

FCC Part 27 Compliance Test Report

Test Report no.:	FCC_Cellular_RM-1116_05.docx	Date of Report:	22-Sep-2015
Number of pages:	10	Customer's Contact person:	Tia Melava
Testing laboratory:	TCC Microsoft Tampere Laboratory P.O.Box 403 Visiokatu 3 FIN-33101 TAMPERE, FINLAND Tel. +358 71 800 8000 Fax. +358 71 804 6880	Customer:	Microsoft P.O.Box(86) Joensuunkatu 7E FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 71 80 44122
FCC listing no.:	94436		
IC recognition no.:	661AK-1		
Tested devices/ accessories:	Phone RM-1116 / Battery BV-T4D		
FCC ID:	PYARM-1116	IC:	661X-RM1116
Supplement reports:	-		
Testing has been carried out in accordance with:	CFR 47, FCC rules Parts 27, TIA-603-C-2004 and IC standards, RSS-GEN (Issue 4, November 2014), RSS-199 (Issue 2, October 2014). 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:			

Timo Raiskio, System Manager, EMC

1. Summary for FCC Part 27 Compliance Test Report

Date of receipt	21-Aug-2015
Testing completed	22-Sep-2015
The customer's contact person	Tia Melava
Test Plan referred to	T:\Projects\RM-1116\TestPlan\RS_TestPlan_RM-1116_Service_action_EUT100254.xlsm
Notes	LTE conducted output power results can be found in chapter 4. Appendix.
Document name	T:\Projects\RM-1116\EMC\FCC_Cellular_RM-1116_05.docx

1.1. EUT and Accessory Information

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

Devices under tests

Product	Type	SN	HW	MV	SW	DUT
Phone	RM-1116	004402742362068	2030	-	01066.00001.15267.14000	400042
Battery	BV-T4D	4955405174010300359;0670771	LG v3.0	-	-	400025

1.2. Summary of Test Results

LTE7:

Section in CFR 47	Section in RSS-GEN or RSS-199	Name of the test	Result
§2.1046(a)	4.4	Conducted RF output power	-
§27.50(h)(2)	4.4	Radiated RF output power	PASSED
N/A	N/A	Peak to average power ratio	-
§2.1049(h)	6.6	99 % occupied bandwidth	-
§27.53(l)	4.5(b)	Band edge compliance	-
§2.1051	4.5(b)	Spurious emissions at antenna terminals	-
§27.53(l), §2.1053	4.5(b)	Spurious radiated emissions	-
§27.54	4.3	Frequency stability, temperature variation	-
§27.54	4.3	Frequency stability, voltage variation	-

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 Microsoft Laboratory.

