

FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CNFC_RM-821_14	Date of Report:	13-Sep-2012
Number of pages:	15	Customer's Contact person:	Vaattovaara Lasse
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 Corporation P.O.Box(86) Joensuunkatu 7H / Kiila 1B FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 45220
FCC listing no.:	533467		
IC recognition no.:	661V-1		
Tested devices/ accessories:	Phone RM-821 / Headset WH-208 / AC-Charger AC-50U		
FCC ID:	PYARM-821	IC:	661V-RM821
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2009), and, IC standards, RSS-210 (Issue 8, December 2010). 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:			

Hannu Söderholm, Senior Engineer, EMC

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	17-Jun-2012
Testing completed	05-Jul-2012
The customer's contact person	Vaattovaara Lasse
Test Plan referred to	T:\Projects\RM-820\TestPlan\RS_testplan_RM-820_EMC_FCC_SAR_HAC.xls
Notes	-
Document name	T:\Projects\RM-821\EMC\Temp\FCC15CNFC_RM-821_14.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
Phone	RM-820	004402138707215	2003		1123.0005.8325.9680.139	16361
Headset	WH-208	-	-	-	-	16344
AC-Charger	AC-50U	4090432185270513671;0675620	-	-	-	16340

1.2. Summary of Test Results

NFC:

Section in CFR 47	Section in RSS-Gen or 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
	4.6.1	Occupied Bandwidth	PASSED
15.225(e)	A2.6	Frequency Stability	PASSED
15.207	7.2.2	AC powerline conducted emissions	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.

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2. Occupied bandwidth

EUT with DUT number	RM-820, DUT 16361
Accessories with DUT numbers	WH-208, DUT 16344; AC-50U, DUT 16340
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 45 / 101
Date of measurements	05-Jul-2012
Measured by	Tomi Lipponen

2.1. Test Setup

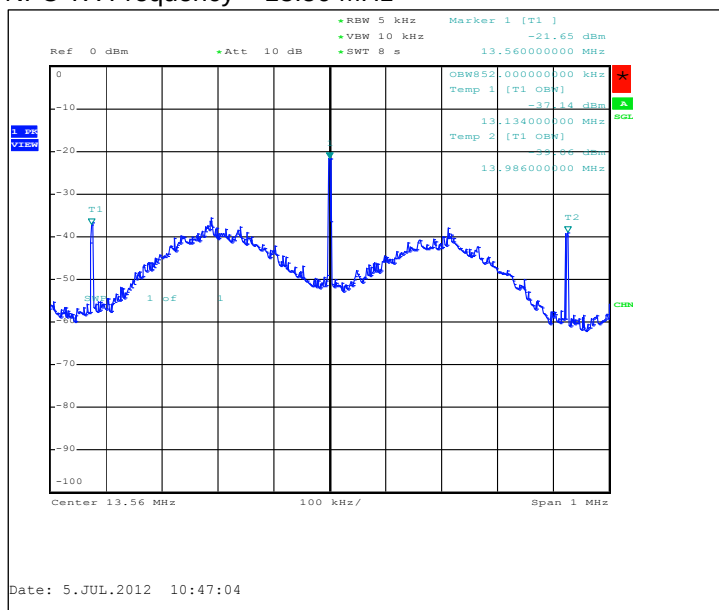
A small whip antenna was placed close to the EUT, and connected to the measuring Spectrum Analyzer.

2.2. Test method and limit

The Test was carried out with the EUT in Test mode with modulation on.

2.3. NFC Test results

NFC TX Frequency = 13.56 MHz

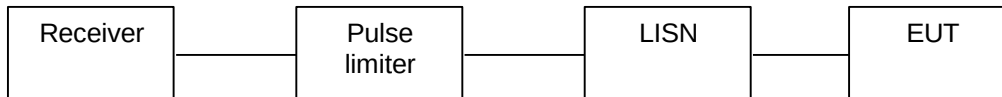


Operation mode (TX on)	Occupied bandwidth [kHz]
NFC, modulated	852

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

EUT with DUT number	RM-820, DUT 16361
Accessories with DUT numbers	WH-208, DUT 16344; AC-50U, DUT 16340
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 45 / 101
Date of measurements	05-Jul-2012
Measured by	Tomi Lipponen

3.1. Test Setup



3.2. Test method and limit

The measurement is made according to Public notice DA 00-705 and IC standard RSS-GEN as follows:

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:

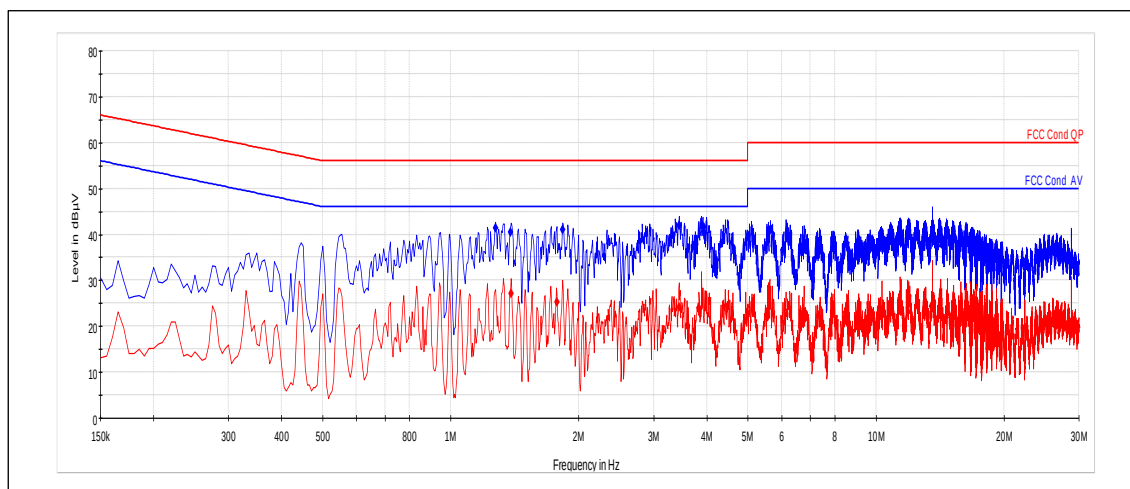
$$U [dB\mu V] = U_{RX} + A_{TOT}$$

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

3.3. NFC Test results



QuasiPeak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
1.275	41.46	N	PASSED
1.38	40.44	N	PASSED
1.83	41.08	N	PASSED
3.44	41.94	N	PASSED
3.925	40.74	N	PASSED
3.94	41.63	N	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
1.385	27.13	N	PASSED
1.775	25.29	N	PASSED
3.44	24.08	N	PASSED
3.83	24.01	N	PASSED
13.51	24.4	N	PASSED

4. Frequency stability, temperature variation (FCC §15.225 (e) [2], RSS-210 A2.6)

EUT with DUT number	RM-820, DUT 16361
Accessories with DUT numbers	WH-208, DUT 16344; AC-50U, DUT 16340
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 45 / 101
Date of measurements	04-Jul-2012
Measured by	Tomi Lipponen

4.1. Test Setup

The EUT was placed in a Climatic Chamber. A small whip antenna was placed close to the EUT, and connected to the measuring Spectrum Analyzer. Measurement performed without modulation on TX.

4.2. Test method and limit

The measurement is made according to FCC rules FCC 47 CFR Part 15 section 15.225 (e) [2] and RSS-210 A2.6

- The EUT is placed in the chamber in transmit mode.
- The climate chamber temperature is set to the maximum value and allowed to stabilize.
- The transmit frequency is measured.
- Temperature is lowered to the next temperature value and allowed to stabilize.
- The steps c - d is repeated for each temperature.

Limits for frequency stability, temperature variation measurements

Frequency deviation [%]
+/- 0.01

4.3. NFC Test results

NFC TX Frequency = 13.56 MHz

Temperature [°C]	Frequency [MHz]	Deviation [kHz]	Deviation [%]	Result
50	13.559952	-0.048	-0.000354	PASSED
40	13.559948	-0.052	-0.000383	PASSED
30	13.559954	-0.046	-0.000339	PASSED
20	13.559978	-0.022	-0.000162	PASSED
10	13.560013	0.013	0.000096	PASSED
0	13.560055	0.055	0.000406	PASSED
-10	13.56007	0.07	0.000516	PASSED
-20	13.560061	0.061	0.000450	PASSED
-30	13.560022	0.022	0.000162	PASSED

5. Frequency stability, voltage variation (FCC §15.225 (e) [2], RSS-210 A2.6)

EUT with DUT number	RM-820, DUT 16361
Accessories with DUT numbers	WH-208, DUT 16344; AC-50U, DUT 16340
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 45 / 101
Date of measurements	06-Jul-2012
Measured by	Tomi Lipponen

5.1. Test Setup

A small whip antenna was placed close to the EUT, and connected to the measuring Spectrum Analyzer.

5.2. Test method and limit

The EUT battery was replaced with an adjustable power supply. The frequency stability was measured at nominal voltage and at +5% and -15%. Measurement performed without modulation on TX.

Limits for frequency stability, voltage variation measurements

Frequency deviation [%]
+/- 0.01

5.3. NFC Test results

NFC TX Frequency = 13.56 MHz

Voltage [V]	Frequency [MHz]	Deviation [kHz]	Deviation [%]	Result
4.1	13.559956	-0.044	-0.000324	PASSED
3.5	13.559958	-0.042	-0.000310	PASSED
3.68	13.559961	-0.039	-0.000288	PASSED

6. Radiated spurious emissions below 30MHz

EUT with DUT number	RM-820, DUT 16361
Accessories with DUT numbers	AC-50U , DUT 16341 ; WH-208, DUT 16345
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH]	25 / 38
Date of measurements	03-Jul-2012
Measured by	Kalle Hannila / Jari Keto

6.1. Test method and limit

The tests were made according to the ANSI C63.4-2009, RSS-Gen and RSS-210.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100**	3
88–216	150**	3
216–960	200**	3
Above 960	500	3

§ 15.225 Operation within the band 13.110–14.010 MHz.

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

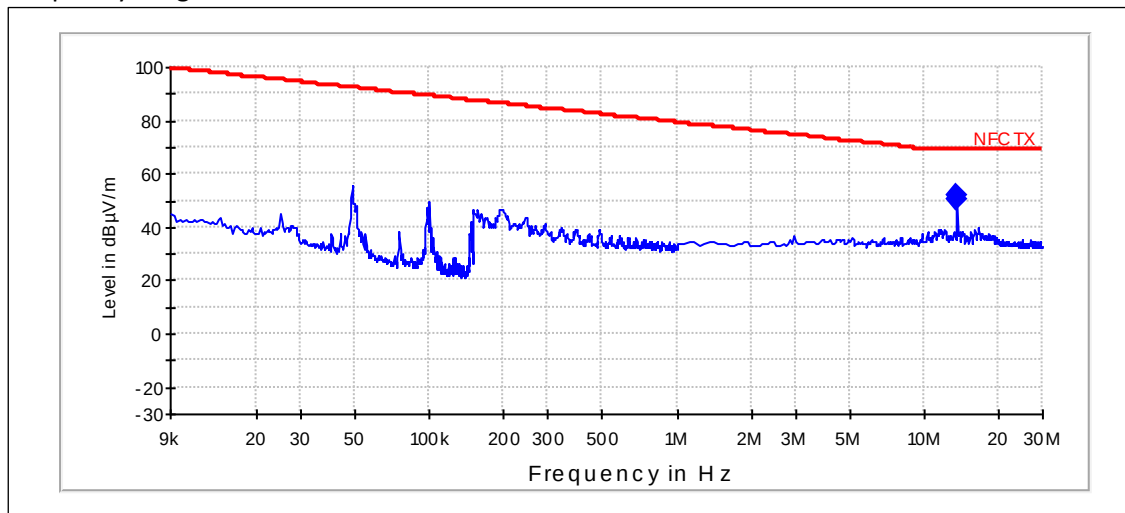
(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

6.2. Test Results

Frequency range 9 kHz...30 MHz



The highest values (QuasiPeak)

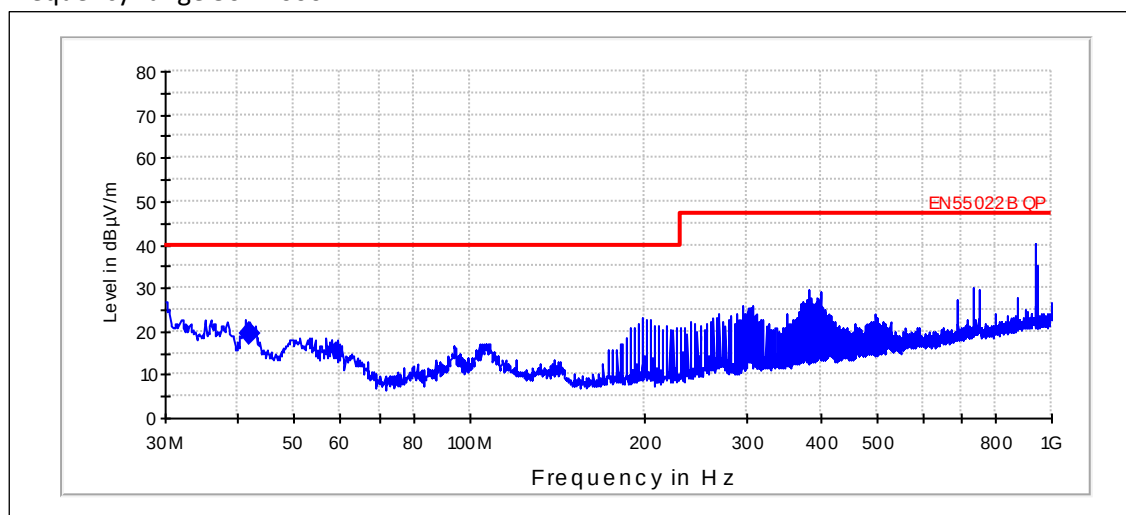
Frequency [MHz]	Level[dBm]	Margin[dB]	Azimuth[deg]	Elevation [deg]	Polarisation	Result
13.558	50.71	18.3	338	0	H	PASSED
13.56	51.76	17.2	338	0	H	PASSED

