

FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CNFC_RX-114_05.docx	Date of Report:	25-Sep-2013
Number of pages:	14	Customer's Contact person:	Jamie Lee
Testing laboratory:	TCC Nokia Salo Laboratory P.O.Box(86) Joensuunkatu 7H / Kiila 1B FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 45220	Customer:	Nokia, Inc. 16620 West Bernardo Drive San Diego, CA 92127 USA Tel. +1 858 831 5000 Fax. +1 858 385 1598
FCC listing no.:	533467		
IC recognition no.:	661V-1		
Tested devices/ accessories:	Device RX-114 / AC-Charger AC-300 / Headset WH-208		
FCC ID:	QMNA	IC:	661X-A
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2009), IC standards. Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".		
Documentation:	The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory. The documentation of the testing performed on the tested devices is archived for 15 years at TCC Nokia.		
Test Results:	The EUT complies with the requirements in respect of all parameters subject to the test. The test results relate only to devices specified in this document		
Date and signature for the contents:			

Kalle Hannila, System Manager, EMC

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	30-Aug-2013
Testing completed	23-Sep-2013
The customer's contact person	Jamie Lee
Test Plan referred to	T:\Projects\RX-114\TestPlan\RS_testplan_RX-114.xlsm
Notes	-
Document name	T:\Projects\RX-114\EMC\FCC15CNFC_RX-114_05.docx

1.1. EUT and Accessory Information

The EUT is a mobile phone with following features:
GSM/WCDMA/WLAN/Bluetooth
The EUT is tested with maximum rated TX power.

Devices under tests

Product	Type	SN	HW	MV	SW	DUT
Device	RX-114	004402473513624	0108	-	9471_1032_1322_v1.2.2	17630
AC-Charger	AC-300	-	-	-	-	17632
Headset	WH-208	2332271	-	-	-	17375

1.2. Summary of Test Results

NFC:

Section in CFR 47	Section in RSS-210	Name of the test	Result
15.209	2.6	Radiated emission below 30 MHz	PASSED
15.209	A2.6	Radiated emission above 30 MHz	PASSED
15.225(a-d)	A2.6	Field strength in the 13.56 MHz band	PASSED
15.207	7.2.2	AC power line conducted emission	PASSED

PASSED
FAILED
NP

The EUT complies with the essential requirements in the standard.
The EUT does not comply with the essential requirements in the standard.
The test was not performed by the TCC Nokia Laboratory.

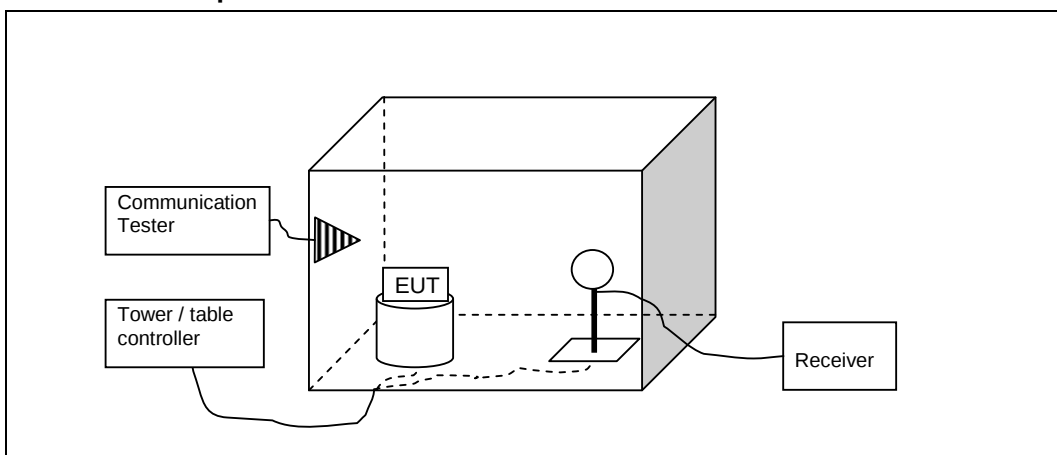
CONTENTS

1. Summary for FCC Part 15C Compliance Test Report.....	2
1.1. EUT and Accessory Information.....	2
1.2. Summary of Test Results.....	2
2. Radiated Emissions below 30 MHz (FCC §15.209, RSS-GEN 7.2.5)	4
2.2. Test method and limit.....	4
2.3. NFC test results	5
3. Radiated emissions above 30 MHz (FCC §15.209, RSS-GEN 7.2.5)	6
3.2. Test method and limit.....	6
3.3. NFC test results	7
4. Field strength in the 13.56 MHz band	8
4.2. Test method and limit.....	8
4.3. NFC test results	9
5. AC powerline conducted emissions (FCC §15.207, RSS-GEN 7.2.2)	10
5.1. Test Setup.....	10
5.2. Test method and limit.....	10
5.3. NFC Test results	11
6. Test Equipment.....	12
6.1. Conducted measurements	12
6.2. Radiated measurements	12

