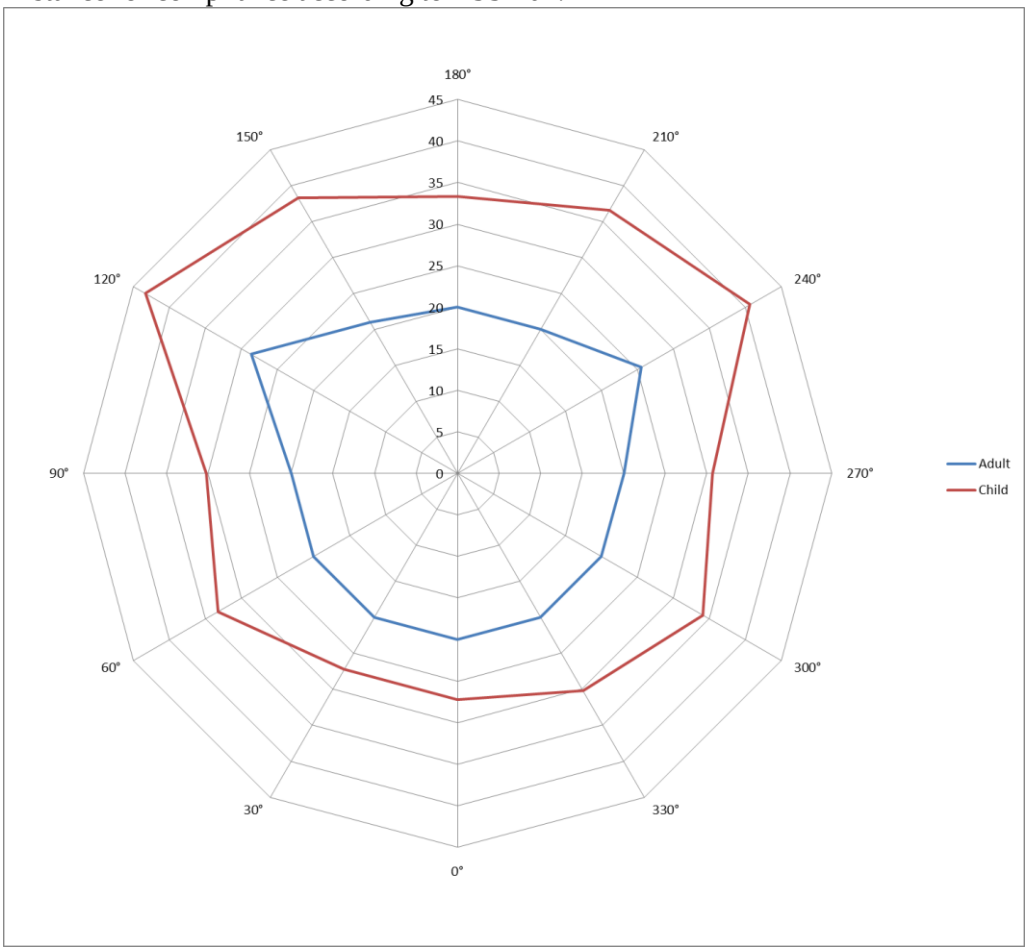


	Distance for compliance (cm).	
Direction	Adult	Child
0°	20.0	20.0
30°	20.0	20.0
60°	20.0	20.0
90°	20.0	20.0
120°	20.0	26.7
150°	20.0	23.7
180°	20.0	20.0
210°	20.0	20.0
240°	20.0	21.2
270°	20.0	20.0
300°	20.0	20.0
330°	20.0	20.0

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

Semi-integrated omni antenna KRE 101 2245/1, worst case: LTE 5 MHz, TX mid frequency

