

FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CNFC_RM-670_38.docx	Date of Report:	26-May-2011
Number of pages:	15	Customer's Contact person:	El-Haj Mohammad
Testing laboratory:	TCC Nokia Copenhagen Laboratory Frederikskaj 1790 COPENHAGEN V DENMARK Tel. +45 33 292929 Fax. +45 33 292934	Customer:	Nokia Corporation Frederikskaj 1790 COPENHAGEN V DENMARK Tel. +45 33 292929 Fax. +45 33 292934
FCC listing no.:	99059		
IC recognition no.:	661AL-1		
Tested devices/ accessories:	Phone RM-670 / Battery BP-5Z / AC-Charger AC-5E / Headset WH-207 / Dummy Battery SD-87		
FCC ID:	QTKRM-670	IC:	661AD-RM670
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:			

Ruben Hansen, System Manager, EMC

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	25-April-2011
Testing completed	26-May-2011
The customer's contact person	El-Haj Mohammad
Test Plan referred to	T:\Projects\RM-670\TestPlan\RS_testplan_RM-670_EMC_FCC_SAR.xls
Notes	-
Document name	T:\Projects\RM-670\EMC\FCC15CNFC_RM-670_38.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-670	004402/13/447413/3	0250	-	111.001.0206	23673
Phone	RM-670	004402/13/447412/5	0250	-	111.001.0206	23672
Battery	BP-5Z	3932130524140101836;0670638	v.0.2	-	-	23656
AC-Charger	AC-5E		-	-	-	23669
Headset	WH-207	06949371126A1R31761	-	-	-	23674
Dummy Battery	SD-87	-	-	-	-	23599

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

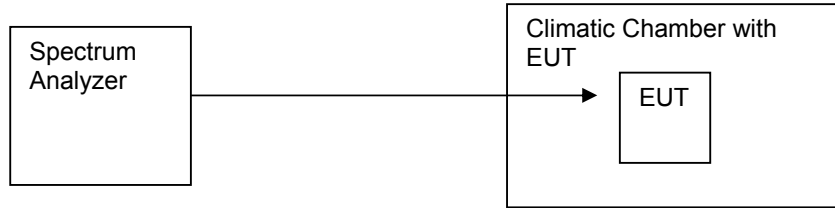
The EUT complies with the essential requirements in the standard.
The EUT does not comply with the essential requirements in the standard.
The test was not performed by the TCC Nokia Laboratory.

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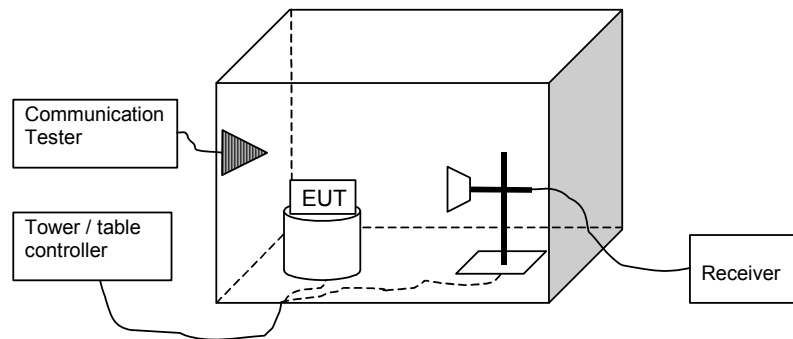
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2. Test setups

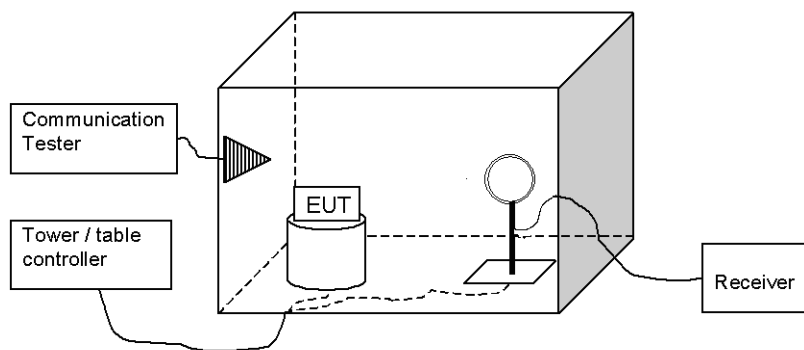
2.1. Voltage Stability test setup



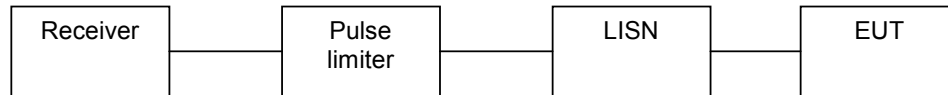
2.2. Radiated Emission 30 to 1000 MHz



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-670 DUT 23672
Accessories with DUT numbers	BP-5Z DUT 23656; AC-15E DUT 23669; WH-207 DUT 23674
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	None
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	24 / 43 / 102
Date of measurements	12-May-2011
Measured by	Ruben Hansen

