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Appendices —

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Tested by:



T017 (EN ISO/IEC 17025)

Timo Hietala, Test Engineer

Reviewed by:

Timo Leismala, Test Manager

SORT OF EQUIPMENT:

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

MARKETING NAME:

Nokia 9300

TYPE:

RAE-6

MANUFACTURER:

Nokia Corporation

CLIENT:

Nokia Corporation

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TEST LABORATORY:

Nemko Oy

FCC REG. NO.

91087 August 24, 2004

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 with Bluetooth. The highest internal frequency of the EUT was 3819.6 MHz.

1.2 EUT and accessories

	<i>unit</i>	<i>type</i>	<i>S/N</i>
<i>EUT</i>	GSM Phone	RAE-6	004400/57/160206/7 HW: 4001, SW: 4.37(0)
	Battery	BP-6M	PROTO80670467VVVVVV L222110000243
	Memory Card	Toshiba 128MB	-
	AC Charger	ACP-12E	0675294399791L277AA0 008498 HW: 5.0
	Data cable	DKU-2	JK43083821 HW: 2.0
	Laptop PC	DELL Latitude D600	CN-0G5152-48643-424- 3178
	Power Supply	DELL PA-1900-02D	CN-09T215-71615-46D- 4872
	Mouse	Compaq M S34	4862A011
	Printer (Ink jet)	HP C2145A	SG57K150F5
	Digital Camera	Apple M2613	TL 42702X250
	Printer AC Cable	-	-
	Printer Data Cable	Belkin F2A046-06	-
	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 Issue 4, 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 Oy/ Perkkaa
<i>Date of testing</i>	30.09.2004
<i>Test equipment</i>	5, 168, 348, 343, 184, 401, 371
<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 and one of the walls 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 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 limit 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