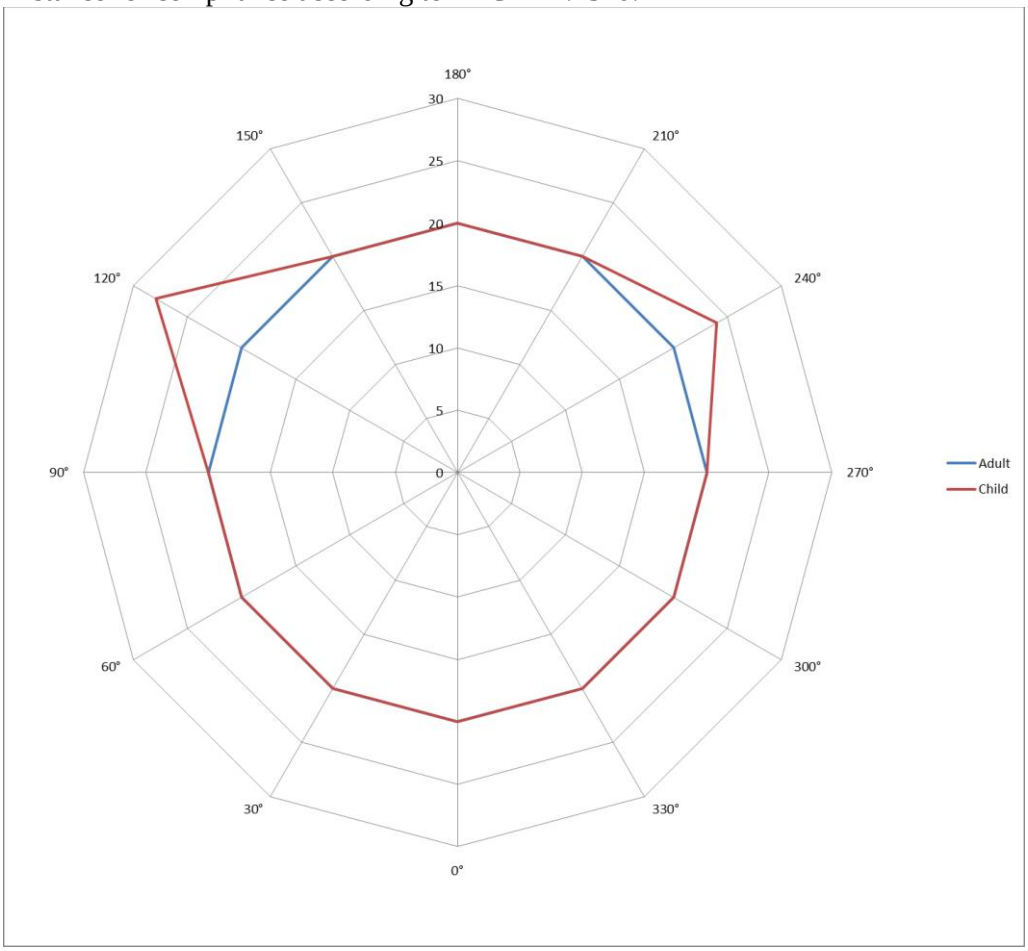
Distance for compliance according to RSS-102:



	Distance for compliance (cm).	
Direction	Adult	Child
0°	20.0	27.2
30°	20.0	27.3
60°	20.0	33.3
90°	20.0	30.2
120°	28.7	43.4
150°	21.0	38.3
180°	20.0	33.3
210°	20.0	36.6
240°	25.6	40.6
270°	20.0	30.7
300°	20.0	34.1
330°	20.0	30.2

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

Distance for compliance according to 47 CFR 1.1310:

