FCC Part 15B Compliance Test Report

Test Report no.:	FCC15B_RM-1063_11	**Date of Report:**	30-Jan-2015
Number of pages:	19	**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 P.O.Box(86) Joensuunkatu 7E FIN-24101 SALO, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 71 80 44122
FCC listing no.: **IC recognition no.:**	533467 661V-1		
Tested devices/ accessories:	**Phone RM-1063 / Battery BV-T4V / Ac-Charger AC-20E / Headset WH-108**		
FCC ID:	PYARM-1063	**IC:**	-
Supplement reports:	-		
Testing has been carried out in accordance with:	**CFR 47, FCC rules Part 15 Subpart B, ANSI C63.4 (2003), CISPR 22 and IC standards, RSS-GEN (Issue 4, November 2014), RSS-132 (Issue 3, January 2013), RSS-133 (Issue 6, January 2013), RSS-139 (Issue 2, February 2009), RSS-130 (Issue 1, October 2013), 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:	 Digitally signed by Lehtonen Sami.K DN: o=Nokia, ou=People, 0.9.2342.19200300.100.1.1=10019393, cn=Lehtonen Sami.K Date: 2015.01.30 14:25:22 +02'00'		

Sami Lehtonen, Specialist, EMC

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

1. Summary for FCC Part 15B Compliance Test Report

Date of receipt	18-Dec-2014
Testing completed	30-Jan-2015
The customer's contact person	Jari Rontu
Test Plan referred to	T:\Projects\RM-1063\TestPlan\RS_testplan_RM-1063.xlsm
Notes	-
Document name	T:\Projects\RM-1063\EMC\FCC15B_RM-1063_11.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-1063	356493060017073	6204	-	02154.00000.14501.24000	18955
Battery	BV-T4V	4181574345C1010324260670764	CCE	-	-	18707
Ac-Charger	AC-20E	4090494156670711455ö0675628	-	-	-	18697
Headset	WH-108	4235VFA	-	-	-	18698

1.2. Summary of Test Results

GSM 850:

Section in CFR 47	Section in RSS-GEN	Name of the test	Result
15.107, a	7.2.4	AC powerline conducted emissions	NP
15.109, a	6.1	Radiated emissions	PASSED

GSM 1900:

Section in CFR 47	Section in RSS-GEN	Name of the test	Result
15.107, a	7.2.4	AC powerline conducted emissions	NP
15.109, a	6.1	Radiated emissions	PASSED

LTE4:

Section in CFR 47	Section in RSS-GEN	Name of the test	Result
15.107, a	7.2.4	AC powerline conducted emissions	NP
15.109, a	6.1	Radiated emissions	PASSED

LTE12:

Section in CFR 47	Section in RSS-GEN	Name of the test	Result
15.107, a	7.2.4	AC powerline conducted emissions	NP
15.109, a	6.1	Radiated emissions	PASSED

LTE7:

Section in CFR 47	Section in RSS-GEN	Name of the test	Result
15.107, a	7.2.4	AC powerline conducted emissions	NP
15.109, a	6.1	Radiated emissions	PASSED

LTE29 RX:

Section in CFR 47	Section in RSS-GEN	Name of the test	Result
15.107, a	7.2.4	AC powerline conducted emissions	
15.109, a	6.1	Radiated 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 Microsoft 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

CONTENTS

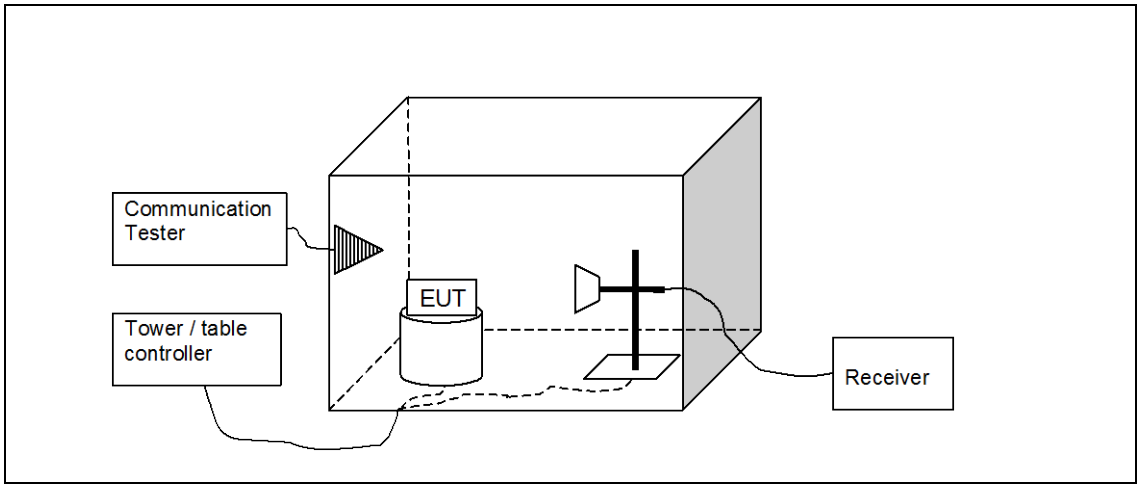
TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

