FCC Part 15C Compliance Test Report

Test Report no.:	FCC15CNFC_RM-1062_08	**Date of Report:**	18-Dec-2014
Number of pages:	16	**Customer's Contact person:**	Jari Rontu
Testing laboratory:	TCC Microsoft Salo Laboratory P.O.Box(86) Joensuunkatu 7E FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 71 80 44122	**Customer:**	Microsoft 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-1062 / Dummy Battery SD-238R / Headset WH-108 / Battery BV-T4B / Headset WH-108**		
FCC ID:	PYARM-1062	**IC:**	-
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 Microsoft.		
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:	 Lehtonen Sami.K 2014.12.18 14:15:32 +02'00'		

Sami Lehtonen, Specialist, EMC

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1. Summary for FCC Part 15C Compliance Test Report

Date of receipt	28-Oct-2014
Testing completed	17-Nov-2014
The customer's contact person	Jari Rontu
Test Plan referred to	T:\Projects\RM-1062\TestPlan\RS_Testplan_RM-1062.xlsm
Notes	-
Document name	T:\Projects\RM-1062\EMC\FCC15CNFC_RM-1062_08.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-1062	004402740524495	3202	-	02148.00000.14431.29000	18689
Dummy Battery	SD-238R		v.1	-	-	18688
Headset	WH-108	4235VFA	-	-	-	18690
Phone	RM-1062	004402740524461	3202	-	02148.00000.14431.29000	18732
Battery	BV-T4B	4181574345C10103838;0670764	V1.0	-	-	18733
Ac-Charger	AC-20E	409049415667071145500675628	-	-	-	18697

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 power line conducted emission	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 Microsoft Laboratory.

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2. Occupied bandwidth

EUT with DUT number	RM-1062, DUT 18689
Accessories with DUT numbers	SD-238R, DUT 18688 ; WH-108, DUT 18690
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	21 / 48 / 101.4
Date of measurements	03-Nov-2014
Measured by	Jari Keto

2.1. Test Setup

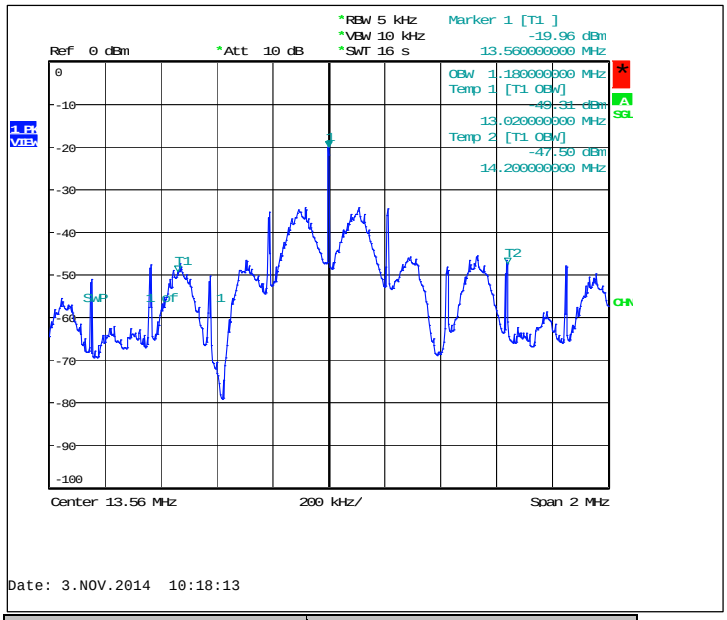
A small whip antenna was placed close to the EUT, and connected to the measuring Spectrum Analyzer.

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	1180

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

EUT with DUT number	RM-1062, DUT 18689
Accessories with DUT numbers	SD-238R, DUT 18688 ; WH-108, DUT 18690
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	22 / 48 / 101.4
Date of measurements	03-Nov-2014
Measured by	Jari Keto

3.1. 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.

