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MPE test on Ericsson mRRUS 12 B13

(3 appendices)

Test object

Product name: mRRUS 12 B13

Product number: KRC 161 332/X, see appendix 1 for details.

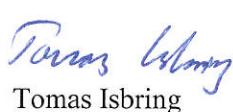
See appendix 1 for the tested hardware configuration and general information.
See appendix 3 for photos.

Summary

Standard	Compliant	Appendix	Remarks
FCC 47 CFR 2.1091 Radiofrequency radiation exposure evaluation: mobile devices	Yes	-	-
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	2014-01	503 881
Measurement software: Antennkalibrering V1.20	-	-
Calculation software: EMF 1.0	-	-
Laser probe AR FL7006	2014-07	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 mRRUS meets the requirements of 47 CFR 2.1091.

Description of the test object

The test object is a micro Remote Radio Unit configured in Single Standard mode for a LTE base station and designed to provide mobile users with a connection to a mobile network.

The test scope covers the following models of test objects:

Product number:	KRC 161 332/1, 110-240 VAC internal antenna
Product number:	KRC 161 332/2, -48 VDC internal antenna
Product number:	KRC 161 332/3, 110-240 VAC no internal antenna
Product number:	KRC 161 332/4, -48 VDC no internal antenna

FCC ID TA8AKRC161332

Delivery of test object

The test object was delivered: 2013-08-09.

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.

Appendix 1

Reservation

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

Test engineers

Tomas Isbring, Hyder Khalaf and Kexin Chen, SP.

Test participant

Mihai Simon, Ericsson AB

Operational test mode

The mRRUS 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:

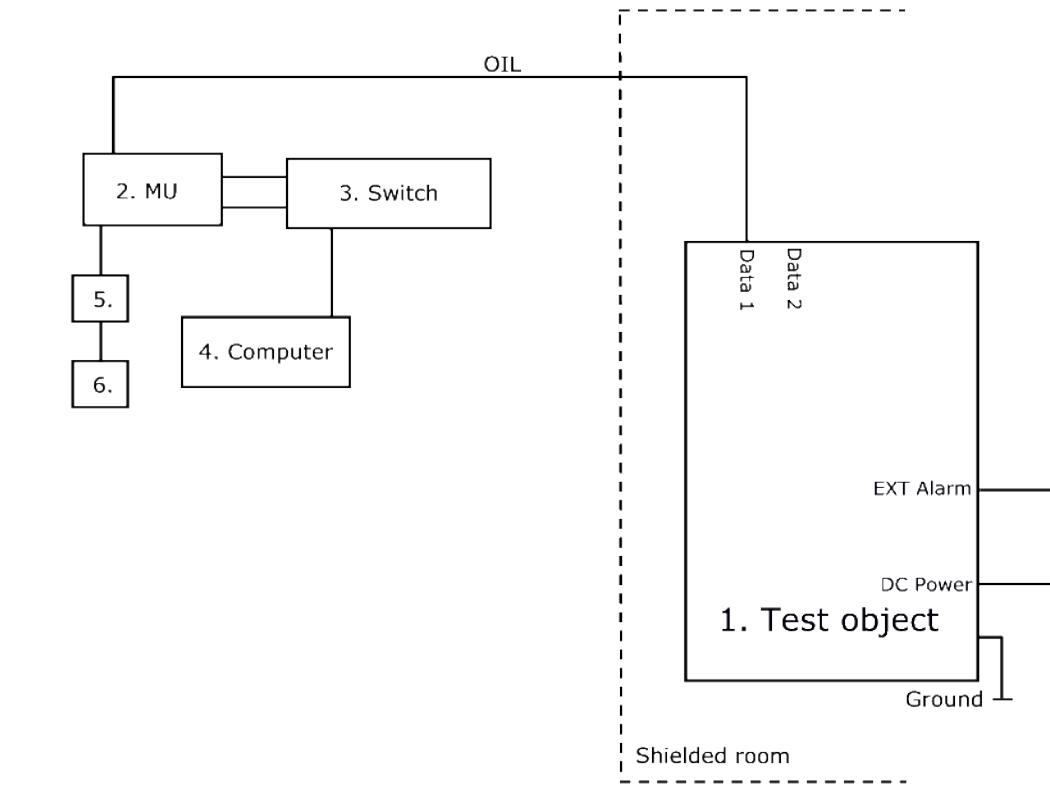
EARFCN Downlink	Frequency [MHz]	Symbolic name	Comment
5205	748.5	B	TX bottom frequency in 5 MHz BW configuration
5230	751.0	M	TX middle frequency in 10 MHz BW configuration
5255	753.5	T	TX top frequency in 5 MHz BW configuration