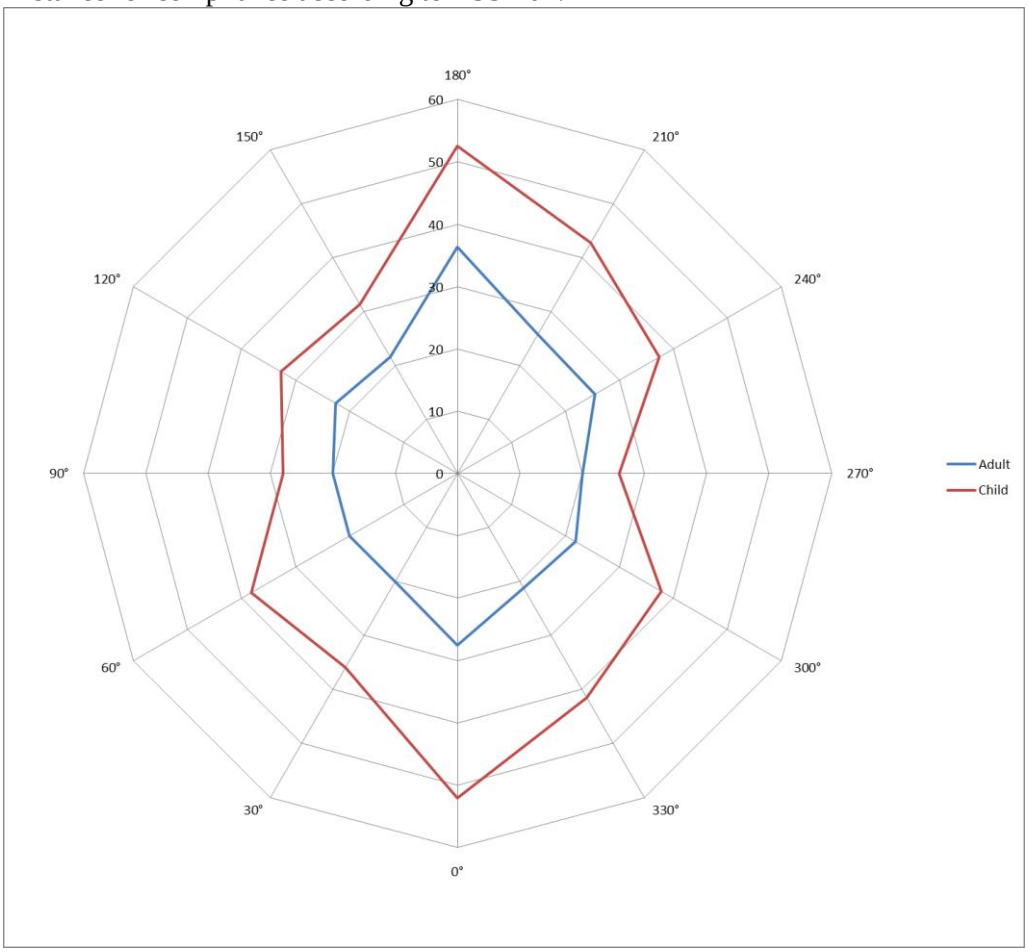


	Distance for compliance (cm).	
Direction	Adult	Child
0°	20.0	20.0
30°	20.0	20.0
60°	20.0	20.0
90°	20.0	20.0
120°	20.0	27.9
150°	20.0	20.0
180°	20.0	20.0
210°	20.0	20.0
240°	20.0	24.0
270°	20.0	20.0
300°	20.0	20.0
330°	20.0	20.0