3.2. 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

3.3. NFC Test results

NFC TX Frequency = 13.56 MHz

Temperature [ºC]	Frequency [MHz]	Deviation [kHz]	Deviation [%]	Result
50	13.559294	-0.706	-0.005206	PASSED
40	13.559313	-0.687	-0.005066	PASSED
30	13.559342	-0.658	-0.004853	PASSED
20	13.559377	-0.623	-0.004594	PASSED
10	13.559407	-0.593	-0.004373	PASSED
0	13.559424	-0.576	-0.004248	PASSED
-10	13.559421	-0.579	-0.004270	PASSED
-20	13.559391	-0.609	-0.004491	PASSED
-30	13.559328	-0.672	-0.004956	PASSED

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4. Frequency stability, voltage variation
(FCC §15.225(e), RSS-210 A2.6)

EUT with DUT number	RM-1062, DUT 18689
Accessories with DUT numbers	SD-238R, DUT 18688 ; WH-108, DUT 18690
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22 / 48 / 101.4
Date of measurements	03-Nov-2014
Measured by	Jari Keto

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

4.2. 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

4.3. NFC Test results
NFC TX Frequency = 13.56 MHz

Voltage [V]	Frequency [MHz]	Deviation [kHz]	Deviation [%]	Result
4.2	13.559326	-0.674	-0.004971	PASSED
3.6	13.559327	-0.673	-0.004963	PASSED
3.8	13.559303	-0.697	-0.005140	PASSED

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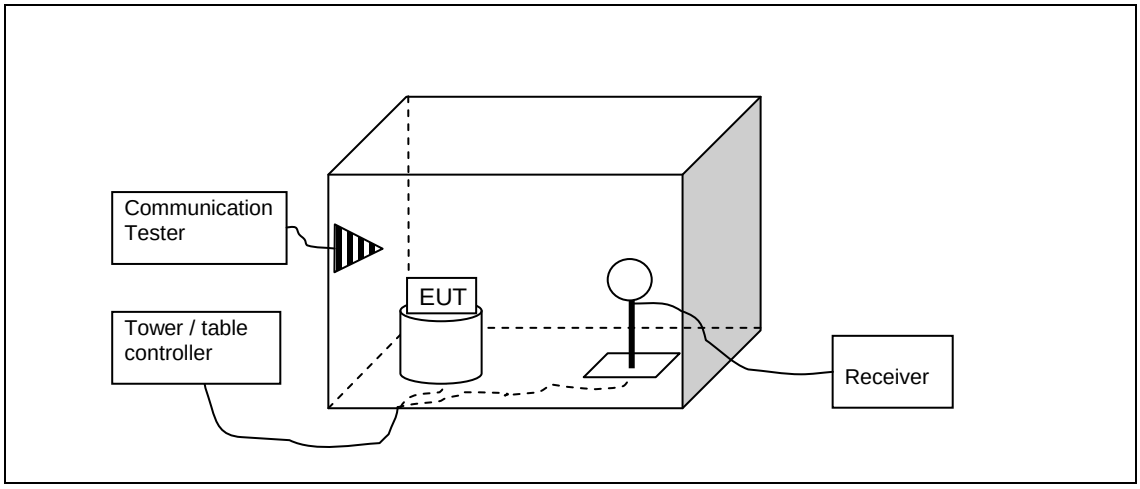
5. Radiated emission below 30 MHz
(FCC 15.209, RSS-210 2.6)

EUT with DUT number	RM-1062, DUT 18732
Accessories with DUT numbers	BV-T4B, DUT 18733 ; AC-20E, DUT 18697
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	22 / 49 / 101.4
Date of measurements	17-Nov-2014
Measured by	Jari Keto

5.1.1 Test setup



5.2. 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.

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Limits for radiated emissions measurements (3 m measurement distance)

Frequency range [MHz]	Limit [µV/m]	Distance [m]	Detector	RBW [kHz]
0.009 - 0.09	2400 / f[kHz]	300	Pk & Avg*	0.2
0.09 - 0.11	2400 / f[kHz]	300	QP	0.2
0.11 - 0.15	2400 / f[kHz]	300	Pk & Avg	0.2
0.15 - 0.49	2400 / f[kHz]	300	Pk & Avg*	9
0.49 - 1.705	24000 / f[kHz]	30	QP	9
1.705 - 30	30	30	QP	9

* These are average limits. The peak limit is 20 dB above the average limit.