Tested configuration

RF A configuration: 1x 37.0 dBm (1x 5 W)
RF B configuration: 1x 37.0 dBm (1x 5 W)
SFP module: DELTA, LCP-2488B4HDRT-E
OIL: Opto fibre, single mode, 2.5 Gbit/s
Power configuration: -48 VDC

Appendix 1

Test setup:



1.	mRRUS 12 B13, KRC 161 332/2, rev. R1A, s/n: C827115310 working software CXP 901 7316/2, Rev. R51ML
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Functional test equipment:

2.	Main Unit DUS 41 01 KDU 137 624/1 R5A, s/n: D168382181, hosted in SUP 6601 1/BFL 901 009/4, rev. R1E, s/n. BR88258854
3.	Switch Netgear PROSAFE GSM 7224, BAMS-1000850754
4.	Computer Sun microsystems ultra 27, BAMS – 1000861874
5.	GPS 02 01, NCD 901 41/1, rev. R1D, s/n: TU8K356428
6.	GPS Active Antenna, KRE 101 2082/1

Integrated antenna

Sector antenna, KRE 101 2135/1, rev. R1A, s/n: T89U300016
Representing version: KRC 161 332/2

Semi-integrated omni antenna

VPol Omni 694-894, KRE 101 2245/1, s/n: D7G3305557, D7G3305561
Type no. 80010846
Representing version: KRC 161 332/4



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Appendix 1

Interface:	Type of port:
Power: -48 VDC	DC Power
Data 1, optical interface	Signal
Data 2, optical interface	Signal
Ext Alarm, unshielded multi wire	Signal
Ground wire	Ground

RBS software

	Software	Revision
DUS 41 01	CXP 102 051/19	R17Z

Appendix 2

RF exposure evaluation: 2.1091 Mobile devices

Date	Temperature	Humidity
2013-08-14	22 °C ± 3 °C	44 % ± 5 %
2013-08-15	23 °C ± 3 °C	45 % ± 5 %
2013-08-16	22 °C ± 3 °C	50 % ± 5 %
2013-08-19	23 °C ± 3 °C	46 % ± 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 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.