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

Semi-integrated omni antenna KRE 101 2245/1, worst case: WCDMA, TX mid frequency

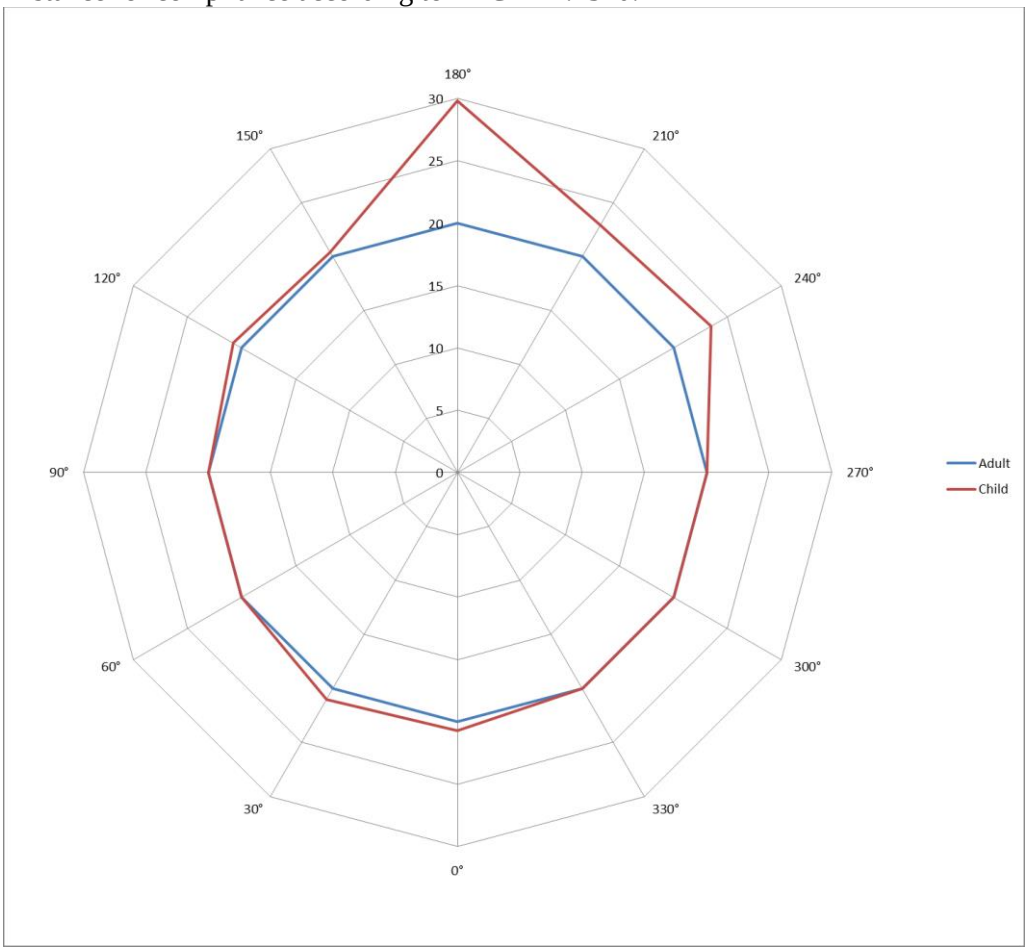
Distance for compliance according to RSS-102:



	Distance for compliance (cm).	
Direction	Adult	Child
0°	27.6	52.0
30°	20.0	36.0
60°	20.0	38.2
90°	20.0	28.0
120°	22.6	32.7
150°	21.6	31.3
180°	36.4	52.6
210°	25.8	42.7
240°	25.4	37.4
270°	20.0	25.9
300°	21.9	37.8
330°	21.2	41.5

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

Distance for compliance according to 47 CFR 1.1310:



	Distance for compliance (cm).	
Direction	Adult	Child
0°	20.0	20.7
30°	20.0	21.0
60°	20.0	20.0
90°	20.0	20.0
120°	20.0	20.8
150°	20.0	20.4
180°	20.0	29.8
210°	20.0	22.9
240°	20.0	23.5
270°	20.0	20.0
300°	20.0	20.0
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.

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	(Note 1)

According to RSS-102 Table 4

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)
300-6000	-	-	$0.02619f^{0.6834}$	(Note 1)

f = frequency in MHz.

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

Complies?	Yes

Appendix 3

Hardware list

Product name	Product number	R-state	Serial number
Radio 2203 B66A	KRC 161 553/1	R1B	C82A095788
PSU 48 05	BMR 910 434/1	R1B	BW9A600346
FAN UNIT	BKV 106 176/2	R2B	CE51000UN1

Antennas:

Product name	Product number	R-state	Serial number
Antenna 6503	KRE 101 2249/1	R1C	D775310011
VPol Omni 790-960/ 1710-2700	KRE 101 2233/1	-	DEI2817045
VPol Omni 790-960/ 1710-2700	KRE 101 2233/1	-	DEI2817002
VPol Omni 694-894/ 1710-2700	KRE 101 2245/1	-	DEI3219806
VPol Omni 694-894/ 1710-2700	KRE 101 2245/1	-	DEI3219825

SFP modules:

Product name	Product number	Manufacturer	Product number of Manufacturer	Serial number
SFP	RDH 102 65/31	Delta	LCP-10G3B4QDRTJA	152709M01828

Radio software:

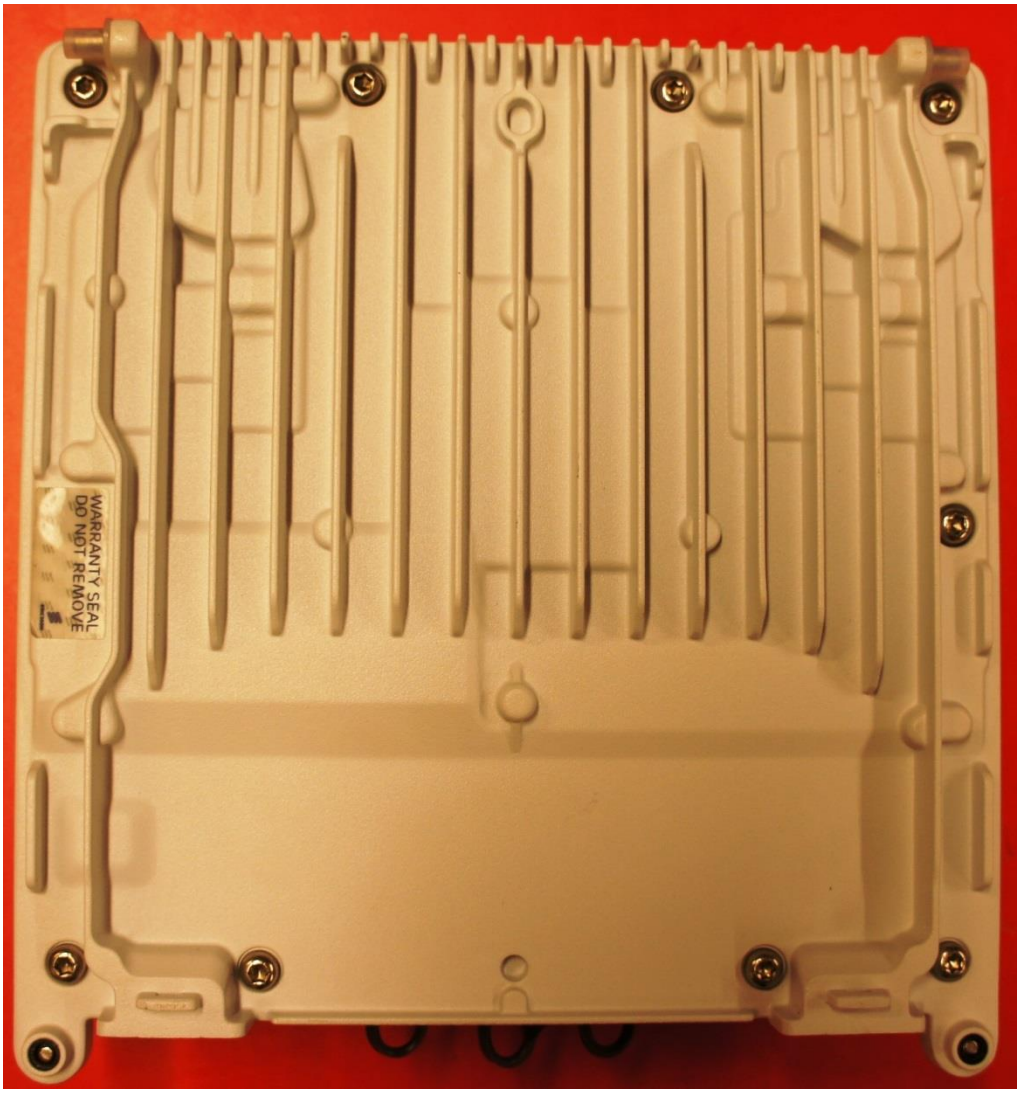
Product number	Revision
CXP 901 7316/2	R62CC