5.3. NFC test results

MaxPeak

Frequency [MHz]	Reading [dBµV/m]	Limit [µV/m]	Distance CF [dB]	Limit @ 3m [dBµV/m]	Height [cm]	Pol	Results
0.009	71.92	266.67	80	148.52	170	H	PASSED
0.0091	70.91	263.74	80	148.43	170	H	PASSED

Average

Frequency [MHz]	Reading [dBµV/m]	Limit [µV/m]	Distance CF [dB]	Limit @ 3m [dBµV/m]	Height [cm]	Pol	Results
0.009	67.99	266.67	80	128.52	170	H	PASSED
0.0091	67.17	263.74	80	128.43	170	H	PASSED

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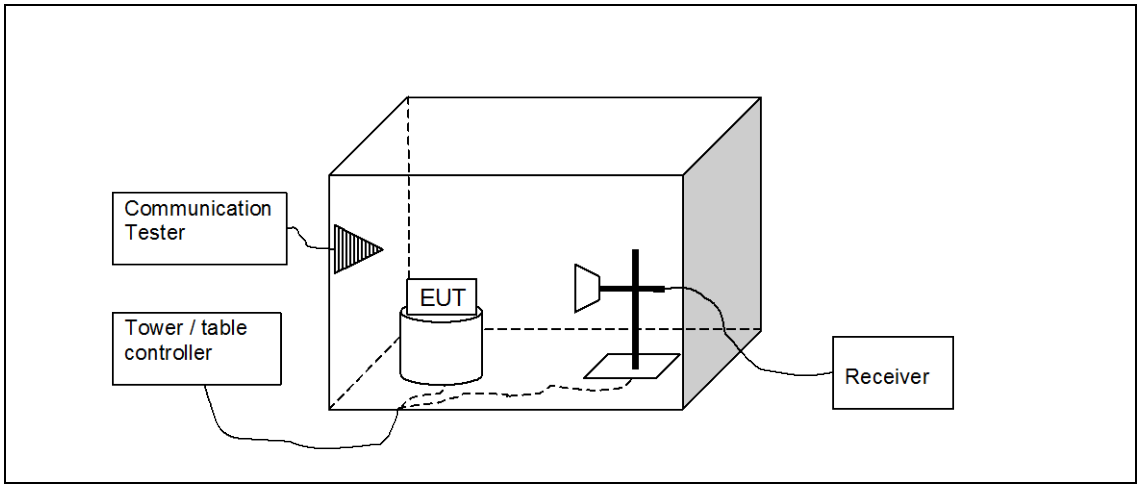
6. Radiated emission above 30 MHz
(FCC 15.209, RSS-210 A2.6)

EUT with DUT number	RM-1062, DUT 18732
Accessories with DUT numbers	BV-T4B, DUT 18733 ; AC-20E, DUT 18697
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	22 / 49 / 101.4
Date of measurements	18-Nov-2014
Measured by	Jari Keto

6.1.1 Test setup



6.2. 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 is made up to 10th harmonic of the EUT highest TX channel.

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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)

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

6.3. NFC test results

Transmit

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
37.285	34.3	51.88	41	-6.7	40	5.7	PASSED
37.363	34.26	51.642	41.06	-6.8	40	5.74	PASSED
40.671	37.79	77.535	46.69	-8.9	40	2.21	PASSED

Transmit

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
37.285	34.3	51.88	41	-6.7	40	5.7	PASSED
37.363	34.26	51.642	41.06	-6.8	40	5.74	PASSED
40.671	37.79	77.535	46.69	-8.9	40	2.21	PASSED

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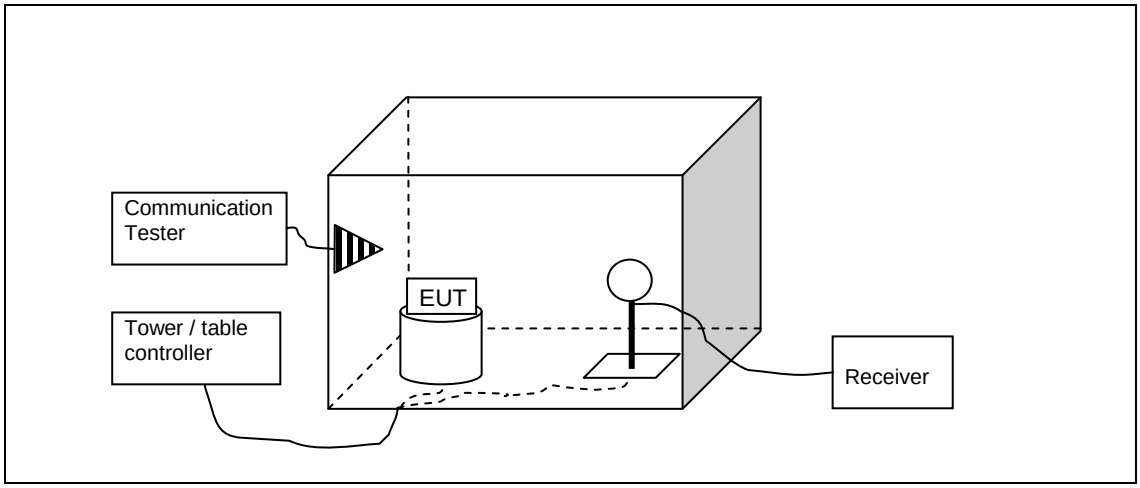
7. Field strength in the 13.56 MHz band

EUT with DUT number	RM-1062, DUT 18732
Accessories with DUT numbers	BV-T4B, DUT 18733 ; AC-20E, DUT 18697
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	22 / 49 / 101.4
Date of measurements	18-Nov-2014
Measured by	Jari Keto

7.1.1 Test setup



7.2. 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 RF anechoic chamber.