2. Radiated Emissions below 30 MHz (FCC §15.209, RSS-GEN 7.2.5)

EUT with DUT number	RX-114, DUT 17630
Accessories with DUT numbers	AC-300, DUT 17632 ; WH-208, DUT 17375
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	19 / 52 / 101.4
Date of measurements	23-Sep-2013
Measured by	Kalle Hannila

2.1.1 Test setup



2.2. Test method and limit

The measurement is made according to ANSI C63.4-2009 and RSS-GEN as follows:

The measurement distance is 3 m.

The limit line has been adjusted with the distance correction factor (+40 dB for 30 m distance, +80 dB for 300 m distance).

The measurement is divided into the Preliminary Measurement and the Final Measurement. The suspected frequencies are searched for in Preliminary Measurement with measuring antenna at fixed height using 2-axis EUT position system, set on the turntable, which is rotated 360 degrees. For all identified emissions, the antenna is adjusted for maximum reading.

The measurement results are obtained as described below:

$$E [dB\mu V/m] = U_{RX} + 20 dB [1/m] + L_{CABLES}$$

Where U_{RX} is receiver reading, 20 dB the antenna factor of the loop antenna and L the cable attenuation.

Limits for radiated emissions measurements (3 m measurement distance)

Frequency range [MHz]	Limit [$\mu V/m$]	Distance [m]	Detector	RBW [kHz]
0.009 - 0.09	2400 / $f[kHz]$	300	Pk & Avg*	0.2
0.09 - 0.11	2400 / $f[kHz]$	300	QP	0.2

0.11 - 0.15	2400 / f[kHz]	300	Pk & Avg	0.2
0.15 - 0.49	2400 / f[kHz]	300	Pk & Avg*	9
0.49 - 1.705	24000 / f[kHz]	30	QP	9
1.705 - 30	30	30	QP	9

* These are average limits. The peak limit is 20 dB above the average limit.

2.3. NFC test results

Transmit

MaxPeak

Frequency [MHz]	Reading [dBμV/m]	Limit [μV/m]	Distance CF [dB]	Limit @ 3m [dBμV/m]	Margin [dB]	Limit [dBμV/m]	Results
0.0313	63.016	76.68	80	137.74	74.7	37.69	PASSED
0.0313	62.835	76.68	80	137.74	74.9	37.69	PASSED
0.0313	62.703	76.68	80	137.74	75	37.69	PASSED
0.0313	62.715	76.68	80	137.74	75	37.69	PASSED