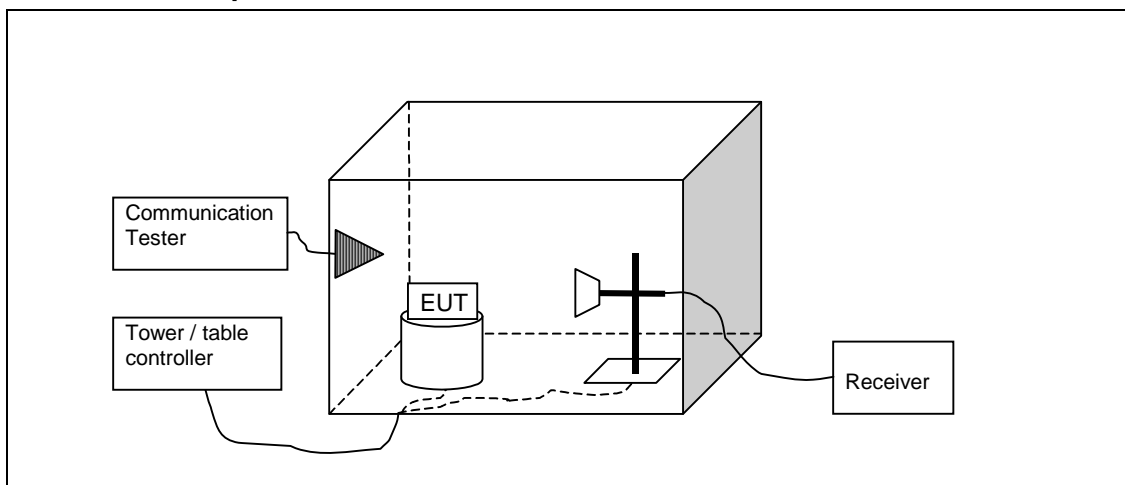
CONTENTS

1. Summary for FCC Part 27 Compliance Test Report	2
1.1. EUT and Accessory Information	2
1.2. Summary of Test Results	2
2. Radiated RF output power (FCC §27.50(h)(2), RSS-199 4.4)	4
2.2. Test method and limit	4
2.3. LTE7 test results, Antenna 1	5
2.4. LTE7 test results, Antenna 2	6
3. Test Equipment.....	8
3.1. Conducted measurements	8
3.2. Radiated measurements	9
4. Appendix	10
4.1. Conducted LTE RF output power values measured by the customer.....	10

2. Radiated RF output power (FCC §27.50(h)(2), RSS-199 4.4)

EUT with DUT number	RM-1116, DUT 400042
Accessories with DUT numbers	BV-T4D, DUT 400025
Operation Voltage [V] / [Hz]	Nominal
Results	PASSED
Remarks	-
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 47 / 100.9
Date of measurements	22-Sep-2015
Measured by	Timo Raisio

2.1.1 Test setup



2.2. Test method and limit

The measurement is made according to TIA-603-C-2004 as follows:

The measurement is performed in the Anechoic Chamber with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system. The turntable is rotated 360 degrees and this is repeated for both horizontal and vertical receive antenna polarizations.

The EUT is placed on a nonconductive plate at 170 cm height.

The substitution method is used. The measurement results are obtained as described below:

$$P[dBm] = P_{SUBST\ TX} + P_{MEAS} - P_{SUBST\ RX} - L_{SUBST\ CABLES} + G_{SUBST\ TX\ ANT}$$

Where $P_{SUBST\ TX}$ is signal generator level. P_{MEAS} is measured power level from the EUT. $P_{SUBST\ RX}$ is measured power level in substitute measurement. $L_{SUBST\ CABLE}$ is the loss of the cable between the signal generator and the substitution antenna and $G_{SUBST\ TX\ ANT}$ is substitution antenna gain.

Limits for radiated RF output power measurements

Frequency range [MHz]	Limit [W]	Limit [dBm]
2502.5 - 2567.5	2 EIRP	33

2.3. LTE7 test results, Antenna 1

FDD, CBW 10MHz, QPSK, 1RB mid, RMS detector

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Results
0 / 2505	25.77	0.378	-20.8	46.57	HORIZONTAL	PASSED
21100 / 2535	25.49	0.354	-21.46	46.95	HORIZONTAL	PASSED
21100 / 2565	24.59	0.288	-22.29	46.88	HORIZONTAL	PASSED

FDD, CBW 10MHz, QPSK, 1RB mid, Peak detector

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Results
0 / 2505	28.94	0.783	-17.63	46.57	HORIZONTAL	PASSED
21100 / 2535	28.69	0.739	-18.26	46.95	HORIZONTAL	PASSED
21100 / 2565	27.2	0.525	-19.68	46.88	HORIZONTAL	PASSED

FDD, CBW 20MHz, QPSK, 1RB mid, RMS detector

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Results
0 / 2510	25.66	0.368	-21.08	46.74	HORIZONTAL	PASSED
21100 / 2535	25.38	0.345	-21.57	46.95	HORIZONTAL	PASSED
21100 / 2560	25.14	0.327	-21.88	47.02	HORIZONTAL	PASSED

FDD, CBW 20MHz, QPSK, 1RB mid, Peak detector

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Results
0 / 2510	28.61	0.726	-18.13	46.74	HORIZONTAL	PASSED
21100 / 2535	28.89	0.774	-18.06	46.95	HORIZONTAL	PASSED
21100 / 2560	27.72	0.591	-19.3	47.02	HORIZONTAL	PASSED

FDD, CBW 10MHz, 16QAM, 1RB mid, RMS detector

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Results
0 / 2505	25.76	0.377	-20.81	46.57	HORIZONTAL	PASSED
21100 / 2535	25.04	0.319	-21.91	46.95	HORIZONTAL	PASSED
21100 / 2565	24.4	0.276	-22.48	46.88	HORIZONTAL	PASSED