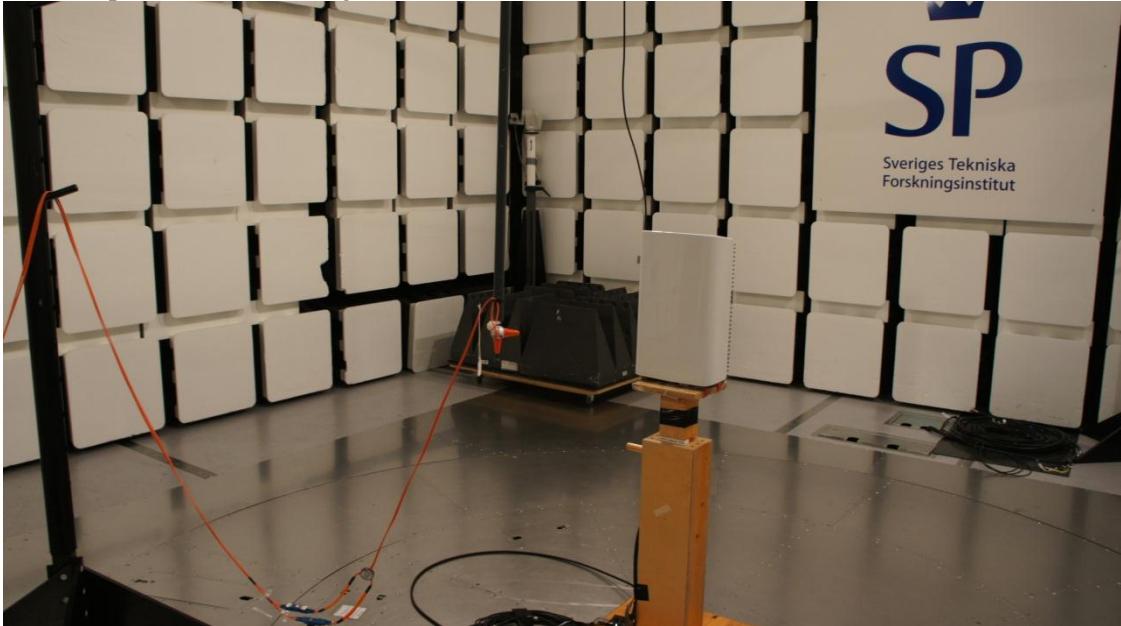
The nominal power stated by the manufacturer is 2x 5 W (2x 37 dBm), with a tolerance of ± 1 dB.

The measured output power was 4.2 W (36.2 dBm). Therefore the calculation was adjusted by 1.8 dBm to cover the highest possible output power.

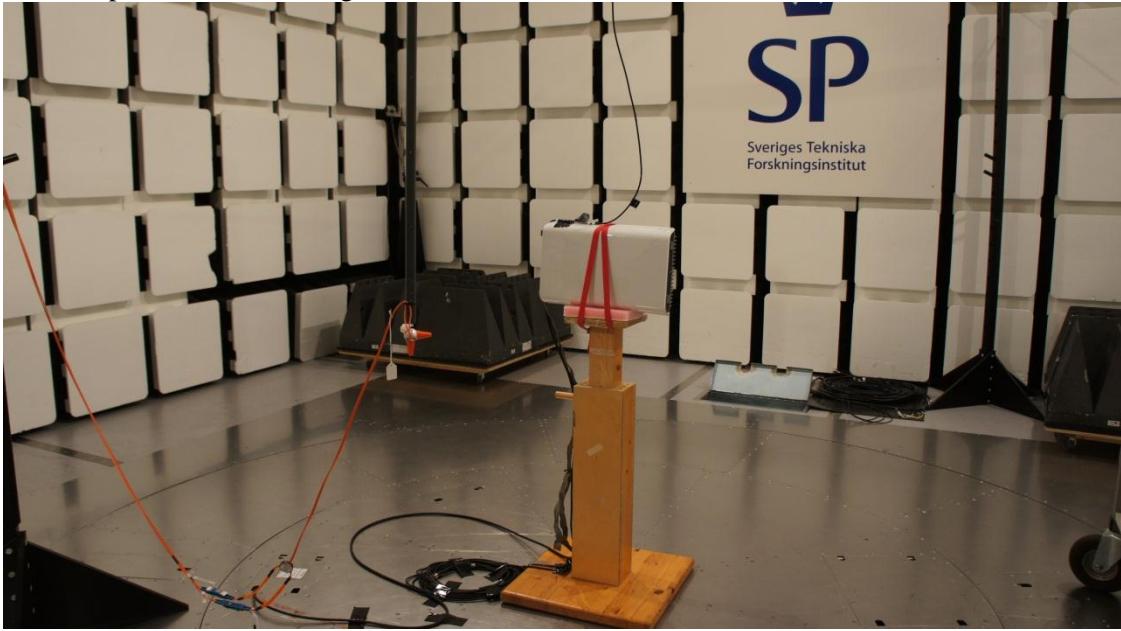
The measurement were made with an Integrated and a Semi-integrated omni antenna.

