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Appendices **–**

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Tested by:



T017 (EN ISO/IEC 17025)

Timo Hietala, Test Engineer

Reviewed by:

Jyrki Leino, Market Access Manager

SORT OF EQUIPMENT:

Triple band (900/1800/1900) E-GPRS GSM Mobile Phone

MARKETING NAME:

TYPE:

MANUFACTURER:

RM-17

Nokia Corporation

CLIENT:

Nokia Germany

ADDRESS:

Lise Meitner Strasse 10, 89081 ULM Germany

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TEST LABORATORY:

Nemko Oy

FCC REG. NO.

91087 August 27, 2001

IC FILE NO.

IC 4627 July 2, 2003

SUMMARY:

In regard to the performed tests the equipment under test fulfils the requirements defined in the test specifications, see page 2 for details

The test results are valid for the tested unit only. Without a written permission of Nemko Oy it is allowed to copy this report as a whole, but not partially.

Summary of performed tests and test results

<i>Section in CFR 47</i>	<i>Section in ICES-003</i>		<i>Result</i>
15.107, a	5.3	AC power line conducted emissions	PASS
15.109, a	5.5	Radiated emissions	PASS

Explanations:

PASS The EUT passed that particular test.

FAIL The EUT failed that particular test.

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1. EUT and Accessory Information

1.1 EUT description

The EUT is a triple band (900/1800/1900MHz) E-GPRS GSM mobile phone. The highest internal frequency of the EUT was 3980.0 MHz.

1.2 EUT and accessories

	<i>unit</i>	<i>type</i>	<i>S/N</i>
<i>EUT</i>	GSM Phone	RM-17	004400/41/165103/5 HW:5701, SW: 3.06.1
<i>Accessories</i>	Battery	BL-5B	L103C20101731
	AC Charger	ACP-12E	0675294 399791J522GD0093862
	Data cable	DKU-5	LK52083821
	Laptop PC	DELL PP01X	381S30J
	Mouse	Compaq M S34	4862A011
	Power Supply	DELL AA20031	3882A522
	Printer (Ink jet)	HP C2145A	SG57K150F5
	Digital Camera	Apple M2613	TL 42702X250
	Printer AC Cable	-	-
	Printer Data Cable	-	-
	Camera Serial Cable	-	-

2. Standards and measurement methods

The test were performed in guidance of the CFR 47 Part 15, Subpart B, Class B, ICES-003, ANSI C63.4 and EN 55022.

3. Test results

3.1 AC power line conducted emissions

The test was performed as a compliance test. The test parameters concerned were as follows:

<i>Site name</i>	Nemko / Perkkaa
<i>Date of testing</i>	11.06.2004
<i>Test equipment</i>	5, 168, 348, 184, 545
<i>Test conditions</i>	22 °C, 35 % RH
<i>Test result</i>	PASS

3.1.1 Test method and limit

The test was performed inside a shielded room where the floor of the test site comprised the reference ground plane (RGP). For the duration of the test the EUT was placed on a non-conductive table 0.8 m high standing on the reference ground plane (see photograph 1). The excess length of the cables of the EUT were made into bundles 30-40 cm in length. The power input cable of the EUT was connected to an artificial mains network. The test was performed separately on the phase and also on the neutral wire.

The disturbances were first examined by performing a spectrum scan by using a peak detector. The general procedure in the conducted disturbance emission test is that no further measurements are necessary if the disturbance levels measured by using the peak detector are below the limit value defined for the measurement performed by using an average detector.

If not, then at the test frequencies concerned the measurement is performed also by using a quasi-peak detector. If the disturbance levels measured by using the quasi-peak detector are below the limit value defined for the measurement performed by using an average detector, then measurements by using the average detector are not necessary.

<i>Frequency band MHz</i>	<i>Quasi-peak dB(μV)</i>	<i>Average limit dB(μV)</i>
0.15 – 0.5	66 – 56	56 – 46
0.5 – 5	56	46
5 - 30	60	50

3.1.2 EUT operation mode

<i>EUT operation mode</i>	GSM 1900 Idle
<i>EUT operation voltage</i>	115 V / 60 Hz