FDD, CBW 10MHz, 16QAM, 1RB mid, Peak detector

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Results
0 / 2505	29.01	0.796	-17.56	46.57	HORIZONTAL	PASSED
21100 / 2535	28.76	0.751	-18.19	46.95	HORIZONTAL	PASSED
21100 / 2565	27.2	0.525	-19.68	46.88	HORIZONTAL	PASSED

FDD, CBW 20MHz, 16QAM, 1RB mid, RMS detector

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Results
0 / 2510	25.47	0.352	-21.27	46.74	HORIZONTAL	PASSED
21100 / 2535	25.46	0.352	-21.49	46.95	HORIZONTAL	PASSED
21100 / 2560	24.88	0.308	-22.14	47.02	HORIZONTAL	PASSED

FDD, CBW 20MHz, 16QAM, 1RB mid, Peak detector

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Results
0 / 2510	28.48	0.705	-18.26	46.74	HORIZONTAL	PASSED
21100 / 2535	28.36	0.685	-18.59	46.95	HORIZONTAL	PASSED
21100 / 2560	27.59	0.575	-19.43	47.02	HORIZONTAL	PASSED

2.4. LTE7 test results, Antenna 2

FDD, CBW 10MHz, QPSK, 1RB mid, RMS detector

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Results
0 / 2505	22.38	0.173	-24.19	46.57	HORIZONTAL	PASSED
21100 / 2535	23.5	0.224	-23.45	46.95	HORIZONTAL	PASSED
21100 / 2565	22.99	0.199	-23.89	46.88	HORIZONTAL	PASSED

FDD, CBW 10MHz, QPSK, 1RB mid, Peak detector

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Results
0 / 2505	25.42	0.348	-21.15	46.57	HORIZONTAL	PASSED
21100 / 2535	26.44	0.441	-20.51	46.95	HORIZONTAL	PASSED
21100 / 2565	26.12	0.409	-20.76	46.88	HORIZONTAL	PASSED

FDD, CBW 20MHz, QPSK, 1RB mid, RMS detector

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Results
0 / 2510	22.08	0.162	-24.66	46.74	HORIZONTAL	PASSED
21100 / 2535	22.49	0.177	-24.46	46.95	HORIZONTAL	PASSED
21100 / 2560	22.67	0.185	-24.35	47.02	HORIZONTAL	PASSED

FDD, CBW 20MHz, QPSK, 1RB mid, Peak detector

Channel / f _c [MHz]	EIRP [dBm]	EIRP [W]	P _{MEAS} [dBm]	A _{TOT} [dB]	Polarisation	Results
0 / 2510	25.34	0.342	-21.4	46.74	HORIZONTAL	PASSED
21100 / 2535	25.17	0.329	-21.78	46.95	HORIZONTAL	PASSED
21100 / 2560	26.45	0.441	-20.57	47.02	HORIZONTAL	PASSED

FDD, CBW 10MHz, 16QAM, 1RB mid, RMS detector

Channel / f_c [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
0 / 2505	22.03	0.16	-24.54	46.57	HORIZONTAL	PASSED
21100 / 2535	23.77	0.238	-23.18	46.95	HORIZONTAL	PASSED
21100 / 2565	22.69	0.186	-24.19	46.88	HORIZONTAL	PASSED

FDD, CBW 10MHz, 16QAM, 1RB mid, Peak detector

Channel / f_c [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
0 / 2505	25.42	0.348	-21.15	46.57	HORIZONTAL	PASSED
21100 / 2535	25.61	0.364	-21.34	46.95	HORIZONTAL	PASSED
21100 / 2565	26.05	0.403	-20.83	46.88	HORIZONTAL	PASSED

FDD, CBW 20MHz, 16QAM, 1RB mid, RMS detector

Channel / f_c [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
0 / 2510	22.01	0.159	-24.73	46.74	HORIZONTAL	PASSED
21100 / 2535	22.79	0.19	-24.16	46.95	HORIZONTAL	PASSED
21100 / 2560	21.82	0.152	-25.2	47.02	HORIZONTAL	PASSED