Appendix 2

Test setup orientation 1, Integrated antenna:

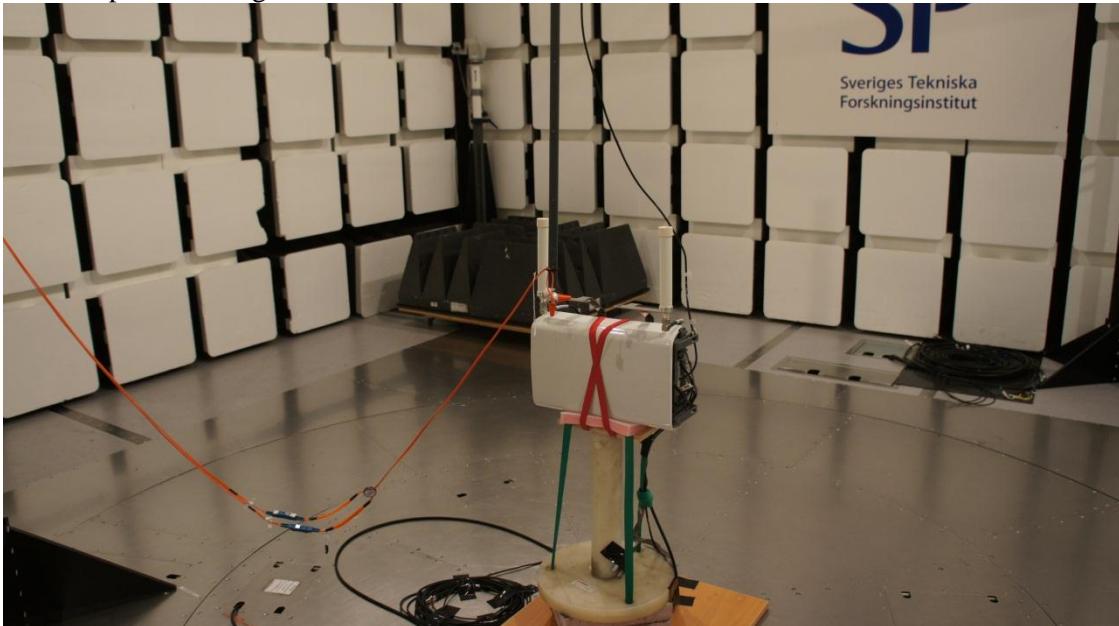


Test setup orientation 2, Integrated antenna:



Appendix 2

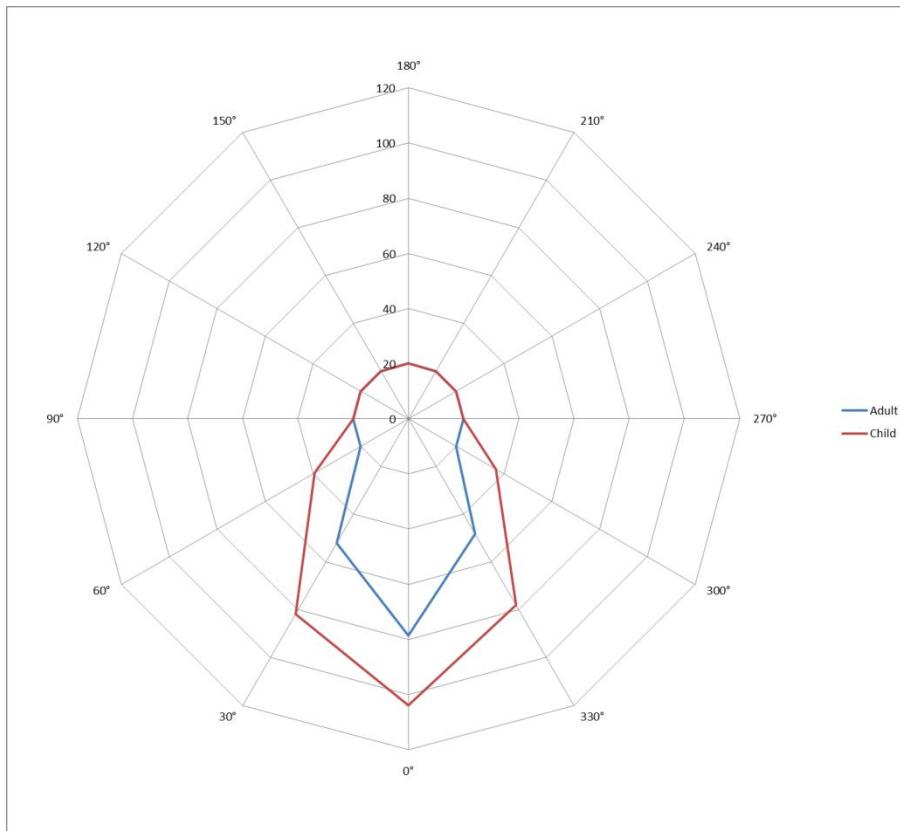
Test setup, Semi-integrated omni antenna:



Appendix 2

Results

Orientation 1, Integrated antenna, worst case: LTE 5 MHz



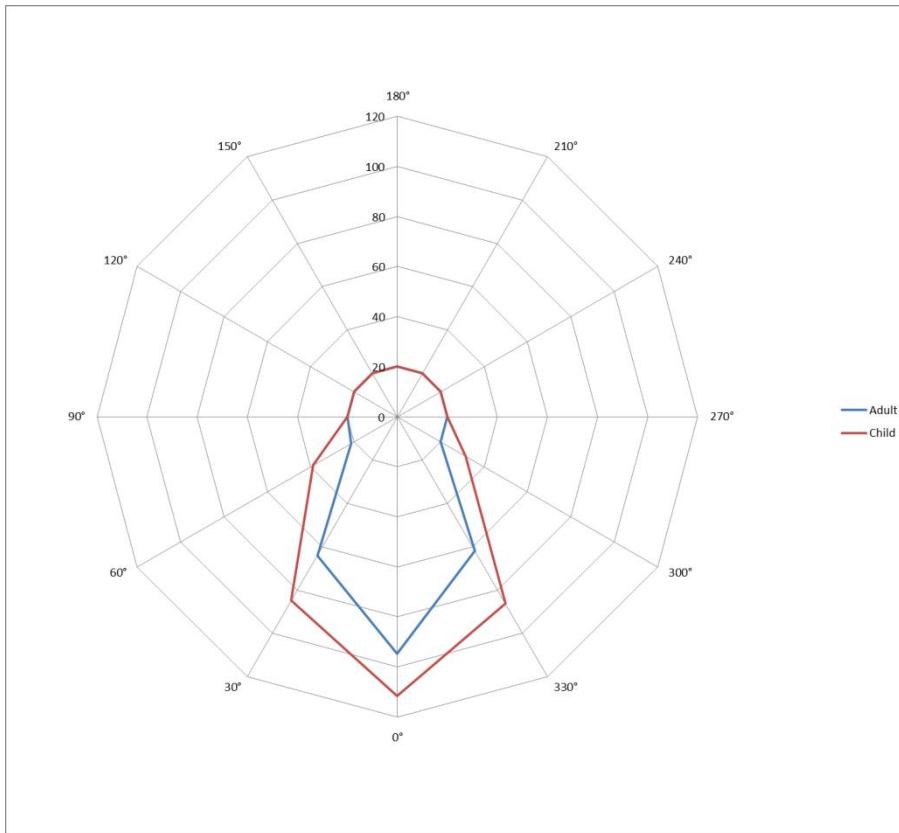
Note: The test object was placed with the front side facing 0° and the back side facing 180° as shown in the test setup photo.