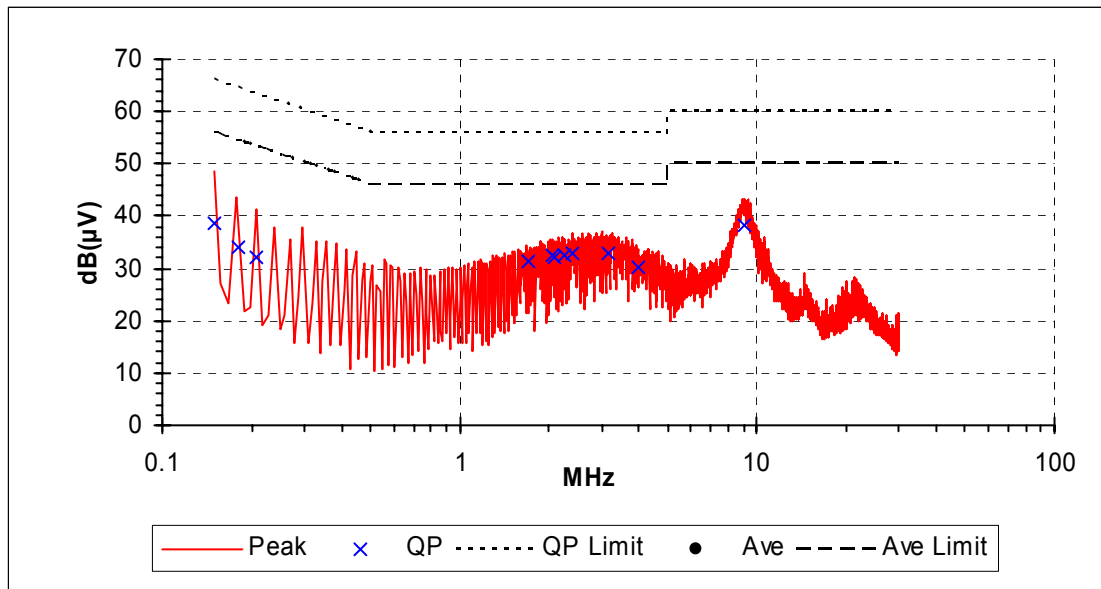
3.1.3 EUT test setup



Photograph 1. AC power line conducted emissions test setup

3.1.4 Test data

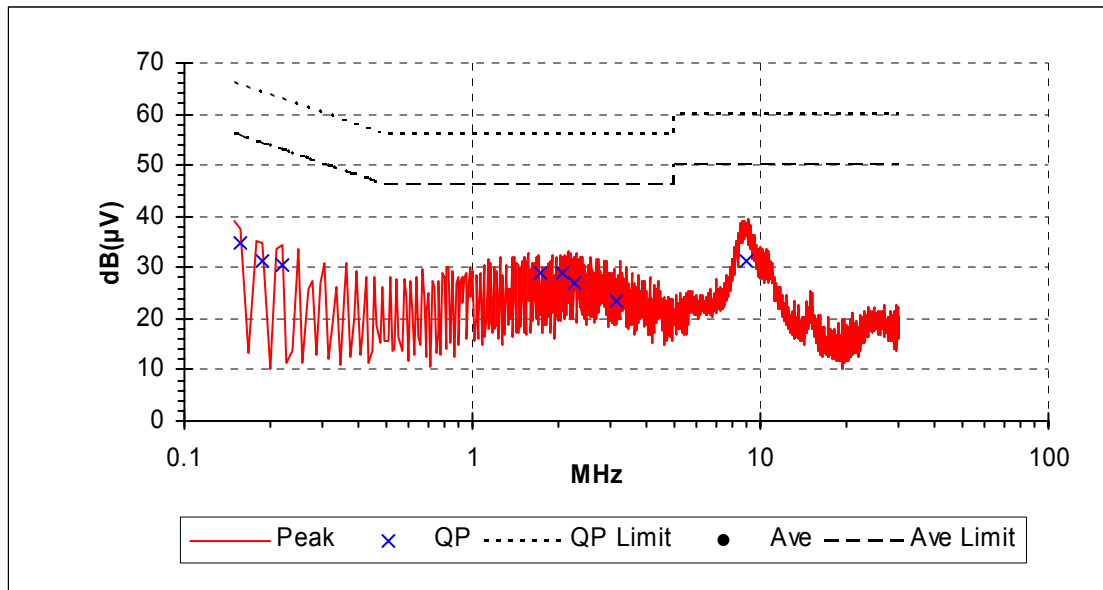
Idle, line N



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
0.1500	38.5	66.0	27.5	-	56.0	-
0.1788	34.1	64.6	30.5	-	54.6	-
0.2081	32.2	63.4	31.2	-	53.4	-
1.7125	31.5	56	24.5	-	46	-
2.0511	32.4	56	23.6	-	46	-
2.0793	32.0	56	24.0	-	46	-
2.2319	32.5	56	23.5	-	46	-
2.3872	32.8	56	23.2	-	46	-
3.1715	32.8	56	23.2	-	46	-
3.9753	30.4	56	25.6	-	46	-
9.0275	38.1	60	21.9	-	50	-

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
0.1555	34.7	66.0	31.3	-	56.0	-
0.187	31.2	64.6	33.4	-	54.6	-
0.2184	30.5	63.4	32.9	-	53.4	-
1.7144	28.8	56	27.2	-	46	-
2.0566	28.8	56	27.2	-	46	-
2.2437	26.8	56	29.2	-	46	-
3.1767	23.4	56	32.6	-	46	-
8.9975	31.1	60	28.9	-	50	-

3.2 Radiated emissions

Site name	Nemko / Perkkaa
Date of testing	28.09.2004
Test equipment	350, 338, 42, 543, 544, 319, 525, 401, 184
Test conditions	22 °C, 35 % RH
Test result	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 (photograph 2). During the test in the frequency range 30-8000 MHz the distance from the EUT to the measuring antenna was 3 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 were 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)

