FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CNFC_RM-846_20.docx	**Date of Report:**	30-Oct-2012
Number of pages:	15	**Customer's Contact person:**	Juha Paukku
Testing laboratory:	TCC Nokia Tampere Laboratory P.O. Box 68 Sinitaival 5 FIN-33720 TAMPERE, FINLAND Tel. +358 (0) 7180 46800 Fax. +358 (0) 7180 46880	**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.: **IC recognition no.:**	94436 661AK-1		
Tested devices/ accessories:	**Phone RM-846 / Battery BL-4J / AC charger AC-50E / Data Cable CA-190CD**		
FCC ID:	PDNRM-846	**IC:**	661R-RM846
Supplement reports:	-		
Testing has been carried out in accordance with:	**CFR 47, FCC rules Part 15 Subpart C, ANSI C63.4 (2009), 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 2012.10.30 14:48:49 +02'00'		

Hannu Söderholm, Senior Engineer, EMC

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1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	12-Oct-2012
Testing completed	30-Oct-2012
The customer's contact person	Juha Paukku
Test Plan referred to	T:\Projects\RM-846\TestPlan\RS_testplan_RM-846.xlsm
Notes	-
Document name	T:\Projects\RM-846\EMC\FCC15CNFC_RM-846_20.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-846	004402471070056	1640	FAV5	1030.51.9200.9903.145	42929
Battery	BL-4J	49554022630A0105584;0670616	LG PWB ver. 2.1	-	-	42925
AC charger	AC-50E	4090492023260400600;0675619	HW0.5MW0.4PV04	-	-	42785
Data Cable	CA-190CD	-	-	-	-	42918
Dummy battery	SD-116M	07484K 20169	0.1	-	-	42919
Charger	AC-50E	5321402345011100458;0675619	1.1	0.2	-	42916
Headset	WH-108	-	4.0	4.0	-	42926

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 below 30 MHz	PASSED
15.225(a)	A2.6	Radiated Emission above 30 MHz	PASSED
15.207	7.2.2	AC powerline conducted emissions	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

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

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CONTENTS

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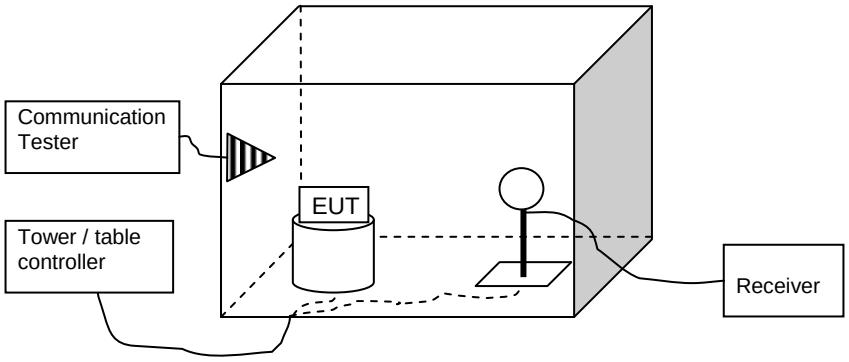
2. Radiated Emissions 9 kHz – 30 MHz

EUT with DUT number	RM-846, DUT 42929
Accessories with DUT numbers	BL-4J, DUT 42924 ; AC-50E, DUT 42785 ; CA-190CD, DUT 42918 ; WH-108, DUT 42926
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH]	21 / 50 / 102.5
Date of measurements	23-Oct-2012
Measured by	Hannu Söderholm

2.1.1 Test Setup



2.2. Test method and limit

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

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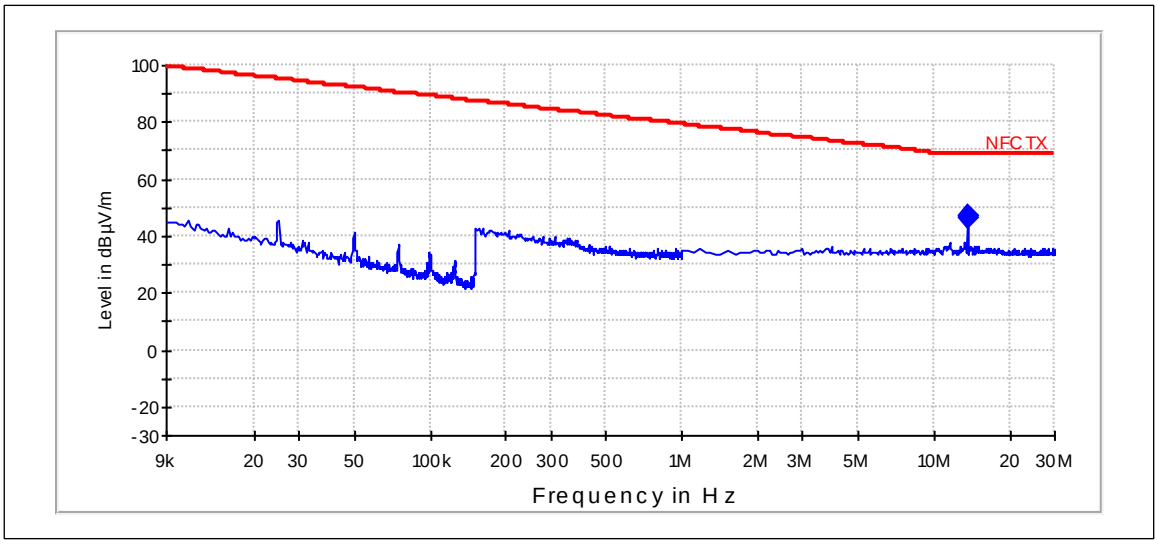
2.3. Test Results mode A, datarate 424

Frequency range 9 kHz...30 MHz



The highest values (QuasiPeak)

Frequency [MHz]	Level[dBm]	Margin[dB]	Azimuth[deg]	Elevation [deg]	Polarisation	Result
13.558	46.1	22.9	338	0	H	PASSED
13.56	46.82	22.2	338	0	H	PASSED

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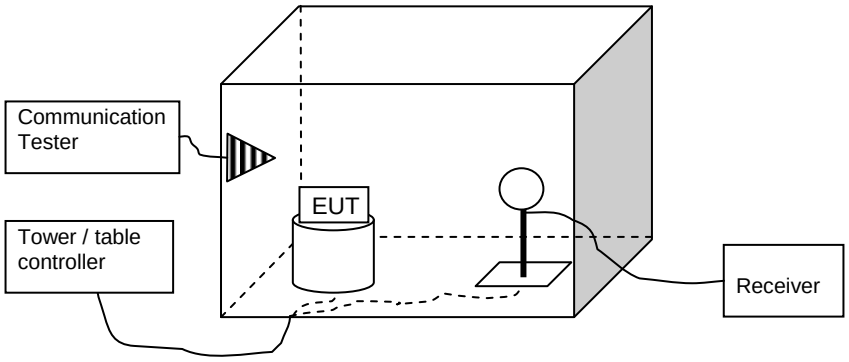
3. Radiated Emissions 30 - 1000MHz

EUT with DUT number	RM-846, DUT 42929
Accessories with DUT numbers	BL-4J, DUT 42924 ; AC-50E, DUT 42785 ; CA-190CD, DUT 42918 ; WH-108, DUT 42926
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH]	21 / 50 / 102.5
Date of measurements	23-Oct-2012
Measured by	Hannu Söderholm

3.1.1 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

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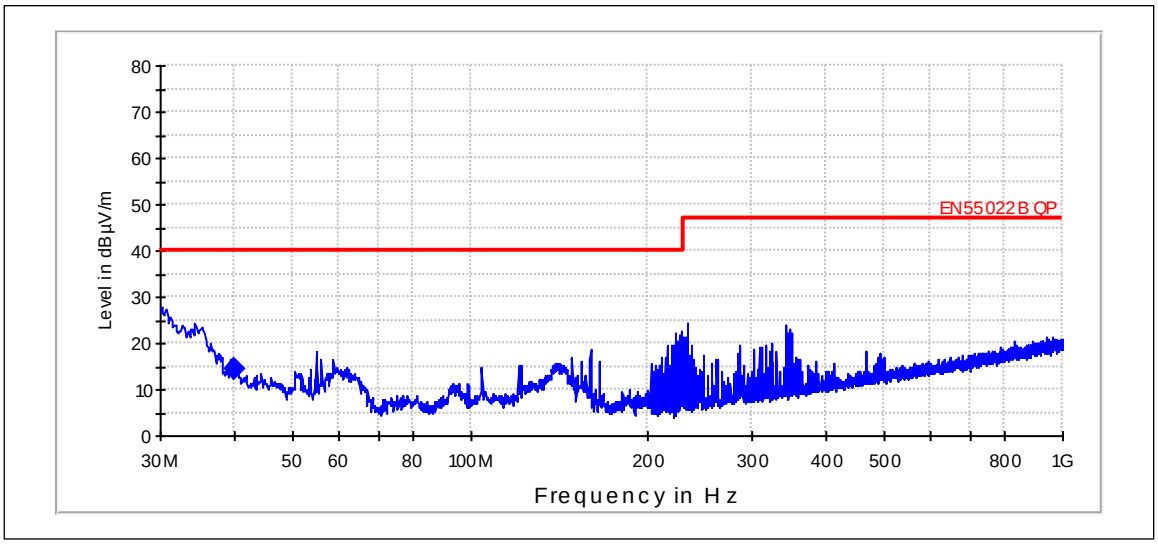
3.3. Test Results mode A, datarate 424

Frequency range 30...1000 MHz



QuasiPeak

Frequency [MHz]	QuasiPeak [dBµV/m]	Bandwidth [kHz]	Height [cm]	Polarization	Azimuth [deg]	Margin - QPK	Limit - QPK	Results
39.97	14.246	120	99	V	-9	25.8	40	PASSED

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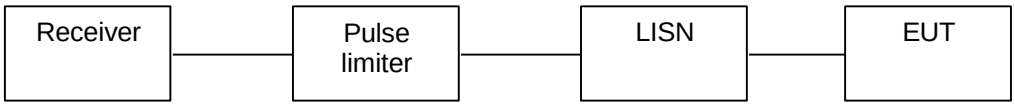
4. AC powerline conducted emissions
(FCC §15.207, RSS-GEN 7.2.2)

EUT with DUT number	RM-846, DUT 42929
Accessories with DUT numbers	BL-4J, DUT 42925 ; AC-50E, DUT 42916 ; CA-190CD, DUT 42918 ; WH-108, DUT 42926
Operation Voltage [V] / [Hz]	110 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 50 / 100.3
Date of measurements	30-Oct-2012
Measured by	Timo Raiskio

4.1. Test Setup



4.2. Test method and limit

FCC15CNFC_RM-846_20.docxThe 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

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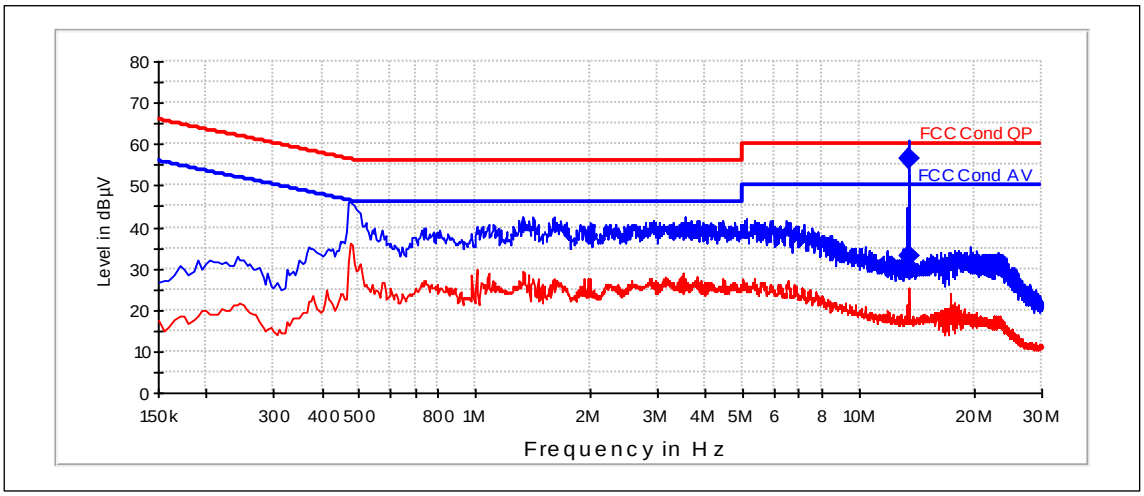
4.3. NFC Test results



QuasiPeak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
13.545	33.12	L1	PASSED
13.555	56.46	N	PASSED

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5. Field strength in the 13.56 MHz band

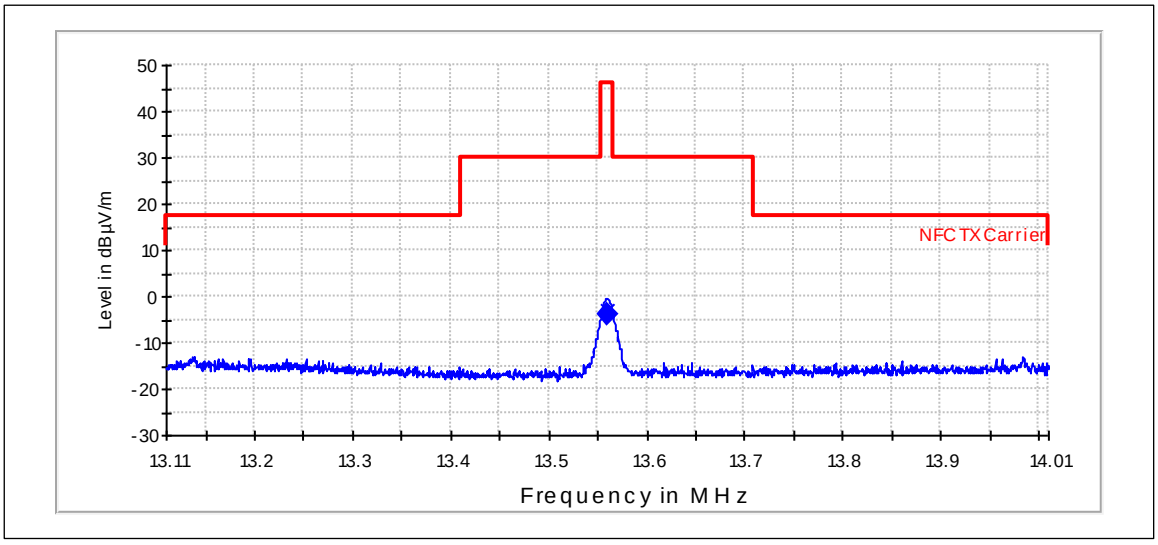
EUT with DUT number	RM-846, DUT 42929
Accessories with DUT numbers	BL-4J, DUT 42924 ; AC-50E, DUT 42785 ; CA-190CD, DUT 42918 ; WH-108, DUT 42926
Result	PASSED
Remarks	-
Temp [°C] / Humidity [%RH]	21 / 50 / 102.5
Date of measurements	23-Oct-2012
Measured by	Hannu Söderholm

5.1. 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.

5.2. Test Results mode A, datarate 424

Radiated H-Field, 3 meter distance



QuasiPeak

Frequency [MHz]	Reading [dBµV]	Correction [dB]	Result [dBµA/m]	Limit [dBµA/m]	Margin [dB]	Result
13.56	27.06	-30.86	-3.8	46	-49.8	

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

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6. Occupied bandwidth

EUT with DUT number	RM-846, DUT 42929
Accessories with DUT numbers	BL-4J, DUT 42925 ; AC-50E, DUT 42785 ; CA-190CD, DUT 42918
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21.5 / 46 / 98.7
Date of measurements	26-Oct-2012
Measured by	Timo Raiskio

6.1. Test Setup

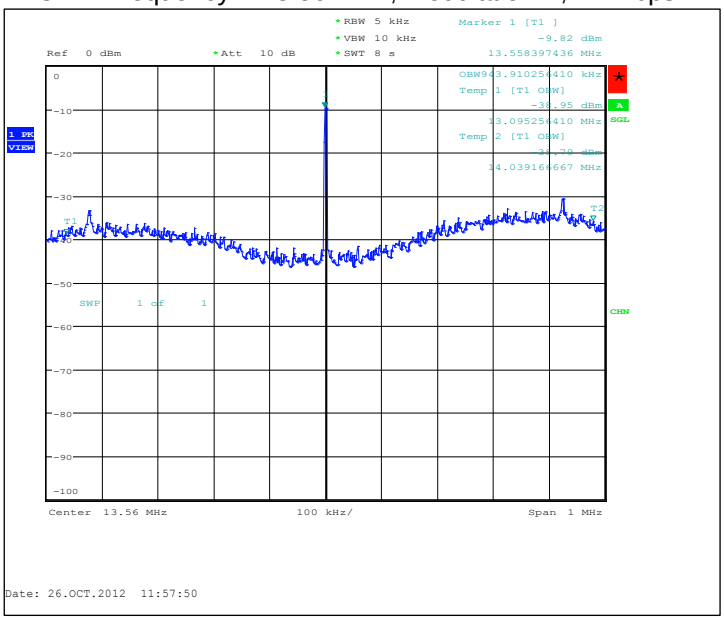
A small whip antenna was placed close to the EUT, and connected to the measuring Spectrum Analyzer.

6.2. Test method and limit

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

6.3. NFC Test results

NFC TX Frequency = 13.56 MHz, modulation A, 424kbps



Operation mode (TX on)	Occupied bandwidth [kHz]
NFC, modulated	943.9

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

EUT with DUT number	RM-846, DUT 42929
Accessories with DUT numbers	BL-4J, DUT 42925 ; AC-50E, DUT 42785 ; CA-190CD, DUT 42918
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21.5 / 46 / 98.7
Date of measurements	26-Oct-2012
Measured by	Timo Raiskio

7.1. 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.

7.2. 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

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

Limits for frequency stability, temperature variation measurements

Frequency deviation [%]
+\- 0.01

7.3. NFC Test results

NFC TX Frequency = 13.56 MHz

Temperature [°C]	Frequency [MHz]	Deviation [kHz]	Deviation [%]	Result
50	13.559885	-0.115	-0.000848	PASSED
40	13.559904	-0.096	-0.000708	PASSED
30	13.559913	-0.087	-0.000642	PASSED
20	13.559937	-0.063	-0.000465	PASSED
10	13.55997	-0.03	-0.000221	PASSED
0	13.559993	-0.007	-0.000052	PASSED
-10	13.560025	0.025	0.000184	PASSED
-20	13.56004	0.04	0.000295	PASSED
-30	13.560014	0.014	0.000103	PASSED

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

EUT with DUT number	RM-846, DUT 42929
Accessories with DUT numbers	SD-116M, DUT 42919
Operation Voltage [V] / [Hz]	3.5 / 3.7 / 4.1
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21.5 / 46 / 98.7
Date of measurements	26-Oct-2012
Measured by	Timo Raiskio

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

8.2. 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

8.3. NFC Test results
NFC TX Frequency = 13.56 MHz

Voltage [V]	**Frequency [MHz]**	**Deviation [kHz]**	**Deviation [%]**	**Result**
4.1	13.560027	0.027	0.000199	PASSED
3.5	13.560009	0.009	0.000066	PASSED
3.7	13.560029	0.029	0.000214	PASSED

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9. Test Equipment

9.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM38112	Power supply	6632A	Agilent	22/24/27, 15C, 15E
TM38631	Signal Generator	83640L	Agilent	22/24/27, 15C, 15E, 15B
TM37678	Communication Tester	CMU200	R&S	15C, 15B
TM30600	Impulse limiter	ESH3-Z2	R&S	15C, 15B
TM26490	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
TM26491	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
TM37610	Spectrum Analyzer	FSU26	R&S	22/24/27, 15C, 15E
TM23007	Oscilloscope	TDS684B	Tektronix	15E
TM22806	Battery	BAT 20/E	Fiskars	15C, 15B
TM22805	UPS	PS 20/1.2	Fiskars	15C, 15B
-	Temperature and humidity logger	175-H2	Testo	15C, 15B
-	Temperature and humidity logger	175-H2	Testo	22/24/27, 15C
-	Air pressure and temperature logger	635-2	Testo	22/24/27, 15C, 15B
-	Air pressure sensor	0638-1835	Testo	22/24/27, 15C, 15B
-	Temperature test chamber	VT 4002	Vötsch	22/24/27
2058	Receiver	ESPC	R&S	15C, 15B
2001	Bluetooth tester	CBT	R&S	15C, 15B
2002	Communication Tester	CMU200	R&S	22/24/27, 15C
2009	LISN 50 µH	ENV216	R&S	15C, 15B
2010	LISN 50 µH	ENV216	R&S	15C, 15B
2012	Power splitter	11667B	Agilent	22/24/27, 15C
2013	Attenuator	8493C	Agilent	22/24/27, 15C
2014	Attenuator	8493C	Agilent	22/24/27, 15C
2019	Power splitter	ZN2PD-9G-S+	Mini-Circuits	15E
2020	Power splitter	ZN2PD-9G-S+	Mini-Circuits	15E
2021	Communication Tester	CMW500	R&S	22/24/27
2023	Spectrum Analyzer	ESMI-RF	R&S	15B/15C
2024	Analyzer display unit	ESAI-D	R&S	15B/15C

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9.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM38114	Power supply	6632A	Agilent	22/24/27, 15C, 15B
TM38631	Signal Generator	83640L	Agilent	22/24/27, 15C, 15E, 15B
-	Antenna	BBHA 9120 D	Schwarzbeck	22/24/27, 15C
TM26497	Antenna	3115	Emco	22/24/27, 15C, 15B
TM37773	Communication Tester	CMU200	R&S	22/24/27, 15B
TM38845	Receiver	ESIB 26	R&S	22/24/27, 15C, 15E, 15B
-	Antenna	HL562	R&S	22/24/27, 15C, 15E, 15B
-	Turntable	2188	EMCO	22/24/27, 15C, 15E, 15B
-	Turntable controller	2090	EMCO	22/24/27, 15C, 15E, 15B
-	RF system panel	TS-RSP	R&S	22/24/27, 15C, 15E, 15B
-	RF system panel	TS-RSP	R&S	22/24/27, 15C, 15E, 15B
-	Mini mast	2075-2	ETS Lindgren	22/24/27, 15C, 15B
TM38843	Mini mast	2075	Emco	22/24/27, 15C, 15B
TM38842	Antenna mast controller	2090	Emco	22/24/27, 15C, 15B
TM30643	LISN 50 µH	LISN-5-20-2	FCC	22/24/27, 15C, 15B
TM30644	LISN 50 µH	LISN-5-20-2	FCC	22/24/27, 15C, 15B
-	Temperature and humidity logger	175-H2	Testo	22/24/27, 15C, 15B
-	Air pressure and temperature logger	635-2	Testo	22/24/27, 15C, 15B
-	Air pressure sensor	0638-1835	Testo	22/24/27, 15C, 15B
TM37523	Preamplifier	AMF-4D-10M-3G-25-20P	Miteq	22/24/27, 15C, 15B
TM37498	Preamplifier	AMF-5D-020180-26-10P	Miteq	22/24/27, 15C, 15B
TM30599	Semi anechoic chambre	UNKNOWN	TDK	22/24/27, 15C, 15B
TM22638	Power supply	OL63743-901	-	22/24/27, 15C, 15E, 15B
TM38066	High pass filter	WHKX3.0/18G-12SS	Wainwright	22/24/27, 15C, 15E, 15B
2028	High pass filter	WHKX 1.0/15G-12SS	Wainwright	22/24/27, 15C,15E, 15B
TM37545	Tunable notch filter	800.0/960.0-0.2/40-8SSK	Wainwright	22
TM26512	Tunable notch filter	WRCD1850/1910-0.2/40-10SSK	Wainwright	24
-	Band reject filter	WRCG1877/1883-1870/1890-40/6EE	Wainwright	24
-	Band reject filter	WRCG1729.4/1735.4-1722.4/1742.4-40/6SS	Wainwright	27
-	Band reject filter	WRCG832/838-825/848-40/5SS	Wainwright	22
TM23892	Controller	G-1000SDX	Yaesu	22/24/27
2001	Bluetooth tester	CBT	R&S	15C, 15B
6023	Antenna	VUBA 9117	Schwarzbeck	22/24/27
2021	Communication Tester	CMW500	R&S	22/24/27
2025	Antenna	HFH2-Z2	R&S	15C

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