2. Radiated emissions

(FCC 15.109, a, RSS-132 6.1, RSS-133 6.1, RSS-139 6.1, RSS-130 6.1, RSS-199 6.1)

EUT with DUT number	RM-1063, DUT 18955
Accessories with DUT numbers	BV-T4V, DUT 18707 ; AC-20E, DUT 18697 ; WH-108, DUT 18698
Operation Voltage [V] / [Hz]	115 / 60
Results	PASSED
Remarks	GSM 850, GSM 1900 and LTE 4 FM radio is on during test. LTE 12 GPS receiver is active on during test. LTE 7 measured antenna 2 and FM radio is on during test. LTE 2 + 29 CA used in test.
Temp [ºC] / Humidity [%RH] / Air Pressure [kPa]	21 / 39 / 97.7 & 98.3
Date of measurements	03-Jan-2015 & 30-Jan-2015
Measured by	Sami Lehtonen

2.1.1 Test setup



2.2. Test method and limit

The measurement is made according to ANSI C63.4-2003as follows:

The measurement is performed in the Semi-Anechoic Chamber with conducting metal floor.

The measurement distance is 3 m.

The EUT is placed on a nonconductive plate at 80 cm height.

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.

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

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 ($A_{TOT} = L_{CABLES} + A_F - G_{PREAMP}$).

CISPR 22 and FCC Part 15 Class B limits (3 m measurement distance)

Frequency range [MHz]	Quasi peak limit [dBµV/m]	Average limit [dBµV/m]	Peak limit [dBµV/m]
30 - 230	40	-	-
230 – 1000	47	-	-
1000 - 3000	-	50	70
Above 3000	-	54	74

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

2.3. GSM 850 test results, FM radio is on

RX mode, channel 128 / 869.2 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
3478.2	36.78	69.024	42.58	-5.8	74	37.22	PASSED
6955.5	47.2	229.087	44.9	2.3	74	26.8	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
3478.2	23.81	15.506	29.61	-5.8	54	30.19	PASSED
6955.5	33.93	49.716	31.63	2.3	54	20.07	PASSED

RX mode, channel 190 / 881.6 MHz

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
37.975	27.4	23.442	40.6	-13.2	40	12.6	PASSED
42.282	25.85	19.611	41.85	-16	40	14.15	PASSED
72.158	17.81	7.771	41.11	-23.3	40	22.19	PASSED
77.135	15.09	5.682	37.79	-22.7	40	24.91	PASSED
97.986	61.18	1145.513	83.08	-21.9	40	-21.18	*PASSED
604.79	28.73	27.321	43.63	-14.9	47	18.27	PASSED
607.996	31.62	38.107	46.42	-14.8	47	15.38	PASSED
646.413	25.49	18.815	39.59	-14.1	47	21.51	PASSED

*98.0 MHz frequency is FM-Radio signal and thus ignored."

RX mode, channel 190 / 881.6 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
7818.439	47.43	235.234	42.13	5.3	74	26.57	PASSED
7824.55	47.13	227.248	41.83	5.3	74	26.87	PASSED
7828.961	47	223.872	41.6	5.4	74	27	PASSED
7840.179	47.19	228.823	41.79	5.4	74	26.81	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
7818.439	34.21	51.345	28.91	5.3	54	19.79	PASSED
7824.55	34.31	51.94	29.01	5.3	54	19.69	PASSED
7828.961	34.36	52.24	28.96	5.4	54	19.64	PASSED
7840.179	34.28	51.761	28.88	5.4	54	19.72	PASSED

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

RX mode, channel 190 / 881.6 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
3525.1	36.87	69.743	42.27	-5.4	74	37.13	PASSED
7054.7	45.98	199.067	42.98	3	74	28.02	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
3525.1	24.21	16.237	29.61	-5.4	54	29.79	PASSED
7054.7	32.52	42.267	29.52	3	54	21.48	PASSED

RX mode, channel 251 / 893.8 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
3575	37.34	73.621	42.34	-5	74	36.66	PASSED
7151.8	46.66	215.278	42.96	3.7	74	27.34	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
3575	24.37	16.539	29.37	-5	54	29.63	PASSED
7151.8	33.5	47.315	29.8	3.7	54	20.5	PASSED

2.4. GSM 1900 test results

RX mode, channel 512 / 1930.2 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
3860.5	38.66	85.704	43.26	-4.6	74	35.34	PASSED
7720.5	47.25	230.409	42.35	4.9	74	26.75	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
3860.5	24.83	17.438	29.43	-4.6	54	29.17	PASSED
7720.5	34.17	51.109	29.27	4.9	54	19.83	PASSED

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

RX mode, channel 661 / 1960.0 MHz

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
38.106	26.22	20.464	39.52	-13.3	40	13.78	PASSED
42.414	26.74	21.727	42.84	-16.1	40	13.26	PASSED
74.73	19.91	9.897	42.81	-22.9	40	20.09	PASSED
97.986	57.97	791.589	79.87	-21.9	40	-17.97	*PASSED
643.207	26.6	21.38	40.7	-14.1	47	20.4	PASSED
646.393	27.12	22.699	41.22	-14.1	47	19.88	PASSED
646.413	26.78	21.827	40.88	-14.1	47	20.22	PASSED
649.599	27.68	24.21	41.68	-14	47	19.32	PASSED
659.218	27.01	22.413	40.71	-13.7	47	19.99	PASSED
665.601	27.61	24.016	41.51	-13.9	47	19.39	PASSED

*98.0 MHz frequency is FM-Radio signal and thus ignored."