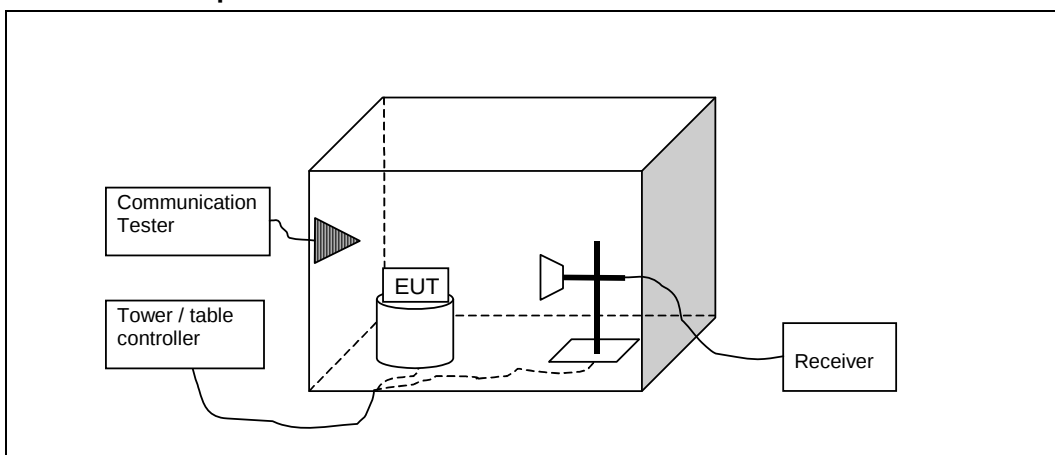
Average

Frequency [MHz]	Reading [dBμV/m]	Limit [μV/m]	Distance CF [dB]	Limit @ 3m [dBμV/m]	Margin [dB]	Limit [dBμV/m]	Results
0.0313	62.64	76.68	80	117.74	55.1	37.69	PASSED
0.0313	62.571	76.68	80	117.74	55.2	37.69	PASSED
0.0313	62.461	76.68	80	117.74	55.3	37.69	PASSED
0.0313	62.265	76.68	80	117.74	55.5	37.69	PASSED

3. Radiated emissions above 30 MHz (FCC §15.209, RSS-GEN 7.2.5)

EUT with DUT number	RX-114, DUT 17630
Accessories with DUT numbers	AC-300, DUT 17632 ; WH-208, DUT 17375
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	19 / 52 / 101.4
Date of measurements	23-Sep-2013
Measured by	Kalle Hannila

3.1.1 Test setup



3.2. Test method and limit

The measurement is made according to the ANSI C63.4-2009 and RSS-Gen as follows:
The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system.

The Final Measurement is performed in the Semi-Anechoic Chamber with conducting metal floor, if the Preliminary Measurement results are closer than 20 dB to the permissible value.

The EUT is placed at nonconductive plate at the turntable center.

For each suspected frequency, the turntable is rotated 360 degrees and antenna is scanned from 1 to 4 m. This is repeated for both horizontal and vertical receive antenna polarizations.

The emissions less than 20 dB below the permissible value are reported.

The measurement results are obtained as described below:

$$E \text{ [dB}\mu\text{V/m]} = U_{RX} + A_{TOT}$$

Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable loss, antenna factor and preamplifier gain ($A_{TOT} = L_{CABLES} + A_F - G_{PREAMP}$).

Limits for spurious radiated emissions measurements (3 m measurement distance)

Frequency range [MHz]	Limit [$\mu\text{V/m}$]	Limit [dB $\mu\text{V/m}$]	Detector
30 - 88	100	40	Quasi peak
88 – 216	150	43.5	Quasi peak
216 – 960	200	46	Quasi peak
960 – 1000	500	54	Quasi peak
Above 1000	500	54	Average
Above 1000	5000	74	Peak

3.3. NFC test results

Transmit

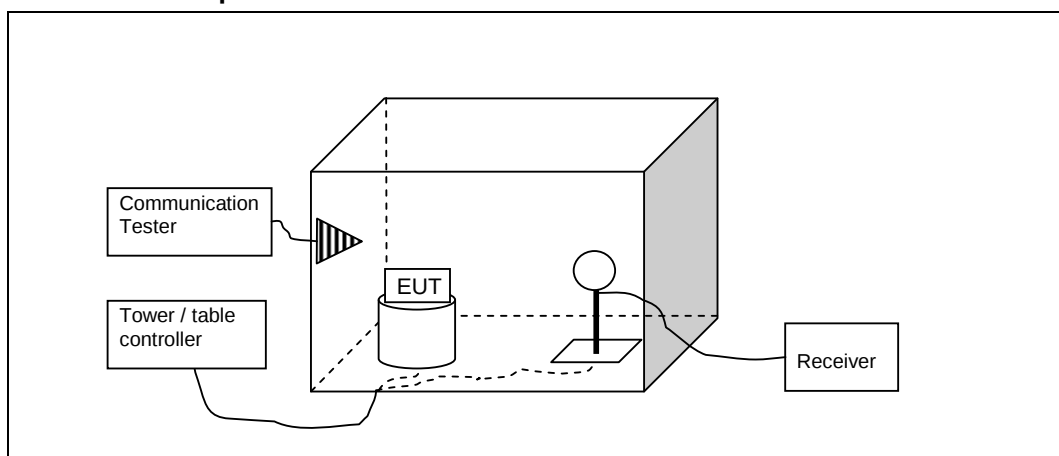
Quasi peak (RBW: 100 kHz, VBW: 100 kHz)

Frequency [MHz]	E [dB $\mu\text{V/m}$]	E [$\mu\text{V/m}$]	U_{RX} [dB μV]	A_{TOT} [dB]	Margin	Limit [dB $\mu\text{V/m}$]	Results
31.155	35.67	60.751	39.9	-4.23	4.3	40	PASSED
48.5	25.18	18.159	41.03	-15.85	14.8	40	PASSED
83.972	24.03	15.909	41.18	-17.15	16	40	PASSED