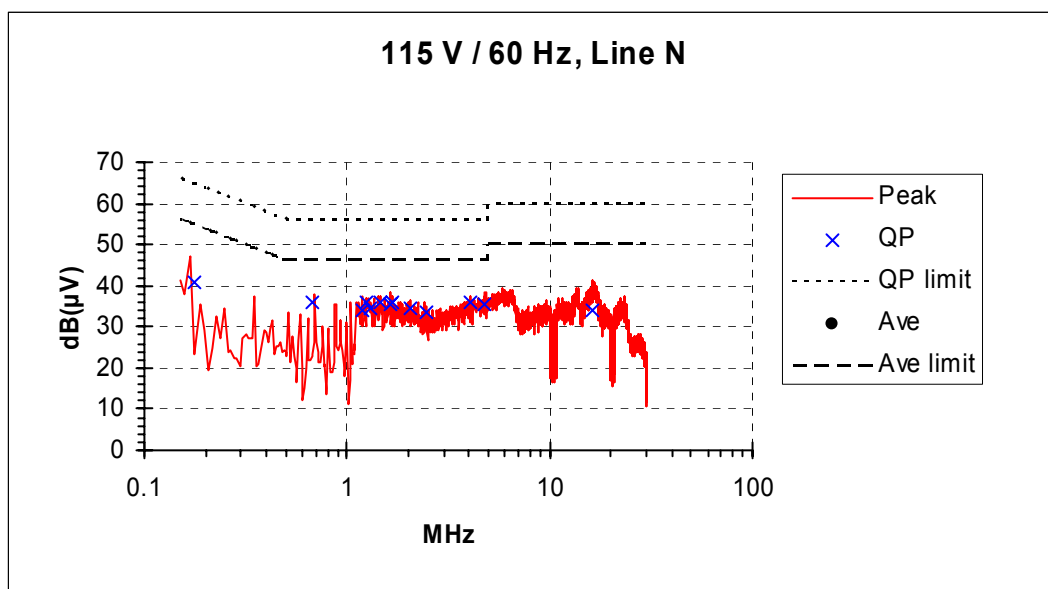
3.1.3 EUT test setup



Photograph 1. AC power line conducted emissions test setup

3.1.4 Test data

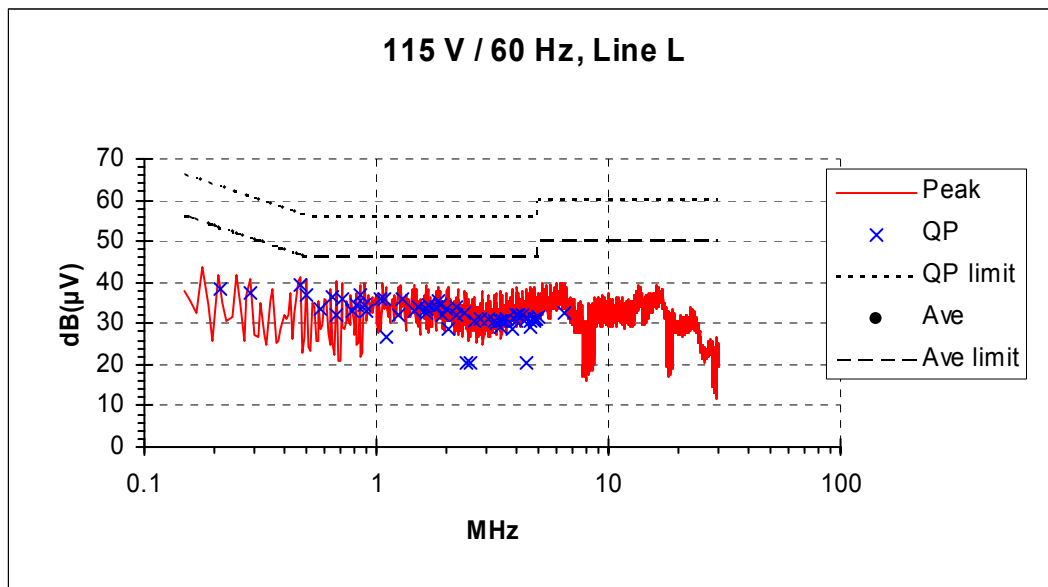
Idle, line N



Highest emissions:

Frequency MHz	Result Quasi-peak dB(μV)	Limit value Quasi-peak dB(μV)	Margin Quasi-peak dB	Result Average dB(μV)	Limit value Average dB(μV)	Margin Average dB
0.175	40.8	64.7	23.9	-	46 / 56	-
0.673	36.1	56.0	19.9			-
1.203	33.9	56.0	22.1			-
1.235	35.8	56.0	20.2			-
1.308	34.3	56.0	21.7			-
1.448	36.0	56.0	20.0			-
1.628	35.5	56.0	20.5			-
1.663	35.8	56.0	20.2			-
2.053	34.7	56.0	21.3			-
2.443	33.4	56.0	22.6			-
4.068	35.9	56.0	20.1			-
4.813	35.4	56.0	20.6			-
16.388	34.0	60.0	26.0			-