7. Radiated spurious emissions above 30MHz

EUT with DUT number	RM-820, DUT 16361
Accessories with DUT numbers	AC-50U, DUT 16341 ; WH-208, DUT 16345
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH]	25 / 38
Date of measurements	03-Jul-2012
Measured by	Kalle Hannila / Jari Keto

7.1. Test Results

Frequency range 30...1000 MHz



QuasiPeak

Frequency [MHz]	QuasiPeak [dBµV/m]	Margin [dB]	Azimuth [deg]	Height [cm]	Polarisation	Result
41.95	19.43	20.6	347	100	V	PASSED

8. Field strength in the 13.56 MHz band

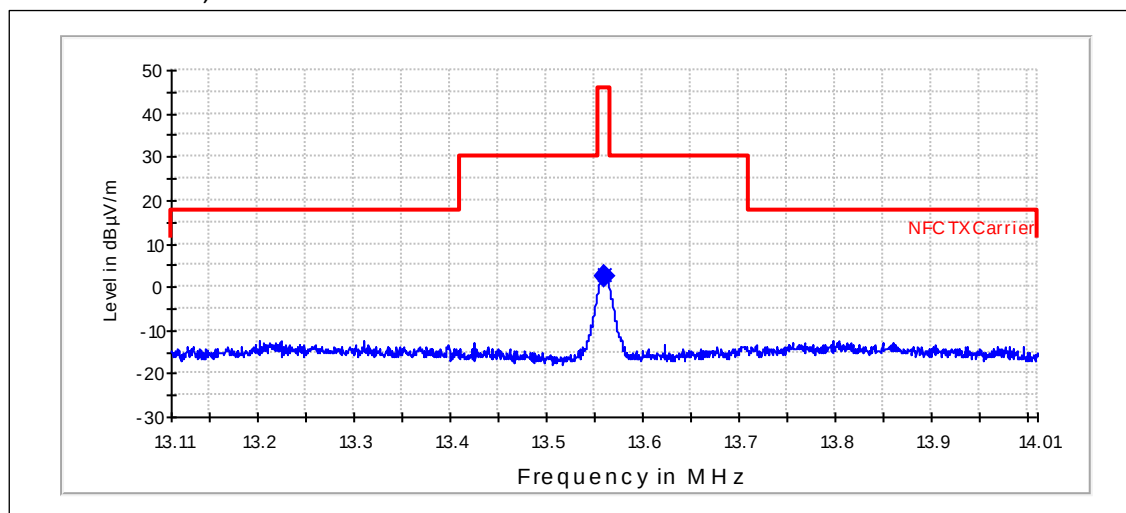
EUT with DUT number	RM-820, DUT 16361
Accessories with DUT numbers	AC-50U, DUT 16341 ; WH-208, DUT 16345
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH]	25 / 38
Date of measurements	03-Jul-2012
Measured by	Kalle Hannila / Jari Keto

8.1. 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 shielded enclosure.

8.2. Test Results

Radiated H-Field, 3 meter distance



QuasiPeak

Frequency [MHz]	Reading [dBμV]	Correction [dB]	Result [dBμA/m]	Limit [dBμA/m]	Margin [dB]	Result
13.56	33.69	-31.5	2.19	46	-43.81	

*Correction = -51.5(Conversion dBμV -> dBμA) + 20dB (Antenna Gain)

9. Test Equipment

9.1. 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	ESI	R&S	-
2059	V-network	ESH3-Z6	R&S	-
6044	V-network	ESH3-Z6	R&S	-
1759	LISN 50 μ H	ESH3-Z5	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	-
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	HP11667B	Agilent	-
6122	Power Splitter	HP11667B	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	-
2039	Power Supply	PL330QMD	Thurlby	-
1992	Signal Generator	83630B	Agilent	-
2206	Signal Generator	SMX	R&S	-

9.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
2391	Band Reject Filter	WRCG1729.4/1735.4-1722.4/1742.4-40/6SS	Wainwright	27
6038	Data Logger	Testo 580	Testo	-
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	-

Eq. No	Equipment	Type	Manufacturer	Used in
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	-
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	-
2140	Antenna	EMCO93110B	EMCO	-
2142	Antenna	3146	EMCO	-
2357	Band Reject Filter	WRCG2400/2483-2390/2493-35/10SS	Wainwright	-
2364	Band Reject Filter	WRCG1877/1883 - 1870/1890-40/6SS	Wainwright	24
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	-
2176	CDN	CDN 801-M3	Lüthi	-
2027	CDN	M2 (modified) DC1	MEB	-
2028	CDN	M3 (modified) DC2	MEB	-
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	-
2135	CDN	CDN 801-M3	Lüthi	-