FDD, CBW 20MHz, 16QAM, 1RB mid, Peak detector

Channel / f_c [MHz]	EIRP [dBm]	EIRP [W]	P_{MEAS} [dBm]	A_{TOT} [dB]	Polarisation	Results
0 / 2510	25.78	0.378	-20.96	46.74	HORIZONTAL	PASSED
21100 / 2535	26.44	0.441	-20.51	46.95	HORIZONTAL	PASSED
21100 / 2560	26	0.398	-21.02	47.02	HORIZONTAL	PASSED

3. Test Equipment

3.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM38112	Power supply	6632A	Agilent	22/24/27, 15C, 15E
TM38114	Power supply	6632A	Agilent	22/24/27, 15C, 15E
TM210233	Communication Tester	CMU200	R&S	22/24/27
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
2001	Bluetooth tester	CBT	R&S	15C, 15B
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
2022	Communication Tester	CMU200	R&S	22/24/27
2023	Spectrum Analyzer	ESMI-RF	R&S	15B/15C
2024	Analyzer display unit	ESAI-D	R&S	15B/15C
2026	Signal Generator	SMF 100A	R&S	22/24/27, 15C, 15E, 15B
-	Bluetooth tester	CBT	R&S	15C, 15B
-	Communication Tester	CMU200	R&S	22/24/27, 15B

3.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
-	Antenna	BBHA 9120 D	Schwarzbeck	22/24/27, 15C
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	OSP130	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 chamber	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
TM23892	Controller	G-1000SDX	Yaesu	22/24/27, 15C, 15E
2001	Bluetooth tester	CBT	R&S	15C, 15B
2002	Communication Tester	CMU200	R&S	22/24/27, 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
2026	Signal Generator	SMF 100A	R&S	22/24/27, 15C, 15E, 15B
2052	Antenna	BBHA 9120 D	Schwarzbeck	22/24/27, 15C, 15B, 15E
-	Antenna	QSH18S20	Q-Par	22/24/27, 15C, 15B, 15E
-	Antenna	QSH20S20	Q-Par	22/24/27, 15C, 15B, 15E
-	Antenna	QSH20S20	Q-Par	22/24/27, 15C, 15B, 15E
-	Bluetooth tester	CBT	R&S	15C, 15B

4. Appendix

4.1. Conducted LTE RF output power values measured by the customer

4.1.1 Tolerance

Tolerance [dB]	
Low	-0.5
High	0.4

4.1.2 LTE 7

SN: 004402742362068				Nominal			A-MPR active		
Band / BW	Modulation	RB Allocation	RB Offset	Ch20775 / 2502.5 MHz	Ch21100 / 2535 MHz	Ch21425 / 2567.5 MHz	Ch20775 / 2502.5 MHz	Ch21100 / 2535 MHz	Ch21425 / 2567.5 MHz
LTE7 5 MHz	QPSK	1	12	22.7	22.7	22.5			
	16QAM	1	12	22.2	22.3	21.8			
SN: 004402742362068				Nominal			A-MPR active		
Band / BW	Modulation	RB Allocation	RB Offset	Ch20800 / 2505 MHz	Ch21100 / 2535 MHz	Ch21400 / 2565 MHz	Ch20800 / 2505 MHz	Ch21100 / 2535 MHz	Ch21400 / 2565 MHz
LTE7 10 MHz	QPSK	1	24	22.7	22.8	23.0			
	16QAM	1	24	21.8	22.1	22.4			
SN: 004402742362068				Nominal			A-MPR active		
Band / BW	Modulation	RB Allocation	RB Offset	Ch20825 / 2507.5 MHz	Ch21100 / 2535 MHz	Ch21375 / 2562.5 MHz	Ch20825 / 2507.5 MHz	Ch21100 / 2535 MHz	Ch21375 / 2562.5 MHz
LTE7 15 MHz	QPSK	1	36	22.5	22.6	22.6			
	16QAM	1	36	21.7	21.6	21.7			
SN: 004402742362068				Nominal			A-MPR active		
Band / BW	Modulation	RB Allocation	RB Offset	Ch20850 / 2510 MHz	Ch21100 / 2535 MHz	Ch21350 / 2560 MHz	Ch20850 / 2510 MHz	Ch21100 / 2535 MHz	Ch21350 / 2560 MHz
LTE7 20 MHz	QPSK	1	49	22.5	22.6	22.6			
	16QAM	1	49	21.7	22.1	22.2			