3.1. Test method and limit

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

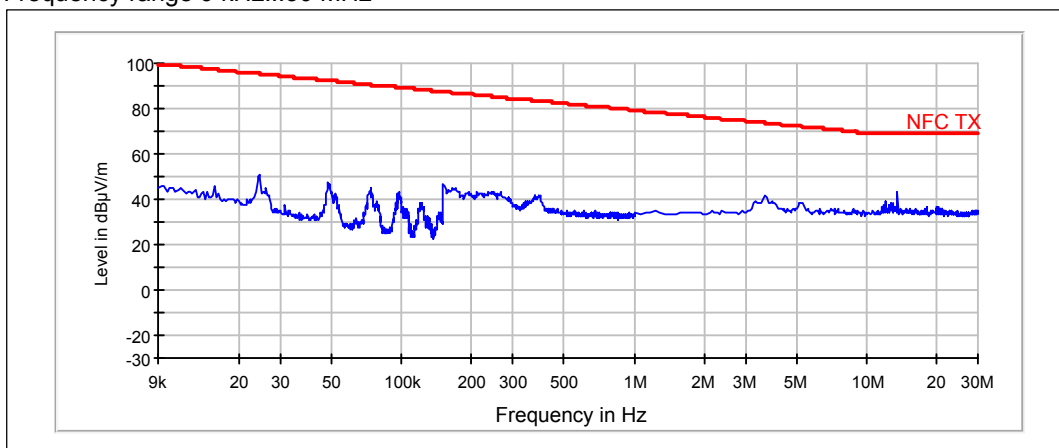
3.2. RFID Test results

Radiated Emission 9 kHz – 30 MHz, 3 meter distance

Frequency [MHz]	Reading [dBμV]	Correction [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]
13.56	22.93	20.0	42.93	124	81.07

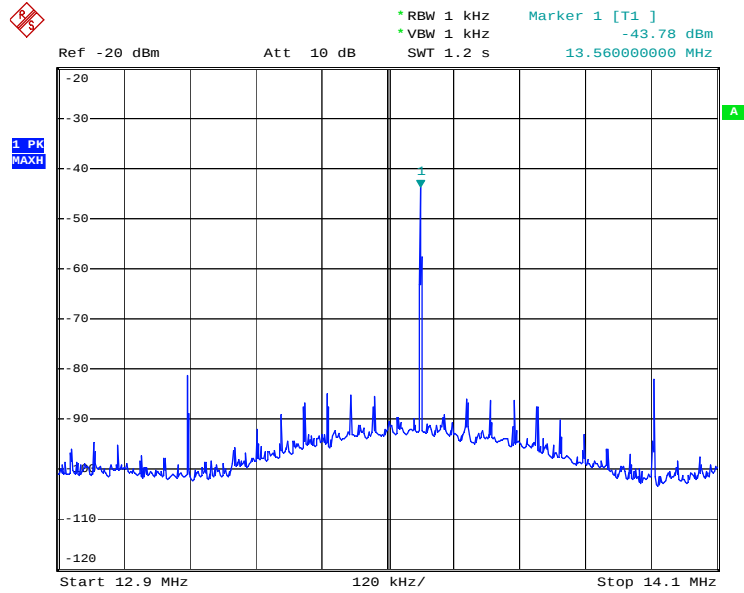
3.3. Test Results

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"
CISPR Band Widths are used. A closer look at the NFC fundamental can be seen in 3.4

3.4. Frequency Mask 12.9 to 14.1 MHz



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Marker 13.56 MHz is 42.93 dB/uV corrected, see 3.2

3.5. Radiated emissions 30 – 1000 MHz

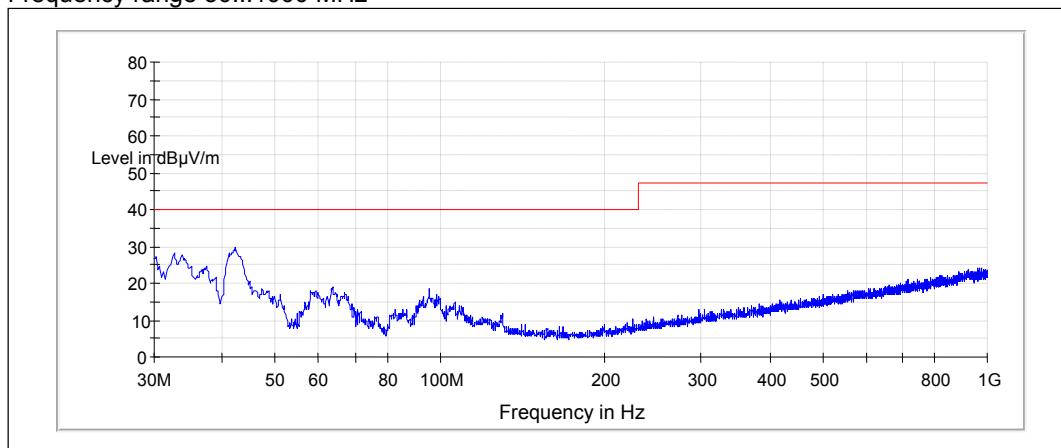
EUT with DUT number	RM-670 DUT 23672
Accessories with DUT numbers	BP-5Z DUT 23656; AC-15E DUT 23669; WH-207 DUT 23674
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	None
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	24 / 43 / 102
Date of measurements	12-May-2011
Measured by	Ruben Hansen

3.6. Test method and limit

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

3.7. Test Results

Frequency range 30...1000 MHz



4. AC power line conducted emissions (FCC §15.207, RSS-GEN 7.2.2)

EUT with DUT number	RM-670 DUT 23672
Accessories with DUT numbers	BP-5Z DUT 23656; AC-15E DUT 23669; WH-207 DUT 23674
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	None
Temp [°C] / Humidity [%RH] / Air Pressure [mBar]	24 / 43 / 102
Date of measurements	12-May-2011
Measured by	Ruben Hansen

4.1. 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:

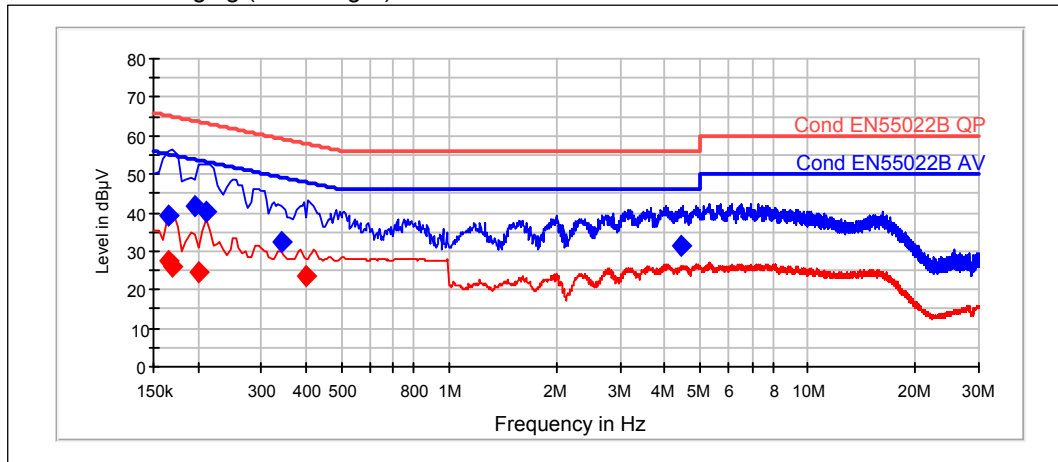
$$U [dB\mu V] = U_{RX} + A_{TOT}$$

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

NFC Active Charging (AC-charger)



Quasi peak

Frequency [MHz]	Level [dBμV]	IF-BW[kHz]	Line	Margin	Result
0.165	39.3	10	N	25.9	PASSED
0.195	41.5	10	L1	22.3	PASSED
0.21	40.07	10	N	23.1	PASSED
0.34	32.33	10	N	26.9	PASSED
4.445	31.32	10	L1	24.7	PASSED

Average

Frequency [MHz]	Level [dBμV]	IF-BW[kHz]	Line	Margin	Result
0.165	27.33	10	N	27.9	PASSED
0.17	25.96	10	N	29	PASSED
0.2	24.74	10	N	28.9	PASSED
0.4	23.4	10	L1	24.5	PASSED

5. Occupied Bandwidth

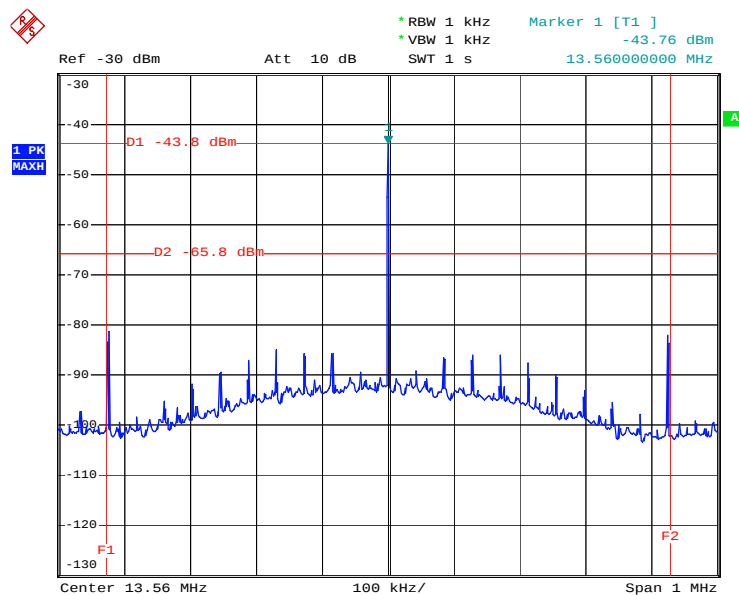
EUT with DUT number	RM-670 DUT 23672
Accessories with DUT numbers	BP-5Z DUT 23656; AC-15E DUT 23669; WH-207 DUT 23674
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	None
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	24 / 43 / 102
Date of measurements	12-May-2011
Measured by	Ruben Hansen

5.1. Test setup

The Occupied Bandwidth was measured by attaching a tiny loop antenna close to the NFC transmit antenna on the back of the EUT. The EUT was transmitting in highest power level with modulation on.

5.2. Test Results

Operation Mode (TX On)	Occupied bandwidth [kHz]
NFC, modulated	844



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

EUT with DUT number	RM-670 DUT 23673
Accessories with DUT numbers	SD-87 DUT 23599
Operation Voltage [V] / [Hz]	-
Results	PASSED
Remarks	None
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	25 / 46 / 102
Date of measurements	23-May-2011
Measured by	Ruben Hansen

6.1. Test Setup

The EUT was placed in a Climatic Chamber. A small loop 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	13.560021	0.021	0.00015	PASSED
40	13.559994	-0.006	-0.000044	PASSED
30	13.559985	-0.015	-0.000111	PASSED
20	13.559969	-0.031	-0.000229	PASSED
10	13.559967	-0.033	-0.000243	PASSED
0	13.559972	-0.028	-0.000206	PASSED
-10	13.559996	-0.004	-0.000029	PASSED
-20	13.560009	0.009	0.000066	PASSED

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

EUT with DUT number	RM-670 DUT 23673
Accessories with DUT numbers	SD-87 DUT 23599
Operation Voltage [V] / [Hz]	See below
Results	PASSED
Remarks	None
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	25 / 46 / 102
Date of measurements	23-May-2011
Measured by	Ruben Hansen

7.1. Test Setup

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

7.2. 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

7.3. NFC Test results

NFC TX Frequency = 13.56 MHz

Voltage [V]	Frequency [MHz]	Deviation [kHz]	Deviation [%]	Result
4.2	13.560005	0.005	0.000037	PASSED
3.5	13.560009	0.009	0.000066	PASSED
3.7	13.560012	0.012	0.000088	PASSED

8. Test Equipment

8.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
13037	Power Supply 0-15V 10A	EA3012	LP Instruments	15C, 15B
13357	Signal Generator	SMP02	Rohde&Schwarz	22/24/27, 15C, 15B
13513	Pulse Limiter	ESH3Z2	Rohde&Schwarz	15C, 15B
13666	Receiver	ESPC	Rohde&Schwarz	15C, 15B
13935	LISN	ESH3-Z5	Rohde&Schwarz	15C, 15B
20682	LISN	ESH3-Z5	Rohde&Schwarz	15C, 15B
16601	Communication Tester	CMU200	Rohde&Schwarz	22/24/27, 15C, 15B
16995	Directional Coupler 20dB 0,5-2,0 GHz SMA Conn.	1538RA-20	Weinschel	15C, 15B
18772	Shielded Chamber	RFD-100	ETS-Lindgren	15C, 15B
18772	Shielded Chamber	RFD-100	ETS-Lindgren	15C, 15B
19116	Power splitter	-	various	22/24/27, 15C, 15B
19171	Communication Tester	CMU200	Rohde&Schwarz	15C, 15B
19625	Climatic Chamber	VT4002EMC	Vötsch	22/24/27, 15C, 15B
19678	Spectrum Analyzer	FSP	Rohde&Schwarz	22/24/27, 15C, 15B
20168	Bluetooth Tester	CBT	Rohde&Schwarz	22/24/27, 15C, 15B
20543	UPS. 700V/A 490W	PW 9120 700i	Powerware	22/24/27, 15C, 15B
20544	Transformer. 230/115V	-	Nokia	22/24/27, 15C, 15B
20739	Communication Tester	CMU200	Rohde&Schwarz	15C, 15B

8.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
13077	Power Supply	EA-3016	-	22/24/27, 15C, 15B
13799	Signal Generator	SMP02	Rohde&Schwarz	22/24/27, 15C, 15B
13936	Band reject filter	WRCD1747.5-0.2/40-10SS	Wainwright Instruments	22/24/27, 15C, 15B
13937	Band reject filter	WRCA902.4-0.2/40-6SS	Wainwright Instruments	22/24/27, 15C, 15B
14021	Relay Dual 6 Chnl μ Wave Mux	10-785-522	-	22/24/27, 15C, 15B
14114	Highpass Filter	WHK1000-12SS	Wainwright Instruments	22/24/27, 15C, 15B
14187	Band reject filter	WRCD1747.5-0.2/40-10SS	Wainwright	22/24/27, 15C, 15B
14188	Band reject filter	WRCA902.4-0.2/40-6SS	Wainwright	22/24/27, 15C, 15B
14900	Antenna Controller	HD100	HD GmbH	22/24/27, 15C, 15B
15191	Turntable Contoller Unit	G-800SDX	YAESU	22/24/27, 15C, 15B
15742	Programmable Relay Switching System	-----	Pickering	22/24/27, 15C, 15B
16633	Band reject filter	WRCD1880.0-0.2/40-10SS	Wainwright	22/24/27, 15C, 15B
16948	Dual 6 Channel MUX Microwave Relay SMA 50 Ohm	10-785-522	Pickering	22/24/27, 15C, 15B
16949	Dual 6 Channel MUX Microwave Relay SMA 50 Ohm	10-785-522	Pickering	22/24/27, 15C, 15B
17644	Dual 6 Channel MUX Microwave Relay SMA 50 Ohm	10-785-522	Pickering	22/24/27, 15C, 15B
18416	Communication Tester	CMU200	Rohde&Schwarz	22/24/27, 15C, 15B
18773	Anechoic chamber	RFD-100	ETS-Lindgren	22/24/27, 15C, 15B
18774	Anechoic chamber	RFSD-F/A-100	ETS-Lindgren	22/24/27, 15C, 15B

Eq. No	Equipment	Type	Manufacturer	Used in
18792	Mast/turntable controller	2090	ETS-EMCO	22/24/27, 15C, 15B
18860	Antenna	HL562	Rohde&Schwarz	22/24/27, 15C, 15B
19151	High Pass Filter	WHJS3000-10SS	Wainwright	22/24/27, 15C, 15B
19587	Band reject filter	WRCG2400/2483-2390/2493-35/10SS	Wainwright	22/24/27, 15C, 15B
19966	Antenna	HFH2-Z2	Rohde&Schwarz	15C, 15B
20078	Relay 2x6 Chnl μ Wave Mux	10-785B-522	Pickering	22/24/27, 15C, 15B
20114	Band reject filter	WRCG1737/1743-1733/1747-40/6SS	Wainwright	22/24/27, 15C, 15B
20115	Band reject filter	-	Wainwright	22/24/27, 15C, 15B
20116	Band reject filter	WRCG832/83/-825/845-40/5SS	Wainwright	22/24/27, 15C, 15B
20168	Bluetooth Tester	CBT	Rohde&Schwarz	22/24/27, 15C, 15B
20543	UPS. 700V/A 490W	PW 9120 700i	Powerware	22/24/27, 15C, 15B
20544	Transformer. 230/115V	-	Nokia	22/24/27, 15C, 15B
20698	Antenna	BBHA 9120 D	SCHWARZBECK	22/24/27, 15C, 15B
-	Relay Dual 6 Chnl μ Wave Mux	10-785-522	-	22/24/27, 15C, 15B