Idle. line L



Highest emissions:

Frequency MHz	Result Quasi-peak dB(μV)	Limit value Quasi-peak dB(μV)	Margin Quasi-peak dB	Result Average dB(μV)	Limit value Average dB(μV)	Margin Average dB
0.468	39.6	56.6	17.0	-	46 / 56	-
0.503	36.9	56.0	19.1			-
0.646	36.4	56.0	19.6			-
0.717	36	56.0	20.0			-
0.825	34.6	56.0	21.4			-
0.861	36.9	56.0	19.1			-
0.894	34.3	56.0	21.7			-
1.043	35.9	56.0	20.1			-
1.080	35.9	56.0	20.1			-
1.293	35.9	56.0	20.1			-
1.508	34.0	56.0	22.0			-
1.688	34.7	56.0	21.3			-
1.833	35.3	56.0	20.7			
1.870	34.5	56.0	21.5			

3.2 Radiated emissions

<i>Site name</i>	Nemko / Perkkää
<i>Date of testing</i>	28.06.2004
<i>Test equipment</i>	350, 338, 42, 543, 544, 319, 525, 545, 184
<i>Test conditions</i>	24 °C. 52 % RH
<i>Test result</i>	PASS

3.2.1 Test method and limit

The test was performed in a semi-anechoic shielded room. The EUT was placed on a non-conductive 0.8 m high table standing on the turntable (photographs 2 and 3). During the test in the frequency range 30-2000 MHz the distance from the EUT to the measuring antenna was 3 m. During the test in the frequency range 2000-8000 MHz the distance from the EUT to the measuring antenna was 1.5 m. The excess length of the cables of the EUT were made into bundles 30-40 cm in length. In order to find the maximum levels of the disturbance radiation the angle of the turntable. The height of the measuring antenna and the lay-out of the EUT cables were varied during the tests. The test was performed with the measuring antenna being both in horizontal and vertical polarizations.

Vertical and horizontal polarizations in the frequency range 30 – 1000 MHz was measured by using the peak detector. During the peak detector scan, the turntable was rotated from 0° to 360° with 30° step with the antenna heights 1.0 m and 3.0 m. The highest levels of the radiated interference field strength measured by using the quasi-peak detector were recorded.

Vertical and horizontal polarizations in the frequency range 1000 – 8000 MHz was measured by using the peak detector. During the measurement the turntable was rotated from 0° to 360° and the antenna was raised from 1.0 m and 4.0 m.

The CFR 47 Part 15. Subpart B. Class B limit of 500 µV/m has been calculated to correspond 54 dB(µV/m) as follows: $[dB(\mu V/m)] = 20 \log[\mu V/m]$.

EN 55022 Class B limit (3m measuring distance)