The Result [dBµA/m] is derived from formula:
Result [dBµA/m] = Receiver reading [dBµV] + Antenna factor 20 dB 1/m - electric to magnetic field correction factor 51.5 dBΩ.

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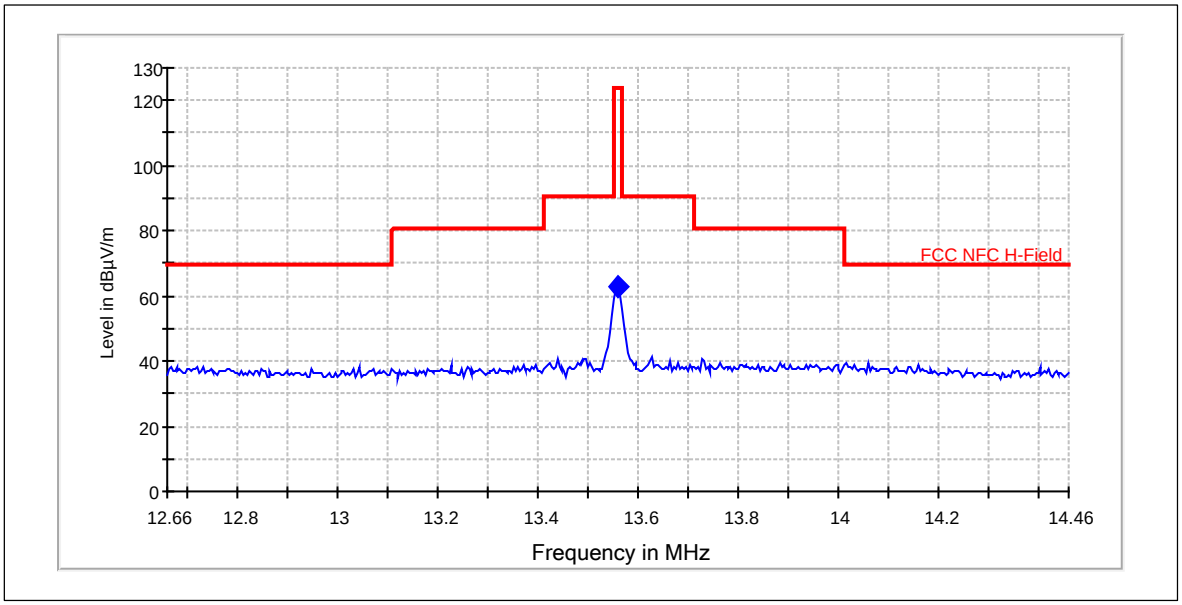
7.3. NFC test results

Radiated H-Field, 3 meter distance



QuasiPeak

Frequency [MHz]	Result [dBµV/m]	Limit [dBµV/m]	Result [dBµA/m]	Pol	Results
13.558	62.83	124	31.33	H	PASSED

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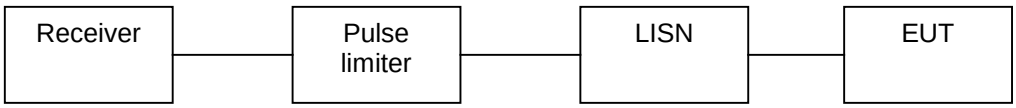
8. AC powerline conducted emissions
(FCC §15.207, RSS-210 NFC)

EUT with DUT number	RM-1062, DUT 18708
Accessories with DUT numbers	BV-T4B, DUT 18709 ; AC-20E, DUT 18633 ; WH-108, DUT 18677
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	20 / 50 / 101.4
Date of measurements	10-Nov-2014
Measured by	Jari Keto