4. Field strength in the 13.56 MHz band

EUT with DUT number	RX-114, DUT 17630
Accessories with DUT numbers	AC-300, DUT 17632 ; WH-208, DUT 17375
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	19 / 52 / 101.4
Date of measurements	23-Sep-2013
Measured by	Kalle Hannila

4.1.1 Test setup

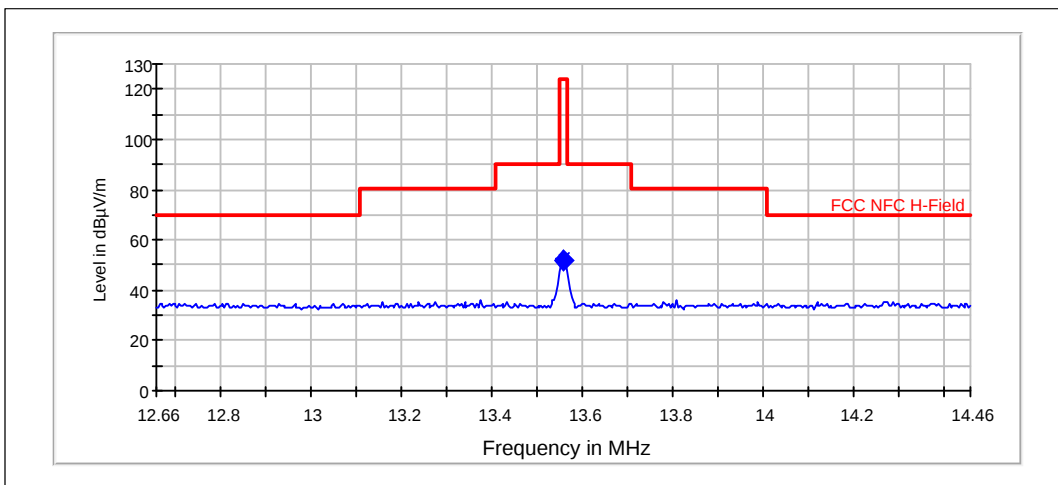


4.2. Test method and limit

The measurement is made according to EN 302 291-01, Section 7.1.1
The measuring distance was 3 meter in RF anechoic chamber.

4.3. NFC test results

Radiated H-Field, 3 meter distance



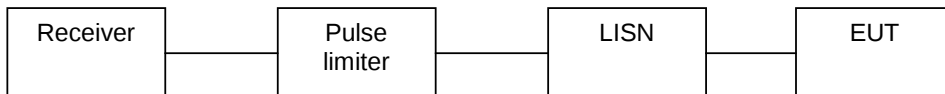
QuasiPeak

Frequency [MHz]	Reading [dBμV]	Result [dBμA/m]	Correction [dB]	Margin [dB]	Limit [dBμV/m]	Results
13.562	51.557	31.56	20	72.4	124	PASSED

5. AC powerline conducted emissions (FCC §15.207, RSS-GEN 7.2.2)

EUT with DUT number	RX-114, DUT 17630
Accessories with DUT numbers	AC-300, DUT 17632 ; WH-208, DUT 17375
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	19 / 52 / 101.4
Date of measurements	23-Sep-2013
Measured by	Kalle Hannila

5.1. Test Setup



5.2. Test method and limit

The EUT is placed on a wooden table 80 cm above the reference groundplane.

The EUT is connected via LISN to a test power supply.

The measurement results are obtained as described below:

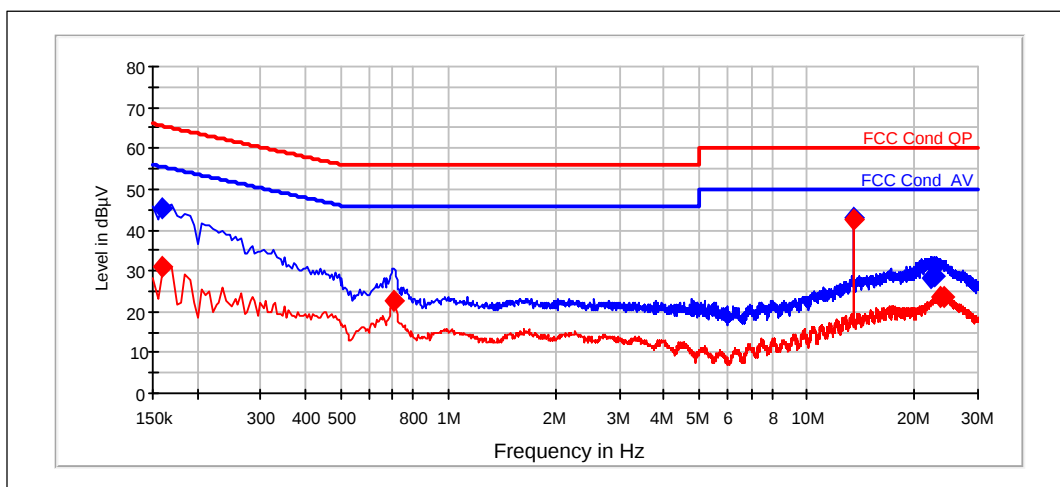
$$U [dB\mu V] = U_{RX} + A_{TOT}$$

Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable and pulse limiter attenuations.

CISPR 22 Class B limits

Frequency range [MHz]	Quasi peak limit [dBμV]	Average limit [dBμV]
0.15 - 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

5.3. NFC Test results



Quasi peak

Frequency [MHz]	Level [dBμV]	IF-BW[kHz]	Line	Margin	Result
0.16	45.31	9	N	20.2	PASSED
13.56	43.21	9	L1	16.8	PASSED
22.055	28.43	9	N	31.6	PASSED
22.735	28.72	9	N	31.3	PASSED

Average

Frequency [MHz]	Level [dBμV]	IF-BW[kHz]	Line	Margin	Result
0.16	30.78	9	N	24.7	PASSED
0.705	22.52	9	L1	23.5	PASSED
13.56	42.41	9	L1	7.6	PASSED
23.68	23.41	9	N	26.6	PASSED
24.095	23.5	9	N	26.5	PASSED

6. Test Equipment

6.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
6038	Data Logger	Testo 580	Testo	-
-	BT / WLAN Antenna	SPA 2400/75/9/0/V	Huber-Suhner	-
-	BT / WLAN Antenna	SPA 2400/75/9/0/V	Huber-Suhner	-
2389	Signal Generator	SMJ 100A	R&S	-
6009	GPS Antenna	SA-700	Chronos	-
6010	GPS Network amplifier	NLA20FPDC	GPS Networking, Inc	-
6011	GPS signal Splitter	LDCBS1x4	GPS Networking, Inc	-
6015	Receiver	ESIB 40	R&S	-
2059	V-network	ESH3-Z6	R&S	-
6044	V-network	ESH3-Z6	R&S	-
2390	Directional Coupler	DC2600	AR	-
1916	Communication Tester	CMTA84	R&S	-
6012	CDN	CDN USB/c	Teseq	-
2388	Bluetooth Tester	CBT	R&S	-
6046	Attenuator 10dB	8493C	Agilent	-
6047	Attenuator 20dB	8493C	Agilent	-
6036	Data Logger	175-H2	Testo	-
6045	Power splitter	11667B	Agilent	-
6039	USB Interface	5541765	Testo	-
10479	Communication Tester	CMW500	R&S	-
6094	Communication Tester	CMW500	R&S	-
6096	EMC Analyzer	E7405A	HP	-
6016	ESD Gun	PESD1610	Haefely	-
6098	Signal Generator	8648C	Agilent	-
6103	Bluetooth tester	CBT	R&S	-
6113	Signal Generator	SMF100A	R&S	-
6120	Thermal Chamber	WT 20/40	Weiss	-
6121	Power Splitter	11667B	Agilent	-
6122	Power Splitter	11667B	Agilent	-
6134	Attenuator 10dB	BW-S10-2W263+	Mini-Circuits	-
6136	Attenuator 20dB	BW-S20-2W263+	Mini-Circuits	-
2359	Temperature Test Chamber	VT4002	Vötsch	-
2347	Communication Tester	CMU200	R&S	-
2180	Communication Tester	CMU200	R&S	-
2156	Communication Tester	CMU200	R&S	-
1999	Receiver	ESIB26	R&S	-
2352	Spectrum Analyzer	FSP-30	R&S	-
2097	Pulse Limiter	ESH3-Z2	R&S	-
2060	LISN 50 µH	ESH3-Z5	R&S	-
1759	LISN 50 µH	ESH3-Z5	R&S	-
2039	Power Supply	PL330QMD	Thurlby	-
1992	Signal Generator	83630B	Agilent	-
2206	Signal Generator	SMX	R&S	-
2156	Communication Tester	CMU200	R&S	-
2180	Communication Tester	CMU200	R&S	-
2347	Communication Tester	CMU200	R&S	-
6094	Communication Tester	CMW500	R&S	-
10479	Communication Tester	CMW500	R&S	-

