

FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CNFC_RM-701_35.docx	Date of Report:	19-Jul-2011
Number of pages:	15	Customer's Contact person:	Juvani Jyrki
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FCC listing no.:	533467		
IC recognition no.:	661V-1		
Tested devices/ accessories:	Phone RM-701 / Battery BL-4J / AC Charger AC-15E / Dummy Load SD-50B		
FCC ID:	LJPRM-701	IC:	661E-RM701
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2003), Public Notice DA 00-705, DTS procedures KDB 558074, 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:			

Kalle Hannila, Engineer , EMC

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	06-May-2011
Testing completed	10-May-2011
The customer's contact person	Juvani Jyrki
Test Plan referred to	T:\Projects\RM-701\TestPlan\RS_testplan_RM-701.xls
Notes	-
Document name	T:\Projects\RM-701\EMC\FCC15CNFC_RM-701_35.docx

1.1. EUT and Accessory Information

The EUT is a NFC device. The NFC module is tested with maximum rated TX power.

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-701	004402134177611	0701	-	111.001.010 6	15633
Battery	BL-4J	382066003509070176360670616	-	-	-	15634
AC Charger	AC-15E	409049047512120308960675463	CE	-	-	15595
Dummy Load	SD-50B	-	-	-	-	15701

1.2. Summary of Test Results

NFC:

Section in CFR 47	Section in RSS-210	Name of the test	Result
15.209	2.7	Radiated Emission	PASSED
15.225(a)	A2.6	Radiated Emission	PASSED
		Occupied Bandwidth	PASSED
15.225(e)	A2.6	Frequency Stability	PASSED

PASSED
FAILED
NP

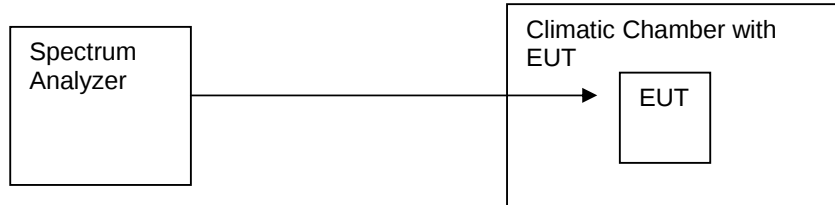
The EUT complies with the essential requirements in the standard.
The EUT does not comply with the essential requirements in the standard.
The test was not performed by the TCC Nokia Laboratory.

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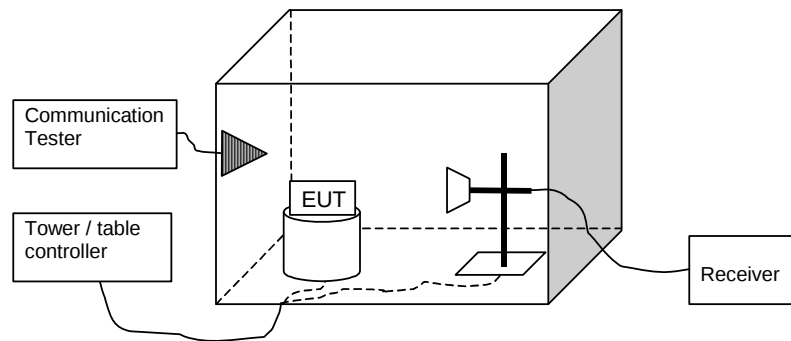
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2. Test setups

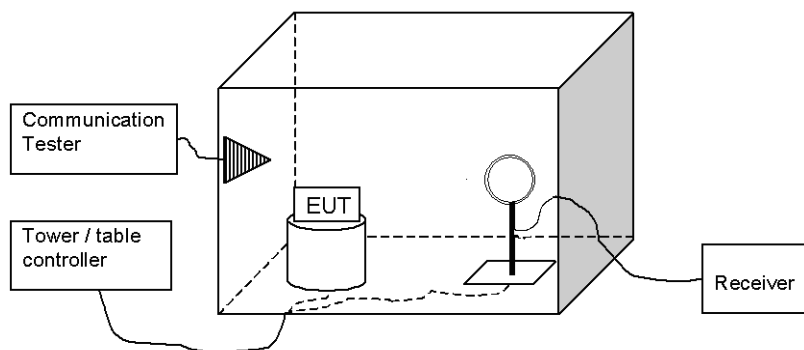
2.1. Voltage Stability test setup



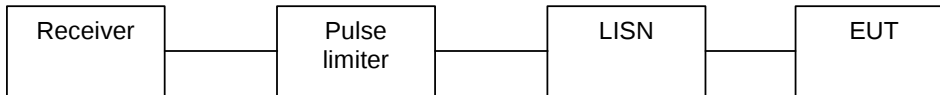
2.2. Radiated Emission 30 to 1000 MHz



2.3. Radiated Emission 9 kHz to 30 MHz



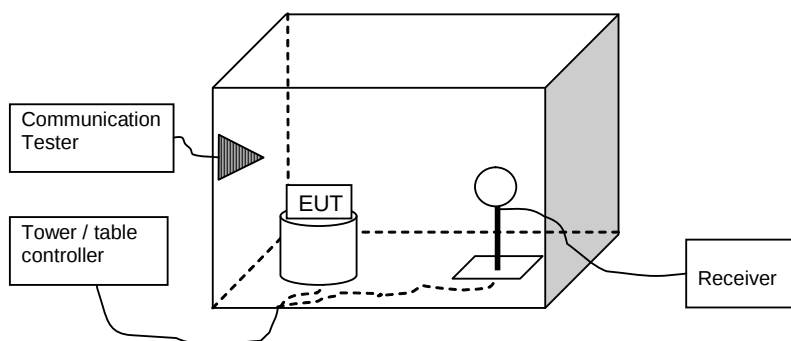
2.4. AC power line conducted emissions test setup



3. Radiated Emissions 9 kHz – 30 MHz

EUT with DUT number	RM-701, DUT 15633
Accessories with DUT numbers	BL-4J, DUT 15634 ; AC-15E, DUT 15588
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 34 / 101.0
Date of measurements	06-May-2011
Measured by	Sami Lehtonen

3.1. Test Setup

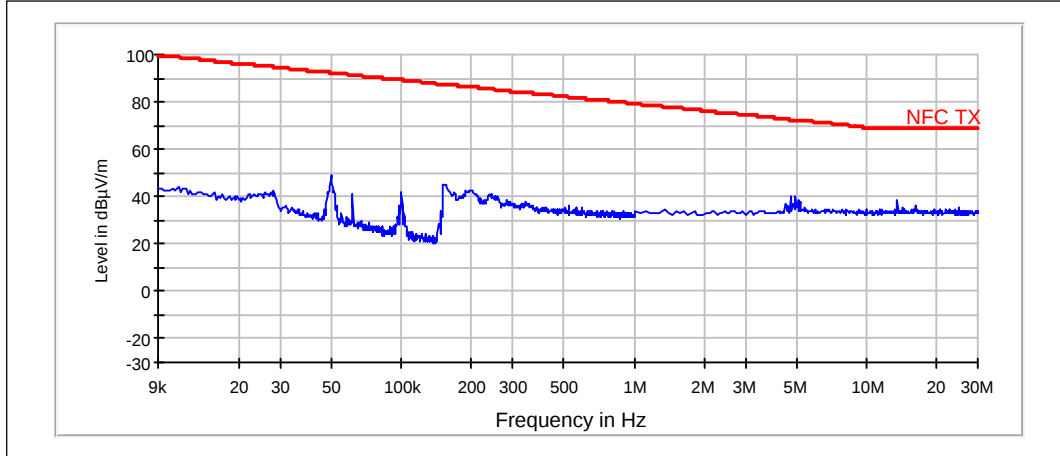


3.2. Test method and limit

The measurement is made according to FCC rules part 15.225 and IC standard RSS-210 Section 2.7

3.3. Spurious below 30MHz

Frequency range 9 kHz...30 MHz

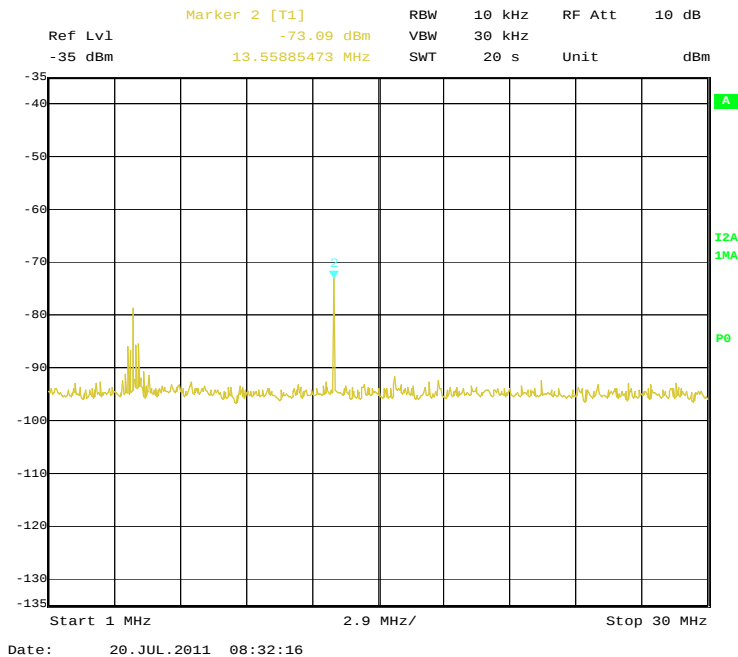


*NFC fundamental at 13.56 MHz is very low. NFC transmitters are only to be used within 2 to 5 centimeters from “target”

**3.4 Spurious 1MHz - 30MHz is measured without accessories to demonstrate there are no spurious emissions exceeding the level of the fundamental and 15.209(c) requirements are filled.

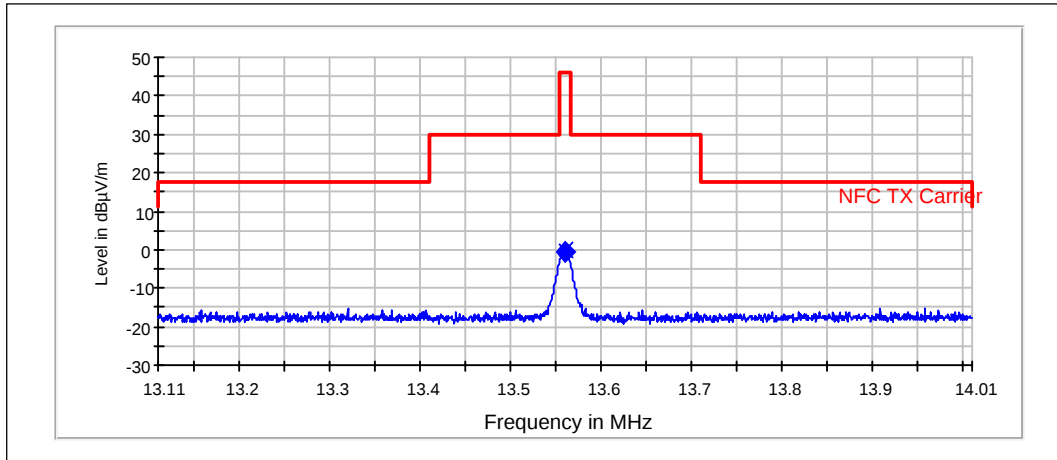
*** Corrected level of the fundamental is 51.14 dBμV/m, see table 3.5

3.4. Spurious 1MHz - 30MHz



3.5. Fundamental Power

Radiated H-Field, 3 meter distance



*Picture correct Level is dBuA/m

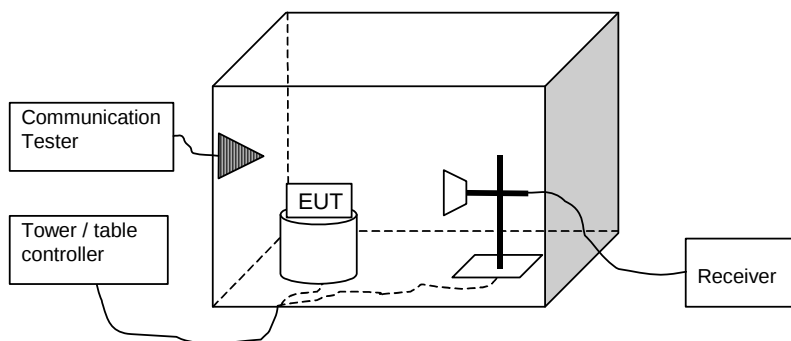
Radiated Emission 9 kHz – 30 MHz, 3 meter distance

Frequency [MHz]	Reading [dBμV]	Correction [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result
13.559	31.14	20	51.14	124	72.82	PASSED

4. Radiated Emissions 30 - 1000MHz

EUT with DUT number	RM-701, DUT 15633
Accessories with DUT numbers	BL-4J, DUT 15634 ; AC-15E, DUT 15588
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 34 / 101.0
Date of measurements	06-May-2011
Measured by	Sami Lehtonen

4.1. Test Setup

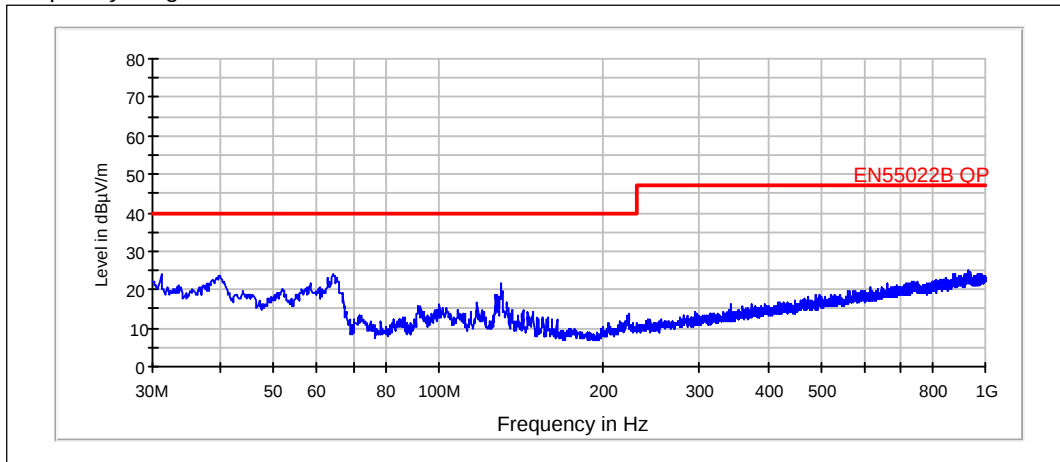


4.2. Test method and limit

The measurement is made according to FCC rules part 15.225 and IC standard RSS-210 Section 2.7

4.3. Spurious above 30MHz

Frequency range 30...1000 MHz



5. Occupied bandwidth

EUT with DUT number	RM-701, DUT 15633
Accessories with DUT numbers	BL-4J, DUT 15634 ; AC-15E, DUT 15595
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 35 / 100
Date of measurements	10-May-2011
Measured by	Anni Manninen

5.1. Test Setup

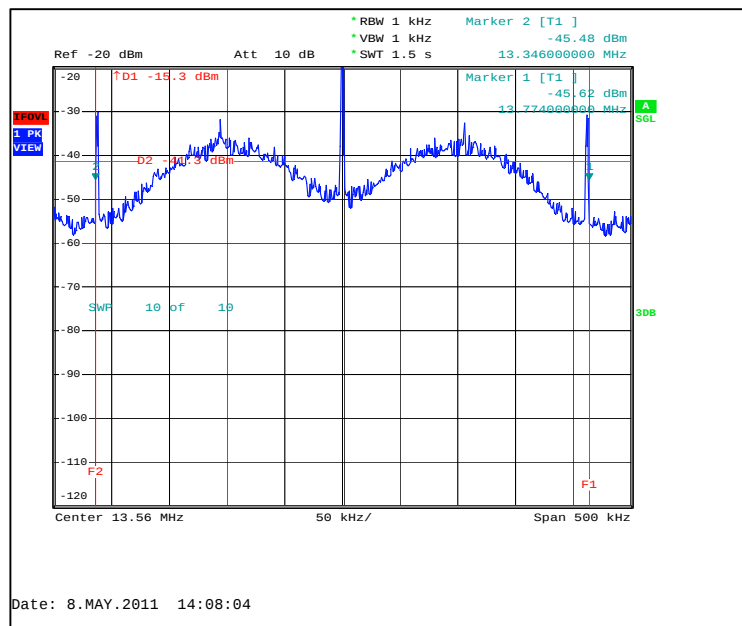
A small whip antenna was placed close to the EUT, and connected to the measuring Spectrum Analyzer.

5.2. Test method and limit

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

5.3. NFC Test results

Operation mode (TX on)	Occupied bandwidth [kHz]
NFC, modulated	428



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

EUT with DUT number	RM-701, DUT 15633
Accessories with DUT numbers	BL-4J, DUT 15634 ; AC-15E, DUT 15595
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 35 / 100
Date of measurements	10-May-2011
Measured by	Anni Manninen

6.1. 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.

6.2. 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

6.3. NFC Test results

NFC TX Frequency = 13.56 MHz

Temperature [°C]	Frequency [MHz]	Deviation [kHz]	Deviation [%]	Result
50	13.55998	-0.02	-0.00015	PASSED
40	13.559975	-0.025	-0.00018	PASSED
30	13.559967	-0.033	-0.00024	PASSED
20	13.559964	-0.036	-0.00027	PASSED
10	13.559967	-0.033	-0.00024	PASSED
0	13.55998	-0.02	-0.00015	PASSED
-10	13.559997	-0.003	-2E-05	PASSED
-20	13.560018	0.018	0.00013	PASSED

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

EUT with DUT number	RM-701, DUT 15633
Accessories with DUT numbers	SD-50B, DUT15701
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 35 / 100
Date of measurements	10-May-2011
Measured by	Anni Manninen

7.1. Test Setup

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

7.2. NFC 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

7.3. NFC Test results

NFC TX Frequency = 13.56 MHz

Voltage [V]	Frequency [MHz]	Deviation [kHz]	Deviation [%]	Result
4.18	13.55995	-0.05	-0.00037	PASSED
3.5	13.559965	-0.035	-0.00026	PASSED
3.7	13.559965	-0.035	-0.00026	PASSED

8. Test Equipment

8.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
1759	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
1916	Communication Tester	CMTA84	R&S	15B
1986	GPS Antenna	AMHP10-15R/390	European Antenna	15C, 15B
1992	Signal Generator	83630B	Agilent	15C, 15B
2039	Power Supply	PL330QMD	Thurlby	15C, 15B
2060	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
2068	CDN	S1	NMP	15C, 15B
2097	Pulse Limiter	ESH3-Z2	R&S	15C, 15B
2156	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
2180	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
2206	Signal Generator	SMX	R&S	15C, 15B
2347	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
2352	Spectrum Analyzer	FSP-30	R&S	22/24/27, 15C
2359	Temperature Test Chamber	VT4002	Vötsch	22/24/27
2360	Serial Bus Converter	Serial 488A	IO Tech	22/24/27
2362	Power Supply	NGPX 70/5	R&S	22/24/27
2388	Bluetooth Tester	CBT	R&S	15B
2389	Signal Generator	SMJ 100A	R&S	15B
2390	Directional Coupler	DC2600	AR	-
6009	GPS Antenna	SA-700	Chronos	15C
6010	GPS Network amplifier	NLA20FPDC	GPS Networking, Inc	15C
6011	GPS signal Splitter	LDCBS1x4	GPS Networking, Inc	15C
6012	CDN	CDN USB/c	Teseq	-
6015	Receiver	ESI	R&S	22/24, 15C, 15B
6016	ESD gun	PESD 1610	HAEFELY	-
-	BT / WLAN Antenna	SPA 2400/75/9/0/V	Huber-Suhner	15C, 15B
-	BT / WLAN Antenna	SPA 2400/75/9/0/V	Huber-Suhner	15C, 15B
-	RF Emission Software	ES-K1 v.1.71	R&S	22/24/27, 15C, 15B
6036	Data Logger	175-H2	Testo	22/24/27, 15C, 15B
6038	Data Logger	Testo 580	Testo	22/24/27, 15C, 15B
6039	USB Interface	5541765	Testo	22/24/27, 15C, 15B
2059	V-network	ESH3-Z6	R&S	-
6044	V-network	ESH3-Z6	R&S	-
6045	Power splitter	11667B	Agilent	22/24/27, 15C
6046	Attenuator 10dB	8493C	Agilent	22/24/27, 15C
6047	Attenuator 20dB	8493C	Agilent	22/24/27, 15C

8.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
1917	Communication Tester	CMTA84	R&S	15B
1984	Antenna	BBHA 9120 D	Schwarzbeck	22/24/27, 15C, 15B
1986	GPS Antenna	AMHP10-15R/390	European Antenna	15C, 15B
1988	Antenna	HL562	R&S	22/24/27, 15C, 15B
1989	Relay Switch Unit	TS-RSP	R&S	22/24/27, 15C, 15B
2009	Signal Generator	SMP 22	R&S	22/24/27, 15C, 15B
2027	CDN	M2 (modified) DC1	MEB	22/24/27, 15C, 15B
2028	CDN	M3 (modified) DC2	MEB	22/24/27, 15C, 15B
2029	Power Supply	PL330	Thurlby	22/24/27, 15C
2043	Band Reject Filter	WRCA824/849-0,2-6SS	Wainwright	22
2047	Band Reject Filter	WRCC1800/2000-0,2-10SS	Wainwright	24

Eq. No	Equipment	Type	Manufacturer	Used in
2051	High Pass Filter	4HC1700-1-KK	R&S	22
2109	Power Supply	PL330QMD	Thurlby	22/24/27, 15C, 15B
2116	Controller	EMCO 2090	ETS	22/24/27, 15C, 15B
2135	CDN	CDN 801-M3	Lüthi	22/24/27, 15C, 15B
2140	Antenna	EMCO93110B	EMCO	22/24/27, 15C
2142	Antenna	3146	EMCO	22/24/27, 15C
2150	High Pass Filter	F-15041	RLC	22/24/27, 15C
2156	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
2176	CDN	CDN 801-M3	Lüthi	22/24/27, 15C, 15B
2180	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
2188	Preamplifier	AFS4-00100300-20-23P-6	Miteq	22/24/27, 15C, 15B
2347	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
2348	Controller	G-1000DXC	Yaesu	22/24/27, 15C, 15B
2349	Computer Controller	GS-232B	Yaesu	22/24/27, 15C, 15B
2350	Preamplifier	AMF-6D-020180-29-20P	Miteq	22/24/27, 15C, 15B
2353	Receiver	ESIB26	R&S	22/24/27, 15C, 15B
2357	Band Reject Filter	WRCG2400/2483-2390/2493-35/10SS	Wainwright	15C
2361	Anechoic Chamber	3 m Semi / Full Anechoic Chamber	Euroshield	22/24/27, 15C, 15B
2364	Band Reject Filter	WRCG1877/1883 - 1870/1890-40/6SS	Wainwright	24
2366	Relay Switch Unit	TS-RSP	R&S	22/24/27, 15C, 15B
2384	Band Reject Filter	WRCG832/838-825/845-40/5SS	Wainwright	22
2388	Bluetooth Tester	CBT	R&S	15B
2389	Signal Generator	SMJ 100A	R&S	15B
2391	Band Reject Filter	WRCG1729.4/1735.4-1722.4/1742.4-40/6SS	Wainwright	27
6009	GPS Antenna	SA-700	Chronos	15C
6010	GPS Network amplifier	NLA20FPDC	GPS Networking, Inc	15C
6011	GPS signal Splitter	LDCBS1x4	GPS Networking, Inc	15C
6014	Substitute Calibration Cable	Sucoflex 104PB	Suhner	-
6017	Antenna	SBA 9113	Schwarzbeck	22 / 24 / 27
-	BT / WLAN Antenna	SPA 2400/75/9/0/V	Huber-Suhner	15C, 15B
-	BT / WLAN Antenna	SPA 2400/75/9/0/V	Huber-Suhner	15C, 15B
-	RF Emission Software	ES-K1 v.1.71	R&S	22/24/27, 15C, 15B
-	RF immunity / Emission Software	EMC32	R&S	22/24/27, 15C, 15B
6037	Data Logger	175-H2	Testo	22/24/27, 15C, 15B
6038	Data Logger	Testo 580	Testo	22/24/27, 15C, 15B
6039	USB Interface	5541765	Testo	22/24/27, 15C, 15B