Photos of test object

Front side of Radio 2203 B66A

Appendix 4

Rear side of Radio 2203 B66A

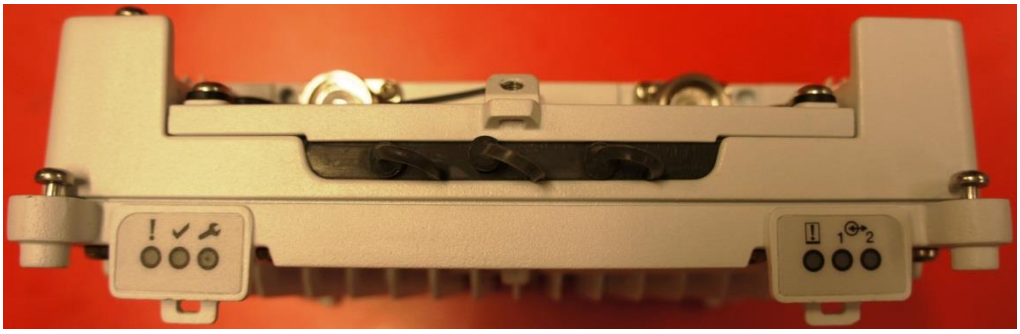


Appendix 4

Left side of Radio 2203 B66A

Right side of Radio 2203 B66A

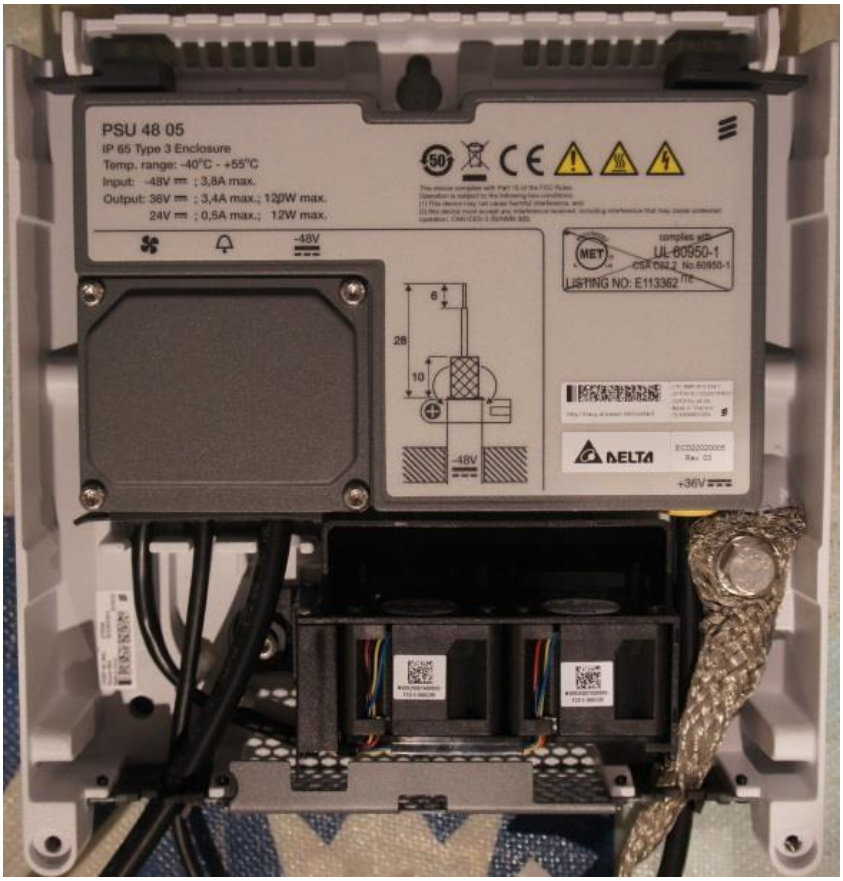
Bottom side of Radio 2203 B66A



Top side of Radio 2203 B66A

Appendix 4

PSU 48 05 and FAN UNIT:

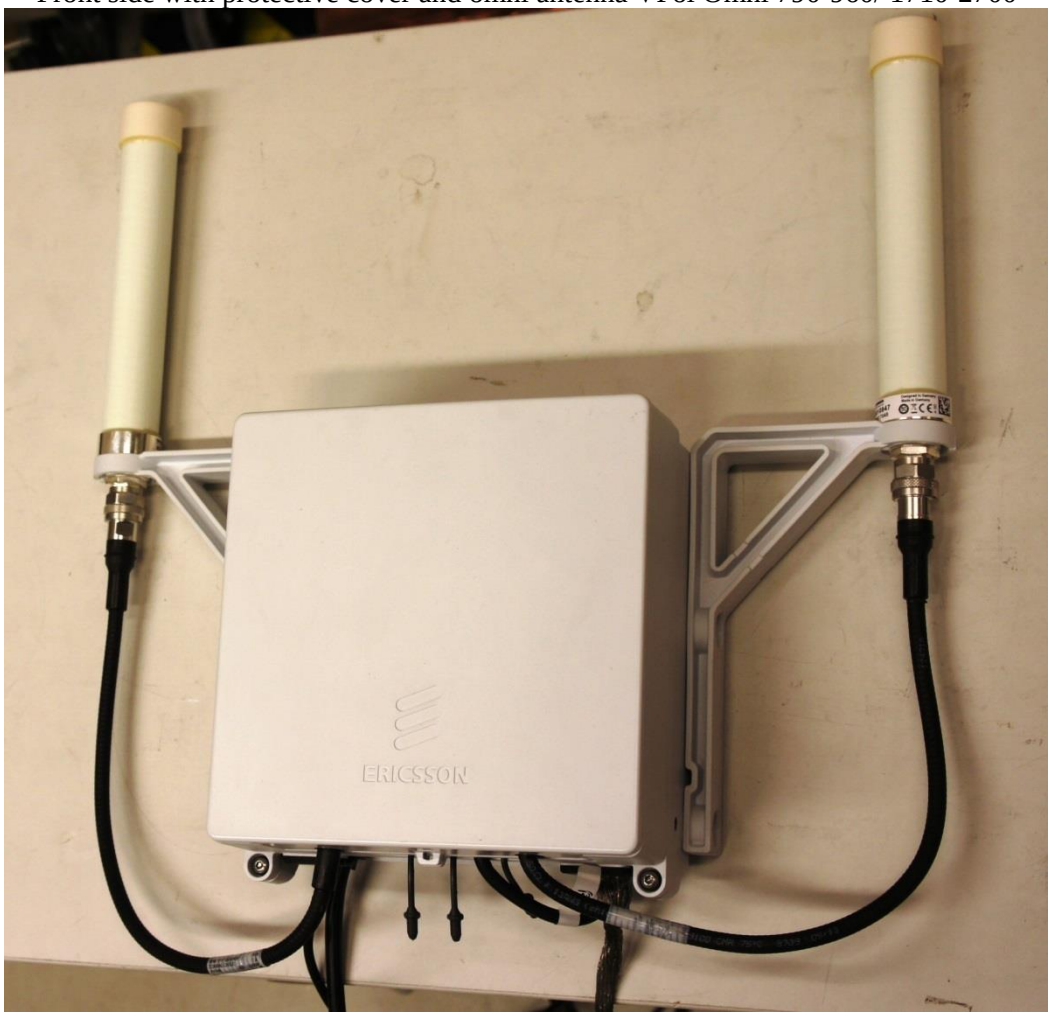


Appendix 4

Front side with integrated Antenna 6503

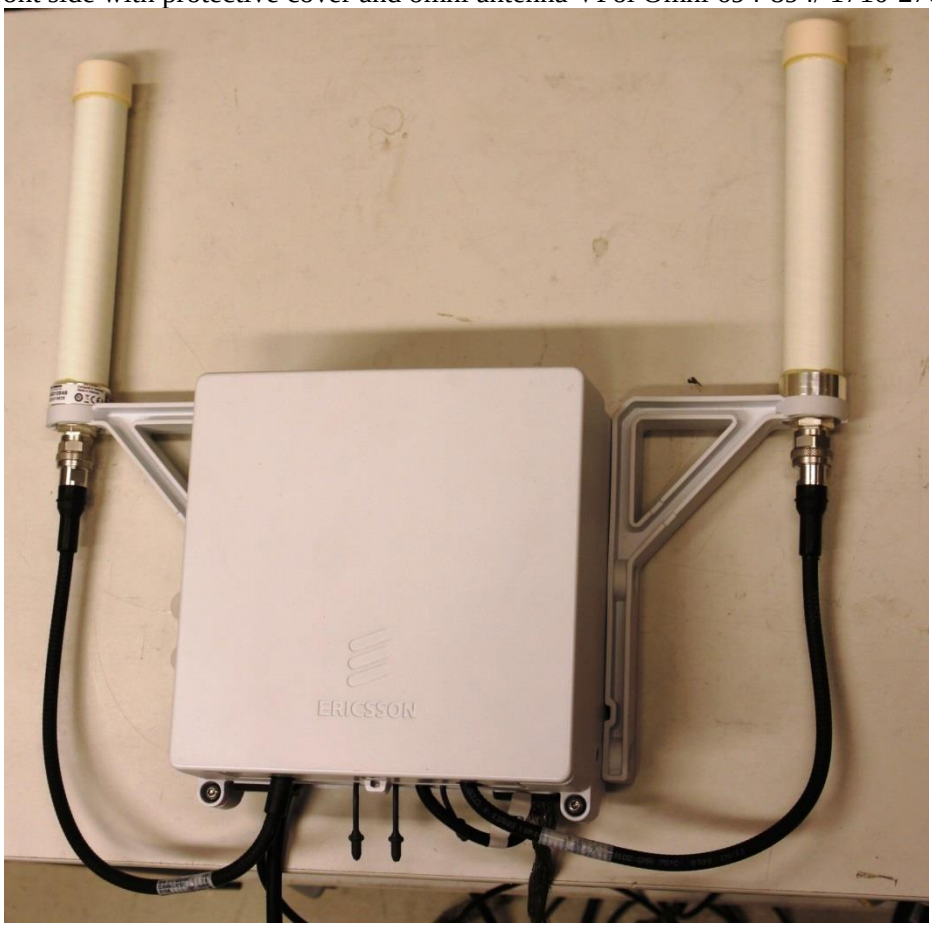
Appendix 4

Front side with protective cover and omni antenna VPol Omni 790-960/ 1710-2700



Appendix 4

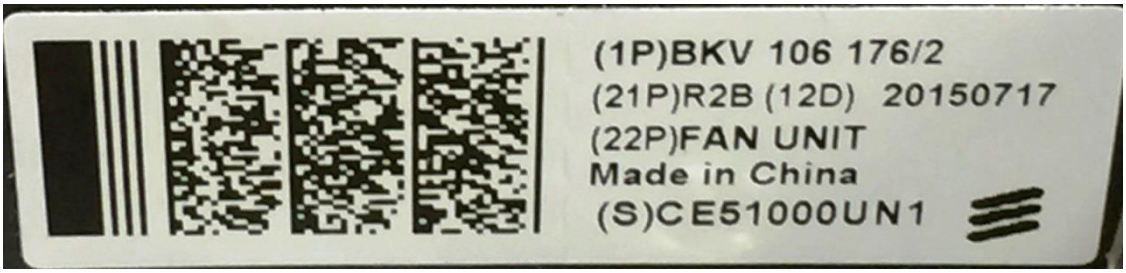
Front side with protective cover and omni antenna VPol Omni 694-894/ 1710-2700



Appendix 4

PSU 48 05 label:

FAN UNIT label:



SFP module:

Appendix 4

Integrated antenna (Antenna 6503):

Semi-integrated omni antennas (VPol Omni 790-960/ 1710-2700):

Antenna 1:

Antenna 2:

Appendix 4

Semi-integrated omni antennas (VPol Omni 694-894/ 1710-2700):

Antenna 1:

Antenna 2: