FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CNFC_RM-860_20.docx	**Date of Report:**	10-Jan-2013
Number of pages:	16	**Customer's Contact person:**	Thomas Mary
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.: **IC recognition no.:**	533467 661V-1		
Tested devices/ accessories:	**Phone RM-860 / AC-Charger AC-50U / Headset WH-902**		
FCC ID:	QMNRM-860	**IC:**	661X-RM860
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:	Digitally signed by Kalle Hannila DN: cn=Kalle Hannila, o=DRD/DQD/DCO/CMCL, ou=TCC Nokia, email=EXT-kalle.t.hannila@nokia.com, c=FI Date: 2013.01.10 14:58:33 +02'00'		

Kalle Hannila, System Manager, EMC

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

1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	17-Dec-2012
Testing completed	04-Jan-2013
The customer's contact person	Thomas Mary
Test Plan referred to	T:\Projects\RM-860\TestPlan\RS_testplan_RM-860_EMC_FCC_SAR_HAC.xlsm
Notes	-
Document name	T:\Projects\RM-860\EMC\FCC15CNFC_RM-860_20.docx

1.1. EUT and Accessory Information

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

Devices under tests

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-860	354106050008520	0103		1532.5951.1249.0000	17028
AC-Charger	AC-50U	40904921542705014700675620	860	-	-	17009
Headset	WH-902	0694972	-	-	-	17008
Phone	RM-860	354106050008652	-	-	-	17041
Headset	WH-902	06949721245B2R	-	-	-	17006
AC-Charger	AC-50U	40904921542705014510675620	860	-	-	17005

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, temperature variation	PASSED
15.225 (e)	A2.6	Frequency stability, voltage variation	PASSED
15.207	7.2.2	AC powerline conducted emissions	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.

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

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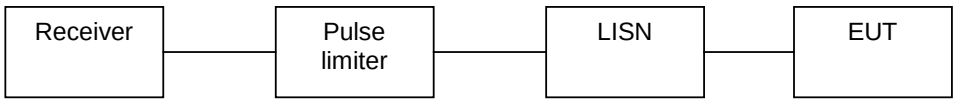
TCC Nokia Salo Laboratory
P.O.Box(86)
Joensuunkatu 7H / Kiila 1B
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 (0) 7180 45220

2. AC powerline conducted emissions

(FCC §15.207, RSS-GEN 7.2.2)

EUT with DUT number	RM-860, DUT 17028
Accessories with DUT numbers	WH-902, DUT 17008 ; AC-50U, DUT 17009
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [^{o}C] / Humidity [%RH] / Air Pressure [kPa]	22 / 31 / 100.3
Date of measurements	21-Dec-2012
Measured by	Jari Keto

2.1. Test Setup



2.2. Test method and limit

FCC15CNFC_RM-860_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:

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

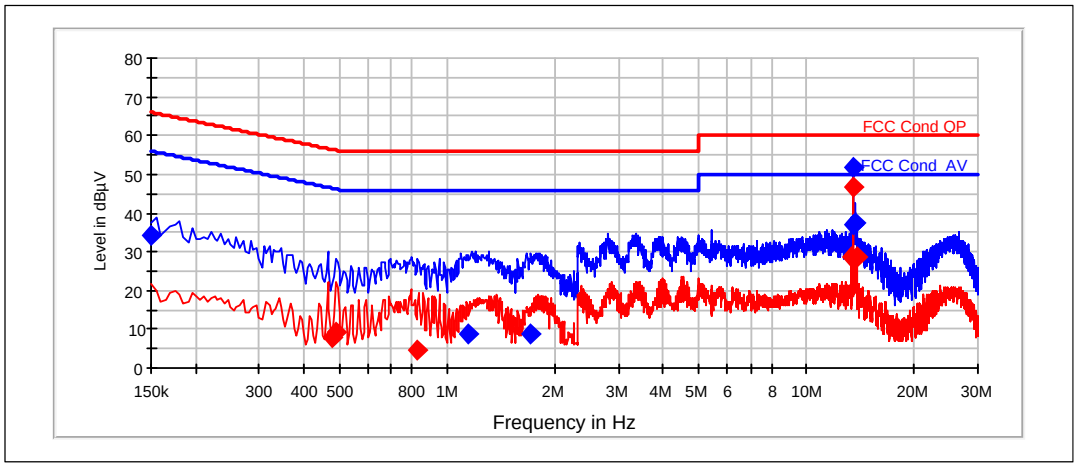
Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable and pulse limiter attenuations.

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

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

2.3. NFC Test results



QuasiPeak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.15	34.12	L1	PASSED
1.15	8.96	L1	PASSED
1.715	8.99	L1	PASSED
13.455	37.16	L1	PASSED
13.56	51.68	L1	PASSED
13.665	37.46	L1	PASSED

Average (RBW: 9 kHz)

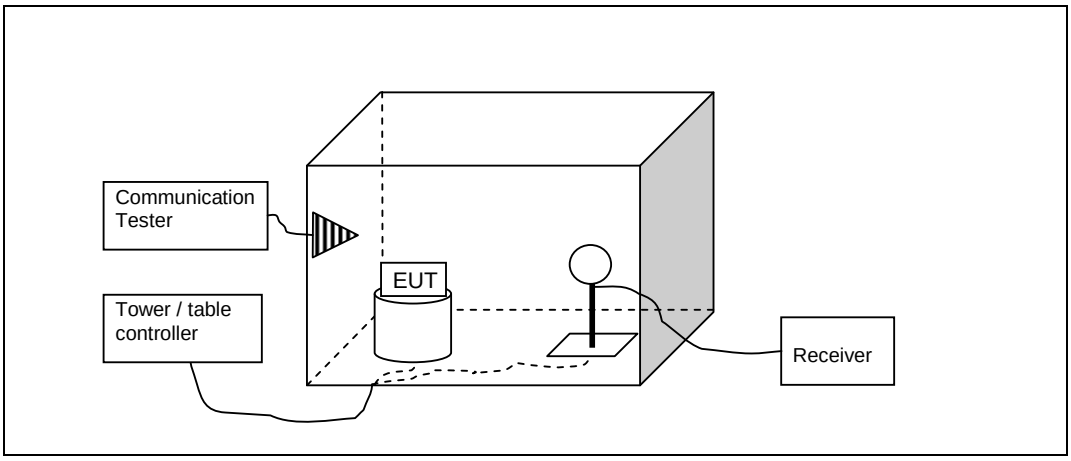
Frequency [MHz]	U [dBµV]	Line	Result
0.48	7.85	L1	PASSED
0.49	9.41	L1	PASSED
0.825	4.53	L1	PASSED
13.35	28.74	L1	PASSED
13.56	46.73	L1	PASSED
13.77	28.46	L1	PASSED

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

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

EUT with DUT number	RM-860, DUT 17028
Accessories with DUT numbers	WH-902, DUT 17006 ; AC-50U, DUT 17005
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 41 / 104.1
Date of measurements	04-Jan-2013
Measured by	Kalle Hannila

3.1.1 Test setup



3.2. 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.

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

3.3. NFC test results

MaxPeak

Frequency [MHz]	Reading [dBµV/m]	Limit [µV/m]	Distance CF [dB]	Limit @ 3m [dBµV/m]	Margin [dB]	Limit [dBµV/m]	Results
0.0309	75.196	77.67	80	137.84	62.6	37.81	PASSED
0.0309	75.133	77.67	80	137.84	62.7	37.81	PASSED
0.175	49.61	13.71	80	122.75	73.1	22.74	PASSED
0.175	62.219	13.71	80	122.75	60.5	22.74	PASSED

Average

Frequency [MHz]	Reading [dBµV/m]	Limit [µV/m]	Distance CF [dB]	Limit @ 3m [dBµV/m]	Margin [dB]	Limit [dBµV/m]	Results
0.0309	74.467	77.67	80	117.84	43.4	37.81	PASSED
0.0309	74.447	77.67	80	117.84	43.4	37.81	PASSED
0.175	32.99	13.71	80	102.75	69.8	22.74	PASSED
0.175	42.709	13.71	80	102.75	60	22.74	PASSED

QuasiPeak

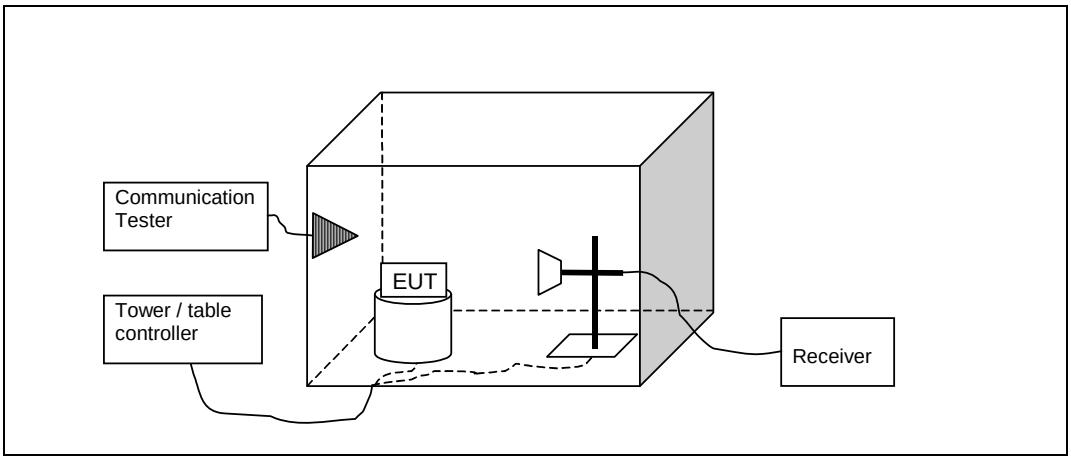
Frequency [MHz]	Reading [dBµV/m]	Limit [µV/m]	Distance CF [dB]	Limit @ 3m [dBµV/m]	Margin [dB]	Limit [dBµV/m]	Results
8.526994	58.286	30.00	40	69.54	11.3	29.54	PASSED
9.378738	62.122	30.00	40	69.54	7.4	29.54	PASSED
9.380551	62.024	30.00	40	69.54	7.5	29.54	PASSED

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

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

EUT with DUT number	RM-860, DUT 17028
Accessories with DUT numbers	WH-902, DUT 17006 ; AC-50U, DUT 17005
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	21 / 41 / 104.1
Date of measurements	04-Jan-2013
Measured by	Kalle Hannila

4.1.1 Test setup



4.2. 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:

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

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)

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

Frequency range [MHz]	Limit [µV/m]	Limit [dBµV/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

NFC test results

Peak (RBW: 1 MHz, VBW: 3 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
1956.516	40.43	105.063	43.12	-2.69	33.6	74	PASSED
1967.532	41.12	113.789	43.64	-2.52	32.9	74	PASSED
1972.344	41.14	114.064	43.64	-2.5	32.8	74	PASSED
1980.264	41.48	118.522	43.91	-2.43	32.5	74	PASSED
1990.68	41.38	117.233	43.51	-2.13	32.6	74	PASSED
1997.796	42.72	136.82	44.56	-1.84	31.3	74	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
30.03	24.69	17.165	28.73	-4.04	15.3	40	PASSED
30.06	24.62	17.022	28.68	-4.06	15.4	40	PASSED
30.09	23.58	15.108	27.66	-4.08	16.4	40	PASSED
35.695	18.27	8.19	26.02	-7.75	21.7	40	PASSED
37.796	25.31	18.435	34.45	-9.14	14.7	40	PASSED
38.841	16.11	6.39	25.95	-9.84	23.9	40	PASSED

Average (RBW: 1 MHz, VBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Margin	Limit [dBµV/m]	Results
1956.516	28.08	25.36	30.77	-2.69	25.9	54	PASSED
1967.532	28.19	25.677	30.71	-2.52	25.8	54	PASSED
1972.344	28.34	26.113	30.84	-2.5	25.6	54	PASSED
1980.264	28.45	26.455	30.88	-2.43	25.5	54	PASSED
1990.68	28.71	27.258	30.84	-2.13	25.3	54	PASSED
1997.796	28.94	27.977	30.78	-1.84	25	54	PASSED

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

5. Occupied bandwidth

EUT with DUT numb	RM-860, DUT 17028
Accessories with DUT numbers	AC-50U, DUT 17009 ; WH-902, DUT 17008
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 31 / 100.3
Date of measurements	20-Dec-2012
Measured by	Jari Keto

5.1. Test Setup

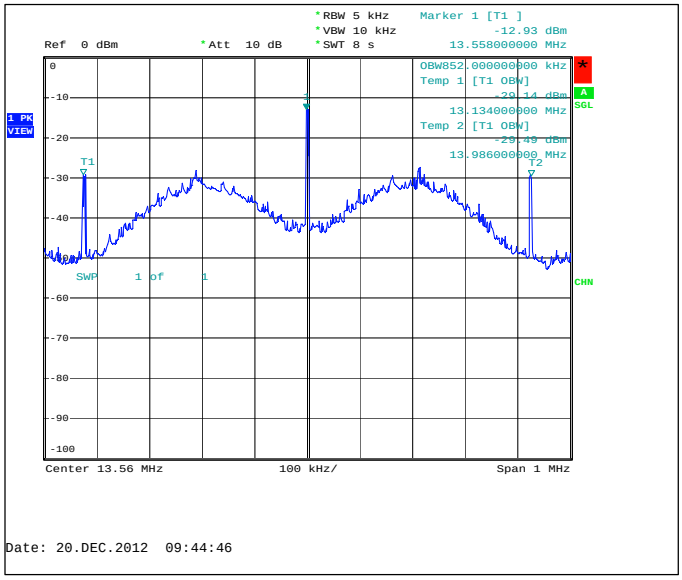
A small whip antenna was placed close to the EUT, and connected to the measuring Spectrum Analyzer.

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

NFC TX Frequency = 13.56 MHz



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

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

6. Frequency stability, temperature variation

(FCC §15.225 (e) [2], RSS-210 A2.6

EUT with DUT number	RM-860, DUT 17028
Accessories with DUT numbers	AC-50U, DUT 17009 ; WH-902, DUT 17008
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 31 / 100.3
Date of measurements	19-Dec-2012
Measured by	Jari Keto

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

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

6.3. NFC Test results

NFC TX Frequency = 13.56 MHz

Temperature [°C]	Frequency [MHz]	Deviation [kHz]	Deviation [%]	Result
50	13.55994	-0.060	-0.000442	PASSED
40	13.559951	-0.049	-0.000361	PASSED
30	13.559979	-0.021	-0.000155	PASSED
20	13.560018	0.018	0.000133	PASSED
10	13.560054	0.054	0.000398	PASSED
0	13.560081	0.081	0.000597	PASSED
-10	13.560081	0.081	0.000597	PASSED
-20	13.560082	0.082	0.000605	PASSED
-30	13.560012	0.012	0.000088	PASSED

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

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

EUT with DUT number	RM-860, DUT 17041
Accessories with DUT numbers	Dummy battery
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 31 / 100.3
Date of measurements	02-Jan-2013
Measured by	Jari Keto

7.1. Test Setup
A small whip 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

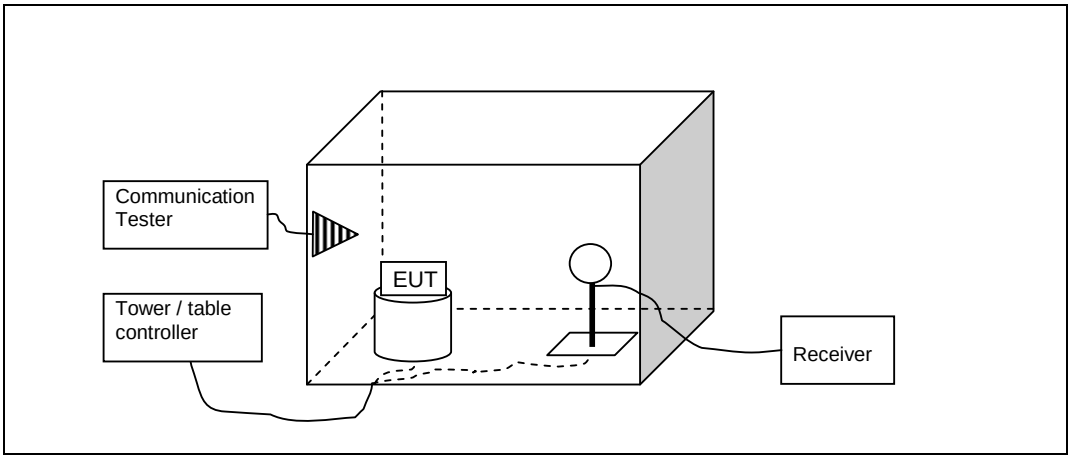
Voltage [V]	Frequency [MHz]	Deviation [kHz]	Deviation [%]	Result
4.2	13.559966	-0.034	-0.000251	PASSED
3.6	13.559967	-0.033	-0.000243	PASSED
3.8	13.559964	-0.036	-0.000265	PASSED

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

8. Field strength in the 13.56 MHz band

EUT with DUT number	RM-860, DUT 17028
Accessories with DUT numbers	WH-902, DUT 17006 ; AC-50U, DUT 17005
Operation Voltage [V] / [Hz]	
Results	
Remarks	
Temp [^{o}C] / Humidity [%RH] / Air Pressure [kPa]	
Date of measurements	04-Jan-2013
Measured by	Kalle Hannila

8.1.1 Test setup



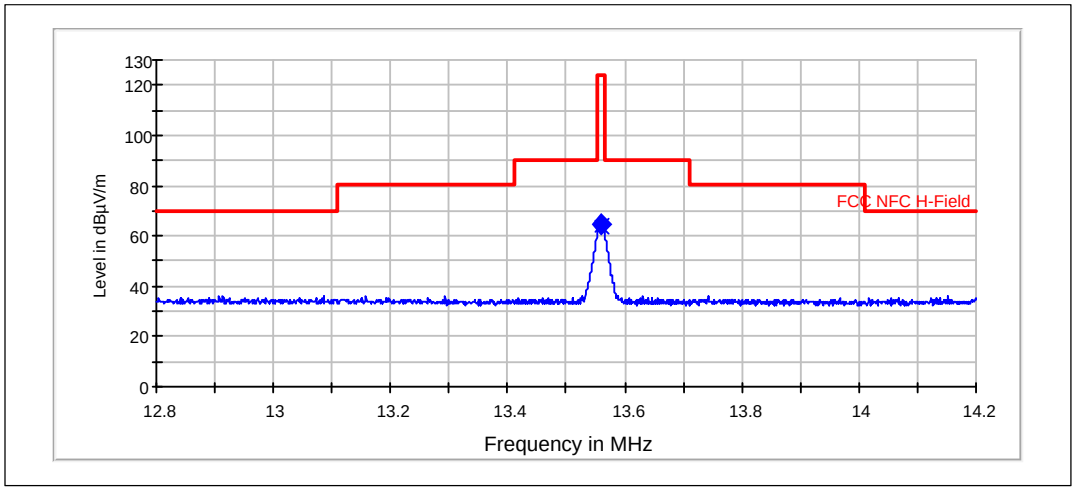
8.2. Test method and limit

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

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

8.3. NFC test results

Radiated H-Field, 3 meter distance



QuasiPeak

Frequency [MHz]	Reading [dBµV]	Result [dBµA/m]	Correction [dB]	Margin [dB]	Limit [dBµA/m]	Results
13.56	64.483	44.48	20	59.5	124	PASSED

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

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 µH	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	-

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

Eq. No	Equipment	Type	Manufacturer	Used in
6010	GPS Network amplifier	NLA20FPDC	GPS Networking, Inc	-
6011	GPS signal Splitter	LDCBS1x4	GPS Networking, Inc	-
-	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	-

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