6.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
6038	Data Logger	Testo 580	Testo	-

Eq. No	Equipment	Type	Manufacturer	Used in
6014	Substitute Calibration Cable	Sucoflex 104PB	Suhner	-
-	BT / WLAN Antenna	SPA 2400/75/9/0/V	Huber-Suhner	-
-	BT / WLAN Antenna	SPA 2400/75/9/0/V	Huber-Suhner	-
2389	Signal Generator	SMJ 100A	R&S	-
6009	GPS Antenna	SA-700	Chronos	-
6010	GPS Network amplifier	NLA20FPDC	GPS Networking, Inc	-
6011	GPS signal Splitter	LDCBS1x4	GPS Networking, Inc	-
1988	Antenna	HL562	R&S	-
-	RF immunity / Emission Software	EMC32	R&S	-
1917	Communication Tester	CMTA84	R&S	-
2388	Bluetooth Tester	CBT	R&S	-
6037	Data Logger	175-H2	Testo	-
6039	USB Interface	5541765	Testo	-
6087	Antenna	BBHA 9120D	Scharzbeck	-
6088	Antenna	VUBA 9117	Scharzbeck	-
6089	Antenna	HFH2-Z2	R&S	-
10479	Communication Tester	CMW500	R&S	-
6094	Communication Tester	CMW500	R&S	-
6103	Bluetooth tester	CBT	R&S	-
6113	Signal Generator	SMF100A	R&S	-
6115	Open switch and control unit	OSP 130	R&S	-
6116	Open switch and control unit	OSP 150	R&S	-
2391	Band Reject Filter	WRCG1729.4/1735.4-1722.4/1742.4-40/6SS	Wainwright	27
6130	Notch Filter	WRCD1880-1.1.25/50-10SS	Wainwright	-
6131	Notch Filter	WRCT902.4-0.4/40-8SS	Wainwright	-
6135	Notch Filter	WRCJV2531/2539-2523/2547-60/12SS	Wainwright	-
2357	Band Reject Filter	WRCG2400/2483-2390/2493-35/10SS	Wainwright	-
2364	Band Reject Filter	WRCG1877/1883 - 1870/1890-40/6SS	Wainwright	24
6158	Band Reject Filter	WRCT836.6-0.4/40-8SS	Wainwright	-
6159	Band Reject Filter	WRCD1747.8-0.4/40-5SS	Wainwright	-
2188	Preamplifier	AFS4-00100300-20-23P-6	Miteq	-
2140	Antenna	EMCO93110B	EMCO	-
2142	Antenna	3146	EMCO	-
2043	Band Reject Filter	WRCA824/849-0,2-6SS	Wainwright	22
2347	Communication Tester	CMU200	R&S	-
2180	Communication Tester	CMU200	R&S	-
2156	Communication Tester	CMU200	R&S	-
2027	CDN	M2 (modified) DC1	MEB	-
2028	CDN	M3 (modified) DC2	MEB	-
2176	CDN	CDN 801-M3	Lüthi	-
2135	CDN	CDN 801-M3	Lüthi	-
1984	Antenna	BBHA 9120 D	Schwarzbeck	-
6017	Antenna	SBA 9113	Schwarzbeck	-
2009	Signal Generator	SMP 22	R&S	-
2029	Power Supply	PL330	Thurlby	-
2361	Anechoic Chamber	3 m Semi / Full Anechoic Chamber	Euroshield	-
2353	Receiver	ESIB26	R&S	-
2348	Controller	G-1000DXC	Yaesu	-
2349	Computer Controller	GS-232B	Yaesu	-

Eq. No	Equipment	Type	Manufacturer	Used in
6160	Probe	NRP-Z22	R&S	-
6161	Probe	NRP-Z22	R&S	-
6212	Antenna Array system	-	TCC	-
2156	Communication Tester	CMU200	R&S	-
2180	Communication Tester	CMU200	R&S	-
2347	Communication Tester	CMU200	R&S	-
6094	Communication Tester	CMW500	R&S	-
10479	Communication Tester	CMW500	R&S	-