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

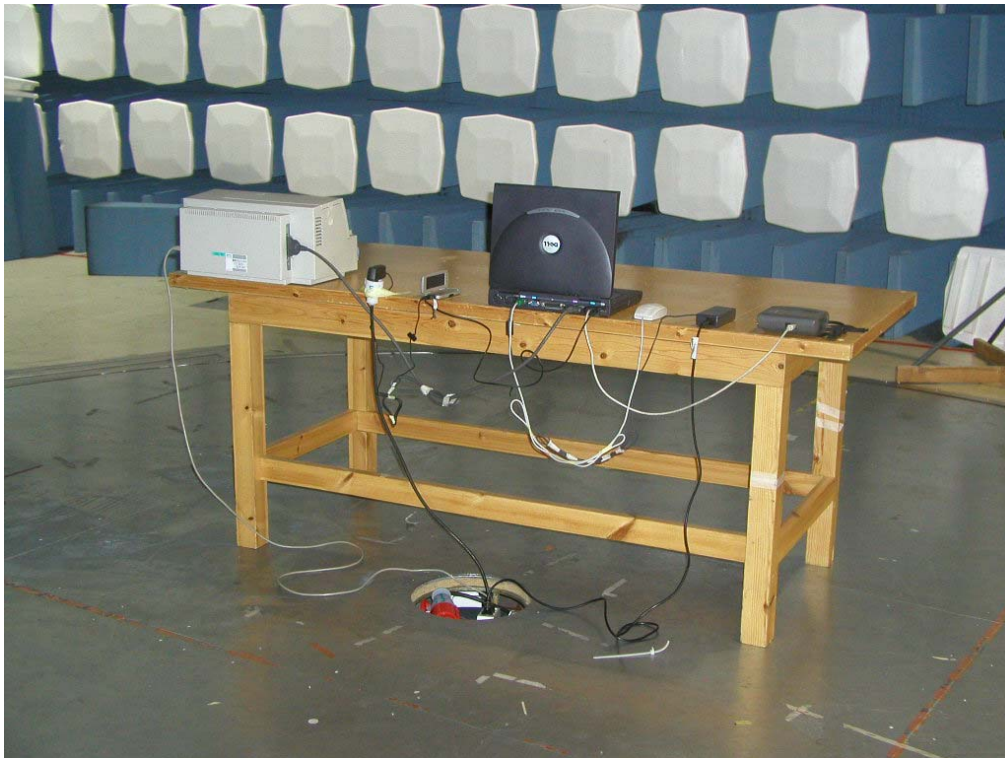
Class B limit (3m measuring distance)

Frequency band MHz	Average limit dB(µV/m)	Peak limit dB(µV/m)
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.