Direction	Distance for compliance (cm).	
	Adult	Child
0°	78.7	104
30°	52.2	81.7
60°	20.0	39.3
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	36.5
330°	48.3	78.1

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 LTE 10 MHz:



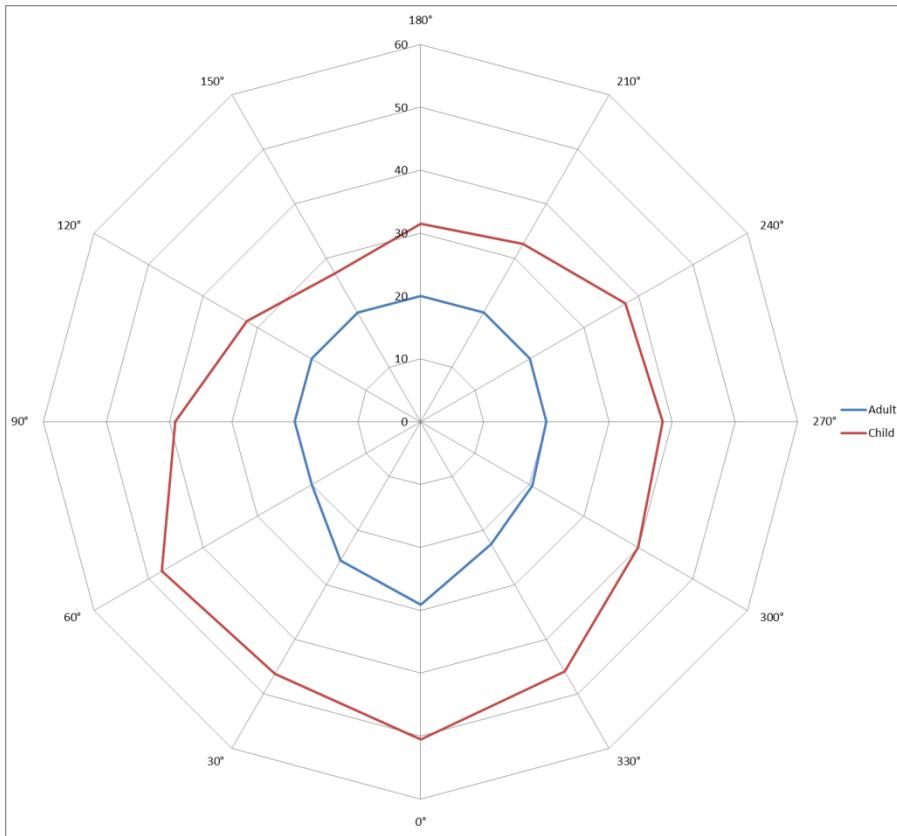
Note: The test object was placed with the front side facing 0° and the cable inlet facing 90° as shown in the test setup photo.

Direction	Distance for compliance (cm).	
	Adult	Child
0°	94.6	111.5
30°	64.1	84.8
60°	21.3	38.8
90°	20.0	30.0
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	31.6
330°	61.9	86.3

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

Appendix 2

Semi-integrated omni worst case LTE 10 MHz:



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

Direction	Distance for compliance (cm).	
	Adult	Child
0°	29.1	50.5
30°	22.5	46.3
60°	20.5	47.5
90°	20.0	39
120°	20.0	31.9
150°	20.0	27.2
180°	20.0	31.5
210°	20.0	32.6
240°	20.0	37.6
270°	20.0	38.5
300°	20.0	39.9
330°	25.5	45.9

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)
300-1500	-	-	0.5 (f/1500)	(Note 1)

f = frequency in MHz

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

Photos of test object

Front side with cover:



Front side without cover:



Front side without Integrated antenna and without cover:



Left side without Integrated antenna and without cover:



Appendix 3

Right side without Integrated antenna and Back side :
without cover:



Front side with Semi-integrated omni
antenna



Appendix 3

Labels:

mRRUS 12 B13:



SFP module:

Data port 1:



Integrated antenna:



Appendix 3

Semi-integrated omni antennas (KRE 101 2245/1):

Antenna 1



Antenna 2