<i>Frequency band MHz</i>	<i>Quasi-peak dB(µV/m)</i>
30 - 230	40
230 - 1000	47

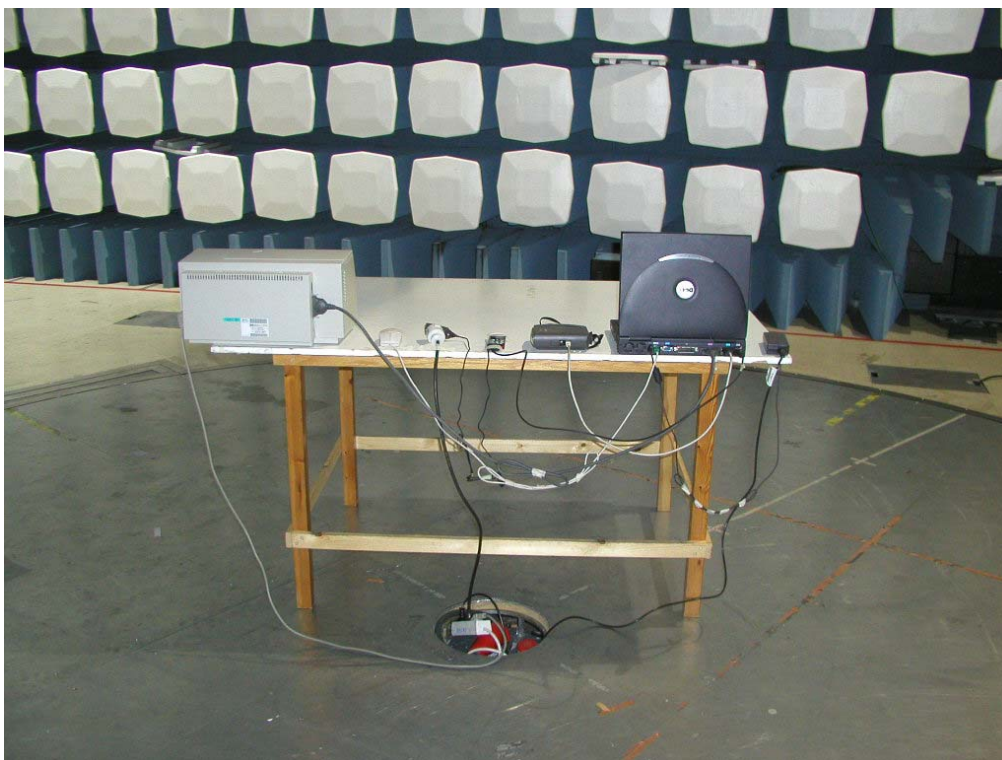
Class B limit (3m measuring distance)

<i>Frequency band MHz</i>	<i>Average limit dB(µV/m)</i>	<i>Peak limit dB(µV/m)</i>
1000 - 8000	54	74

3.2.2 EUT operation mode

<i>EUT operation mode</i>	GSM 1900 Idle
<i>EUT operation voltage</i>	115 V / 60 Hz

3.2.3 EUT test setup



Photograph 2. Radiated emissions test setup

3.2.4 Test data

The measurement results were obtained as described below.