8.1. Test Setup



8.2. Test method and limit

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

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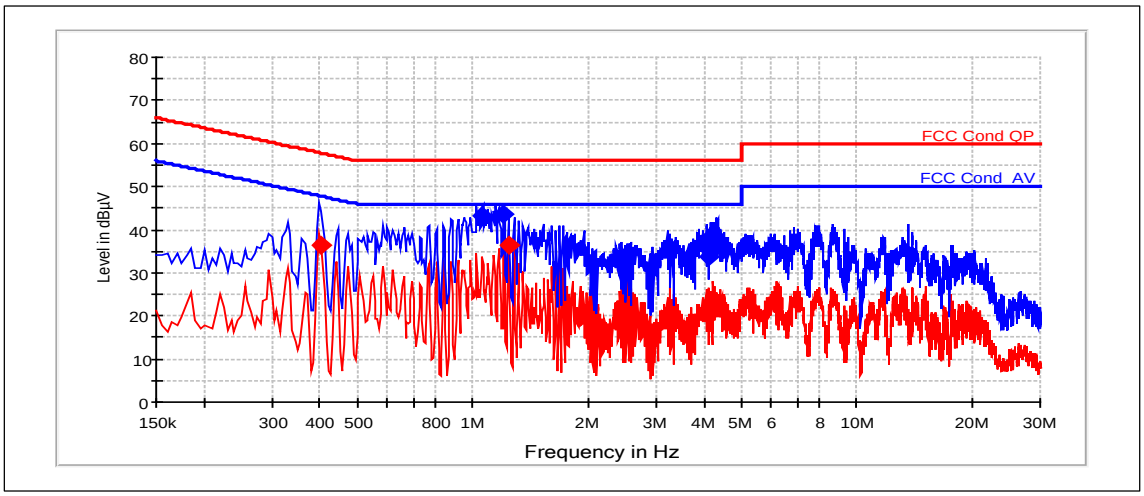
8.3. NFC Test results



QuasiPeak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
1.06	43.39	L1	PASSED
1.205	43.75	L1	PASSED
4.095	33.88	L1	PASSED
4.215	35.61	L1	PASSED
4.33	36.03	L1	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.405	36.34	L1	PASSED
1.245	36.22	L1	PASSED
2.52	18.07	N	PASSED
4.26	21.49	L1	PASSED

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9. Test Equipment

9.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
6039	USB Interface	5541765	Testo	22/24/27, 15C, 15B
6044	V-network	ESH3-Z6	R&S	-
2059	V-network	ESH3-Z6	R&S	-
1759	LISN 50 µH	ESH3-Z5	R&S	22/24/27, 15C, 15B
2097	Pulse Limiter	ESH3-Z2	R&S	22/24/27, 15C, 15B
1999	Receiver	ESIB26	R&S	22/24/27, 15C, 15B
2180	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
2390	Directional Coupler	DC2600	AR	-
-	RF immunity / Emission Software	EMC32	R&S	22/24/27, 15C, 15B
2060	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
1759	LISN 50 µH	ESH3-Z5	R&S	15C, 15B
2039	Power Supply	PL330QMD	Thurlby	15C, 15B
6036	Data Logger	175-H2	Testo	22/24/27, 15C, 15B
2359	Temperature Test Chamber	VT4002	Vötsch	22/24/27
2352	Spectrum Analyzer	FSP-30	R&S	22/24/27, 15C
6109	Communication Tester	CMU200	R&S	22/24/27, 15C
6246	Power Supply	66332A	HP	22/24/27, 15C
1992	Signal Generator	83630B	Agilent	15C, 15B
6098	Signal Generator	8648C	Agilent	-
6046	Attenuator 10dB	8493C	Agilent	22/24/27, 15C
6047	Attenuator 20dB	8493C	Agilent	22/24/27, 15C
6045	Power splitter	11667B	Agilent	22/24/27, 15C
6247	Communication Tester	CBT	R&S	22/24/27, 15C 15B
6052	Communication Tester	CMU200	R&S	22/24/27, 15C 15B
6248	Power Supply	6632B	-	22/24/27, 15C 15B
6106	Spectrum Analyzer	FSP-30	R&S	22/24/27, 15C 15B
6113	Signal Generator	SMF100A	R&S	22/24/27, 15C 15B
6202	Temperature Test Chamber	VT4002	Vötsch	22/24/27, 15C 15B
6122	Power Splitter	11667B	Agilent	22/24/27, 15C 15B
6134	Attenuator 10dB	BW-S10-2W263+	Mini-Circuits	22/24/27, 15C
6136	Attenuator 20dB	BW-S20-2W263+	Mini-Circuits	22/24/27, 15C
6103	Bluetooth tester	CBT	R&S	22/24/27, 15C 15B
6250	Power Supply	6651A	Agilent	22/24/27, 15C 15B
6108	Communication Tester	CMU200	R&S	22/24/27, 15C 15B
6105	Spectrum Analyzer	FSV-30	R&S	22/24/27, 15C 15B
6251	Temperature Test Chamber	VT4002	Vötsch	22/24/27, 15C 15B
6243	Power Splitter	1167B	Agilent	22/24/27, 15C 15B
6245	Attenuator 10dB	BW-S10-2W263+	Mini-Circuits	22/24/27, 15C 15B
6244	Attenuator 20dB	BW-S20-2W263+	Mini-Circuits	22/24/27, 15C 15B