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

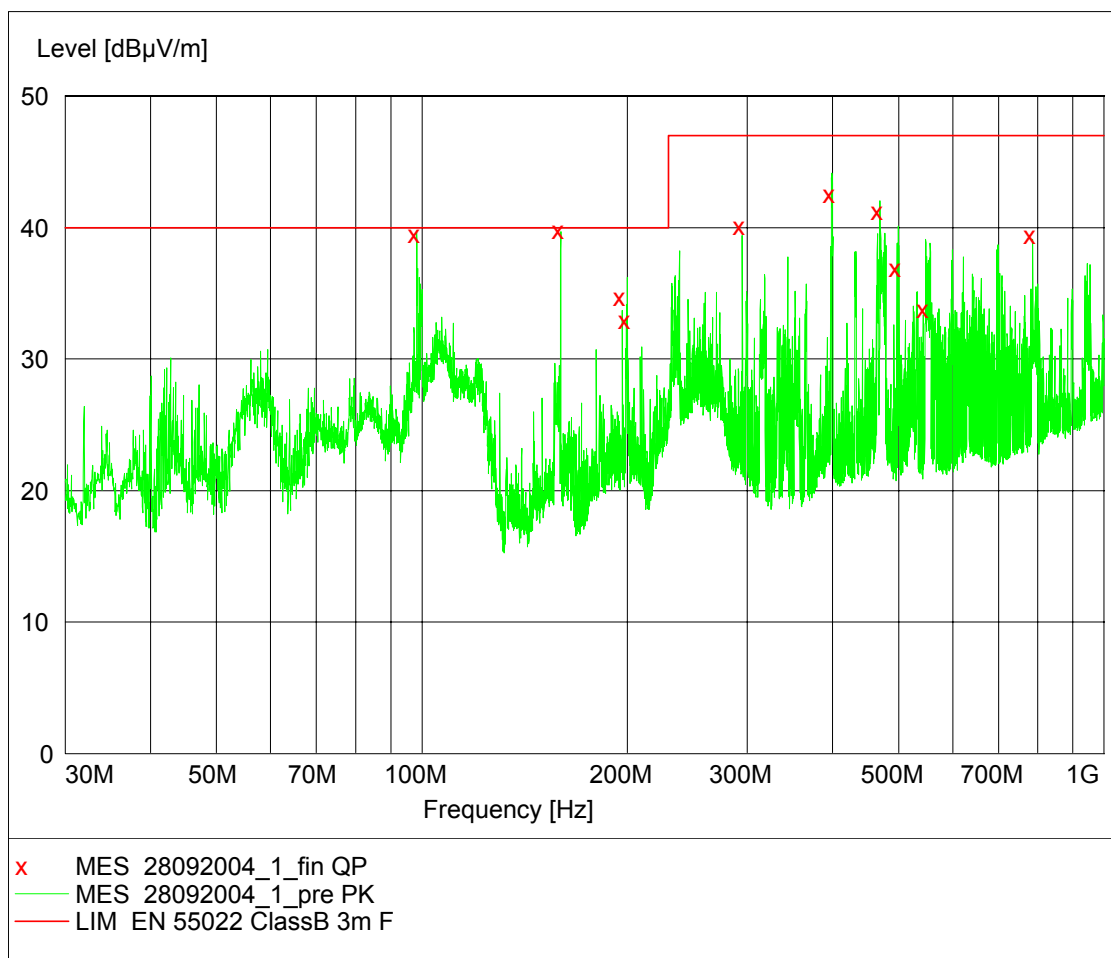
Where

U_{RX} receiver reading

A_{CABLE} attenuation of the cable

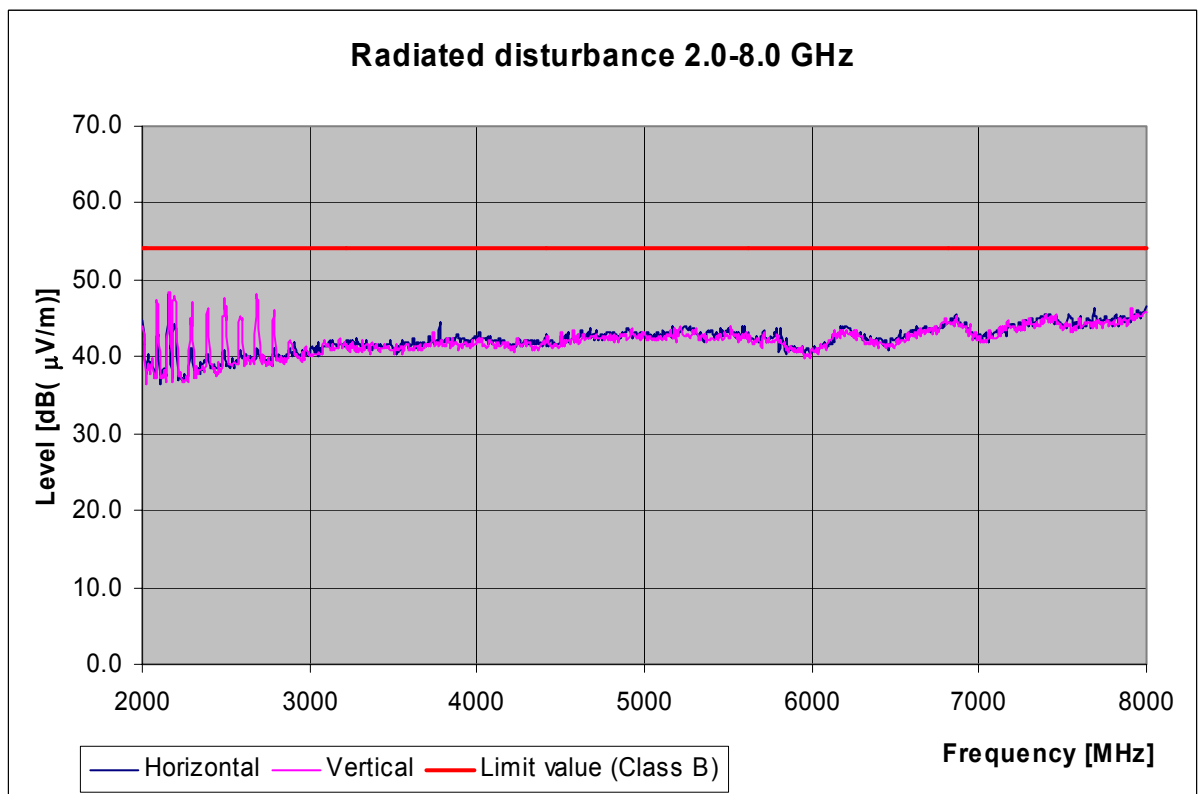
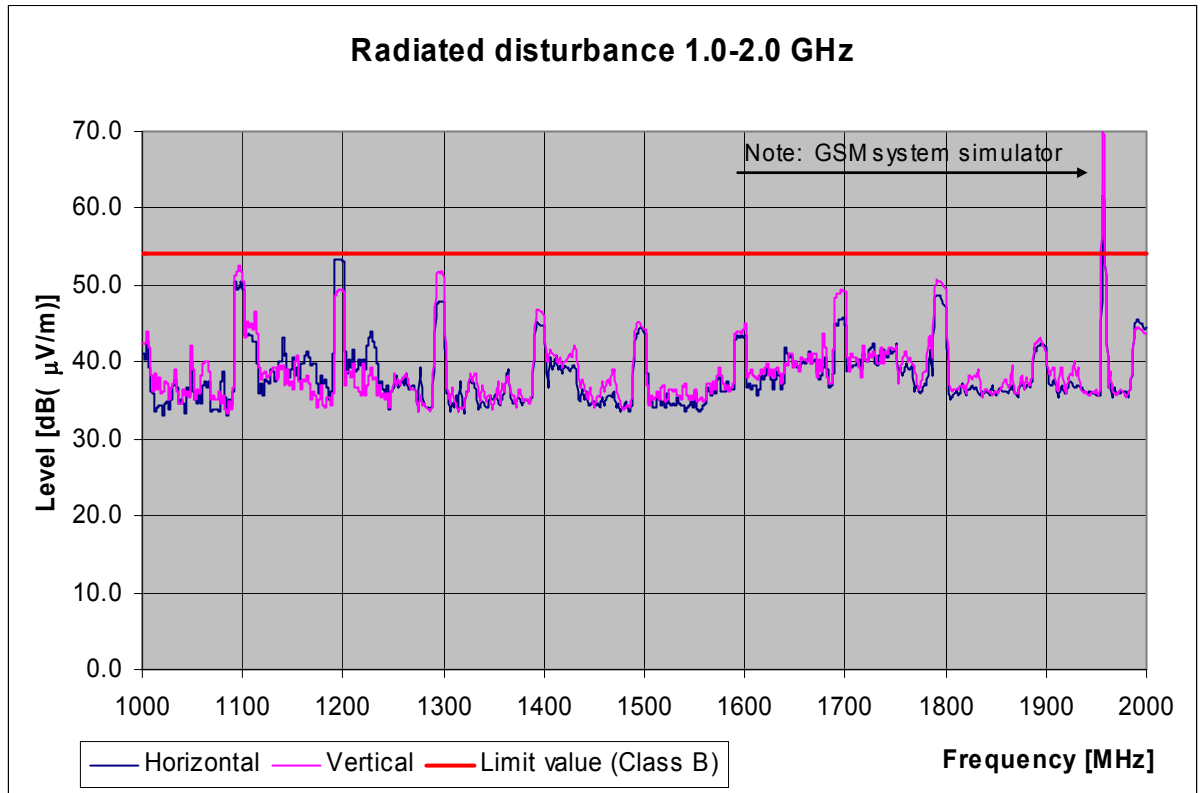
AF antenna factor