$$E [\mu\text{V/m}] = U_{RX} + A_{CABLE} + AF - G_{PREAMP}$$

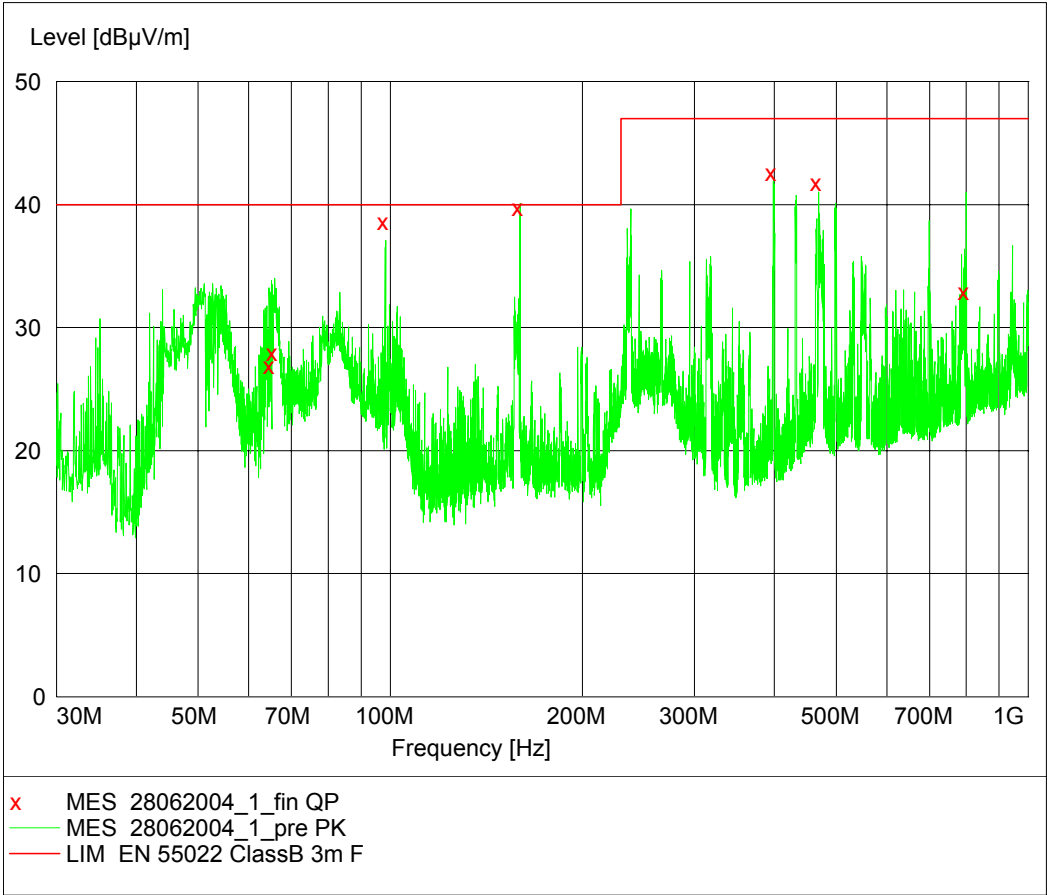
Where

U_{RX} receiver reading

A_{CABLE} attenuation of the cable

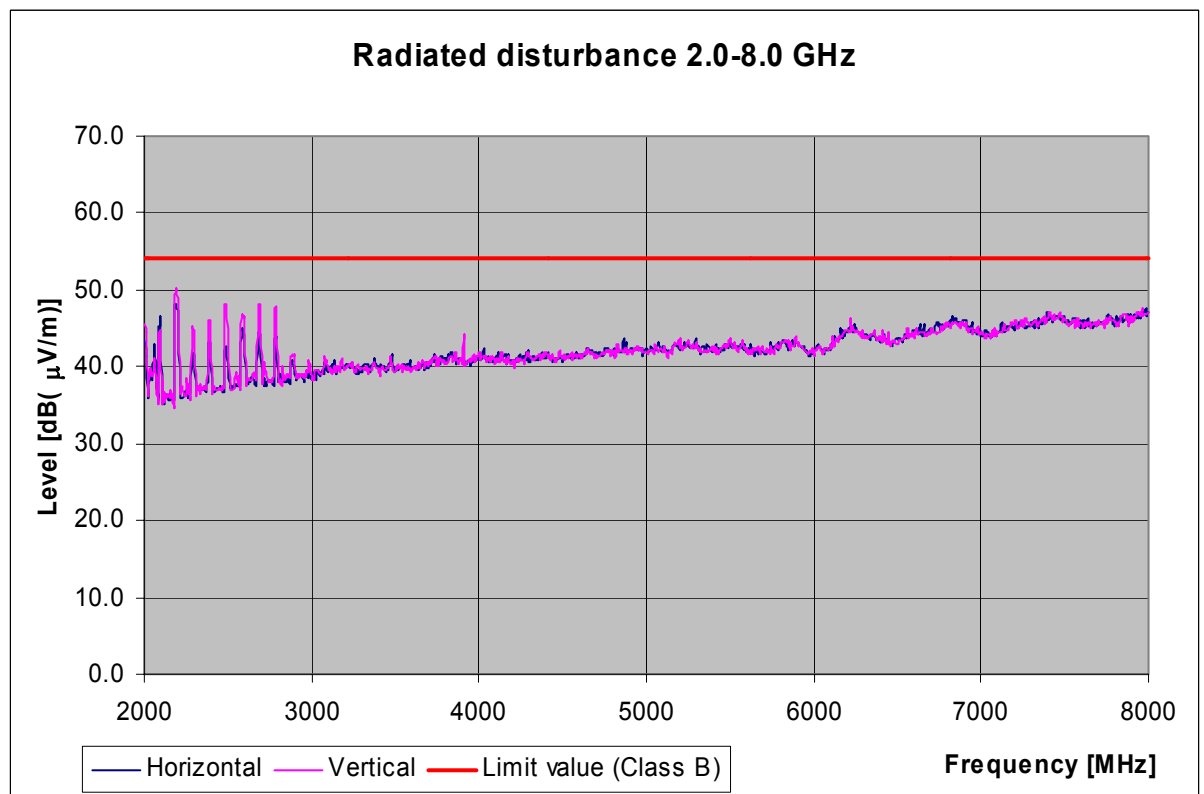
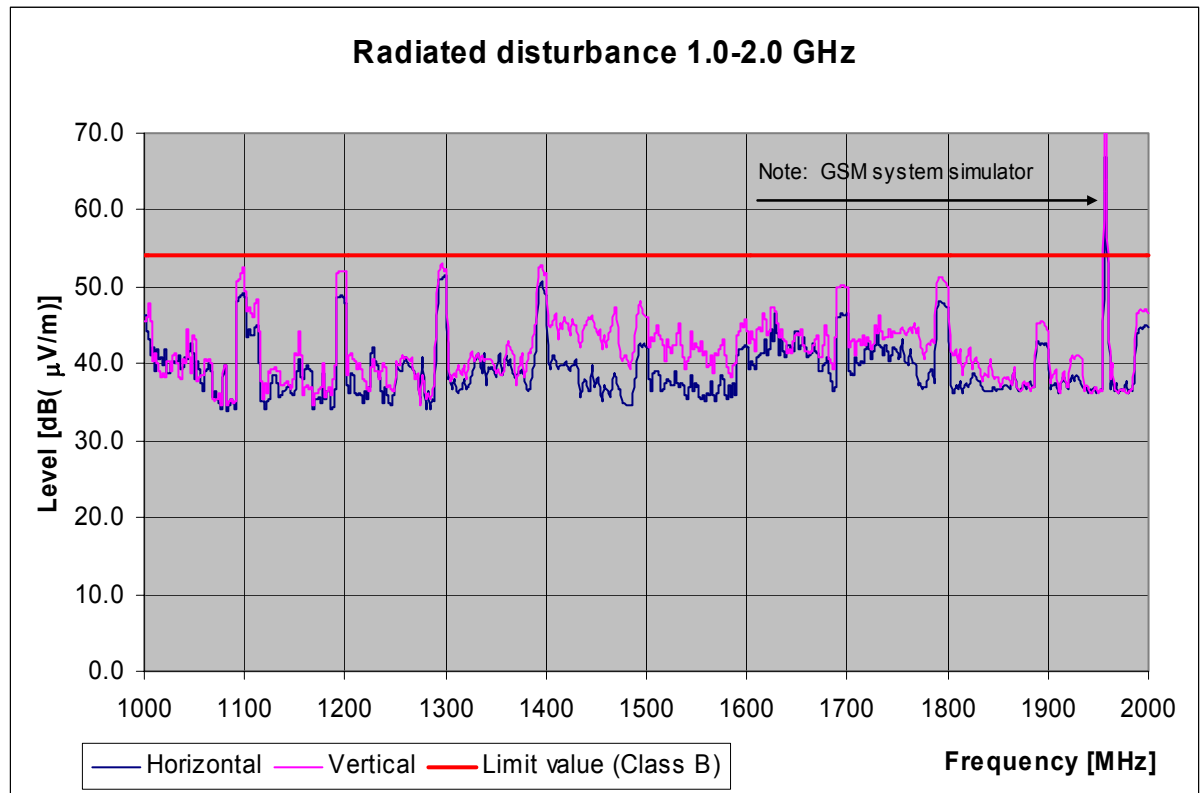
AF antenna factor