9.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
2388	Bluetooth Tester	CBT	R&S	15B
10479	Communication Tester	CMW500	R&S	22/24/27, 15C, 15B
2347	Communication Tester	CMU200	R&S	22/24/27, 15C, 15B
2009	Signal Generator	SMP 22	R&S	22/24/27, 15C, 15B
2348	Controller	G-1000DXC	Yaesu	22/24/27, 15C, 15B
2349	Computer Controller	g-1000DXC	Yaesu	22/24/27, 15C, 15B
2116	Controller	EMCO 2090	ETS	22/24/27, 15C, 15B
2109	Power Supply	PL330QMD	Thurlby	22/24/27, 15C, 15B
2353	Receiver	ESIB26	R&S	22/24/27, 15C, 15B
6115	Open switch and control unit	OSP 130	R&S	22/24/27, 15C 15B
6116	Open switch and control unit	OSP 150	R&S	22/24/27, 15C 15B

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Eq. No	Equipment	Type	Manufacturer	Used in
6117	Open switch and control unit	OSP 150	R&S	22/24/27, 15C 15B
6131	Notch Filter	WRCT902.4-0.4/40-8SS	Wainwright	22/24/27, 15C 15B
6130	Notch Filter	WRCD1880-1.1.25/50-10SS	Wainwright	22/24/27
6159	Band Reject Filter	WRCD1747.8-0.4/40-5SS	Wainwright	22/24/27,15C, 15B
6158	Band Reject Filter	WRCT836.6-0.4/40-8SS	Wainwright	22/24/27,15C, 15B
6197	Band Reject Filter	WRCJV2531/2539-2523/2547-60/12SS	Wainwright	22/24/27,15C, 15B
2231	Band Reject Filter	WRCG1947/1953-1940/1960-40/6SS	Wainwright	22/24/27,15C, 15B
2391	Band Reject Filter	WRCG1729.4/1735.4-1722.4/1742.4-40/6SS	Wainwright	27
2386	Band Reject Filter	WRCG1764.4/1770.4-1760.4/1774.4-40/6SS	Wainwright	22/24/27, 15C, 15B
2385	Band Reject Filter	WRCG1744.4/1750.4-1740.4/1754.4-40/6SS	Wainwright	22/24/27, 15C, 15B
2357	Band Reject Filter	WRCG2400/2483-2390/2493-35/10SS	Wainwright	15C
2188	Preamplifier	AFS4-00100300-20-23P-6	Miteq	22/24/27, 15C, 15B
6195	High Pass Filter	-	Wainwright	22/24/27, 15C, 15B
2364	Band Reject Filter	WRCG1877/1883 - 1870/1890-40/6SS	Wainwright	24
2361	Anechoic Chamber	3 m Semi / Full Anechoic Chamber	Euroshield	22/24/27, 15C, 15B
6212	Antenna Array system	-	TCC	22/24/27, 15C, 15B
-	RF immunity / Emission Software	EMC32	R&S	22/24/27, 15C, 15B
6089	Antenna	HFH2-Z2	R&S	15C, 15B
2027	CDN	M2 (modified) DC1	MEB	22/24/27, 15C, 15B
2028	CDN	M3 (modified) DC2	MEB	22/24/27, 15C, 15B
2176	CDN	CDN 801-M3	Lüthi	22/24/27, 15C, 15B
2135	CDN	CDN 801-M3	Lüthi	22/24/27, 15C, 15B
2029	Power Supply	PL330	Thurlby	22/24/27, 15C
6038	Data Logger	Testo 580	Testo	22/24/27, 15C, 15B
6037	Data Logger	175-H2	Testo	22/24/27, 15C, 15B
6039	USB Interface	5541765	Testo	22/24/27, 15C, 15B

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