G_{PREAMP} gain of the preamplifier



Highest emissions:

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarisation
98.320000	39.50	-14.10	40.00	0.50	100.0	272.00	VERTICAL
159.760000	39.80	-14.30	40.00	0.20	193.0	197.00	HORIZONTAL
196.600000	34.70	-14.70	40.00	5.30	102.0	163.00	VERTICAL
200.120000	33.00	-14.40	40.00	7.00	153.0	101.00	HORIZONTAL
294.920000	40.10	-10.50	47.00	6.90	123.0	130.00	HORIZONTAL
399.240000	42.60	-7.90	47.00	4.40	101.0	141.00	HORIZONTAL
469.400000	41.30	-6.30	47.00	5.70	99.0	190.00	VERTICAL
499.080000	36.90	-5.90	47.00	10.10	100.0	127.00	HORIZONTAL
547.360000	33.80	-4.50	47.00	13.20	122.0	213.00	VERTICAL
786.440000	39.40	-2.10	47.00	7.60	102.0	186.00	HORIZONTAL



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
544	RF-amplifier	ZFL-2000VH2	Mini-Circuits	D01080
168	Artificial Mains	NSLK 8127	Schwarzbeck	8127162
343	Artificial Mains	NSLK8128	Schwarzbeck	-
319	Antenna	CBL6112	Chase	2018
401	GSM MS Test System	HP 8922P	Hewlett Packard	3639U01643
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
371	AC Power source	500i-400	California Instr.	HK 52064