G_{PREAMP} gain of the preamplifier



Highest emissions:

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
65.120000	26.90	-19.70	40.00	13.10	181.0	87.00	VERTICAL
65.920000	27.90	-19.60	40.00	12.10	133.0	109.00	VERTICAL
98.320000	38.60	-14.10	40.00	1.40	133.0	131.00	VERTICAL
159.760000	39.70	-14.30	40.00	0.30	188.0	182.00	HORIZONTAL
399.280000	42.60	-7.90	47.00	4.40	102.0	164.00	HORIZONTAL
469.440000	41.80	-6.30	47.00	5.20	272.0	173.00	VERTICAL
798.720000	32.90	-2.20	47.00	14.10	153.0	193.00	VERTICAL



4. List of test equipment

Each active test equipment is calibrated once a year, antennas every 18 months and other passive equipment every 24 months.

Nr.	Equipment	Type	Manufacturer	Serial number
5	Test receiver	ESH-3	Rohde & Schwarz	894718/015
338	Test receiver	ESS	Rohde & Schwarz	847151/009
42	Spectrum analyzer	8566B	Hewlett Packard	2637A04102
543	RF-amplifier	JCA018-501	JCA Technologies	103
544	RF-amplifier	ZFL-2000VH2	Mini-Circuits	D01080
168	Artificial Mains	NSLK 8127	Schwartzbeck	8127162
343	Artificial Mains	NSLK8128	Schwartzbeck	-
319	Antenna	CBL6112	Chase	2018
525	Double-Ridged Horn	3115	Emco	6691
545	GSM MS Test System	CMU	Rohde & Schwarz	836536/049
184	Temp. & humidity meter	H MI 32	Vaisala	63837
348	Shielded room	RFSD-100	Euroshield Oy	1320
350	Semianechoic shielded room	RFD-F-100	Euroshield Oy	1327