RX mode, channel 661 / 1960.0 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
7825.25	46.98	223.357	41.68	5.3	74	27.02	PASSED
7828.561	47.15	227.772	41.75	5.4	74	26.85	PASSED
7858.715	47.15	227.772	41.65	5.5	74	26.85	PASSED
7864.127	46.97	223.1	41.37	5.6	74	27.03	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
7825.25	34.34	52.119	29.04	5.3	54	19.66	PASSED
7828.561	34.36	52.24	28.96	5.4	54	19.64	PASSED
7858.715	34.11	50.757	28.61	5.5	54	19.89	PASSED
7864.127	34.11	50.757	28.51	5.6	54	19.89	PASSED

RX mode, channel 661 / 1960.0 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
3921.2	37.95	78.977	42.15	-4.2	74	36.05	PASSED
7839.7	47.56	238.781	42.16	5.4	74	26.44	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
3921.2	25.1	17.989	29.3	-4.2	54	28.9	PASSED
7839.7	34.25	51.582	28.85	5.4	54	19.75	PASSED

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

RX mode, channel 810 / 1989.8 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
3978.3	38.23	81.564	42.53	-4.3	74	35.77	PASSED
7960.1	48.11	254.39	42.01	6.1	74	25.89	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
3978.3	24.93	17.64	29.23	-4.3	54	29.07	PASSED
7960.1	34.93	55.783	28.83	6.1	54	19.07	PASSED

2.5. LTE4 test results

RX mode, channel 1975 / 2112.5 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
4226	38.02	79.616	41.92	-3.9	74	35.98	PASSED
6336.4	44.89	175.59	45.09	-0.2	74	29.11	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
4226	25.23	18.26	29.13	-3.9	54	28.77	PASSED
6336.4	32.13	40.411	32.33	-0.2	54	21.87	PASSED

RX mode, channel 2175 / 2132.5 MHz

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
30.18	25.37	18.557	33.57	-8.2	40	14.63	PASSED
36.705	26.02	19.999	38.42	-12.4	40	13.98	PASSED
42.244	26.33	20.725	42.33	-16	40	13.67	PASSED
71.41	20.31	10.363	43.81	-23.5	40	19.69	PASSED
97.986	53.26	460.257	75.16	-21.9	40	-13.26	*PASSED
620.792	26.29	20.63	41.09	-14.8	47	20.71	PASSED
623.998	25.42	18.664	40.12	-14.7	47	21.58	PASSED
643.207	26.46	21.038	40.56	-14.1	47	20.54	PASSED
646.413	26.97	22.31	41.07	-14.1	47	20.03	PASSED
649.619	25.5	18.836	39.5	-14	47	21.5	PASSED

*98.0 MHz frequency is FM-Radio signal and thus ignored."

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

RX mode, channel 2175 / 2132.5 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
7814.53	47.6	239.883	42.4	5.2	74	26.4	PASSED
7826.451	47.61	240.16	42.21	5.4	74	26.39	PASSED
7828.257	47.26	230.675	41.86	5.4	74	26.74	PASSED
7845.393	47.21	229.351	41.81	5.4	74	26.79	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
7814.53	34.18	51.168	28.98	5.2	54	19.82	PASSED
7826.451	34.38	52.36	28.98	5.4	54	19.62	PASSED
7828.257	34.39	52.42	28.99	5.4	54	19.61	PASSED
7845.393	34.15	50.992	28.75	5.4	54	19.85	PASSED

RX mode, channel 2175 / 2132.5 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
4263.8	39.01	89.228	42.51	-3.5	74	34.99	PASSED
6395.8	45.28	183.654	45.18	0.1	74	28.72	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
4263.8	25.57	18.989	29.07	-3.5	54	28.43	PASSED
6395.8	32.6	42.658	32.5	0.1	54	21.4	PASSED

RX mode, channel 2375 / 2152.5 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
4303	38.69	86	41.49	-2.8	74	35.31	PASSED
6457.1	45.42	186.638	45.02	0.4	74	28.58	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
4303	26.15	20.3	28.95	-2.8	54	27.85	PASSED
6457.1	32.39	41.639	31.99	0.4	54	21.61	PASSED

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

2.6. LTE12 test results, GPS receiver is active

RX mode, channel 5035 / 731.5 MHz

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
730.91	46.64	214.783	53.64	-7	47	0.36	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
1461.4	35.62	60.395	42.32	-6.7	70	34.38	PASSED
1461.8	35.5	59.566	42.3	-6.8	70	34.5	PASSED
2192.7	40.17	101.976	42.97	-2.8	70	29.83	PASSED
2194.8	39.85	98.288	42.65	-2.8	70	30.15	PASSED
3000.6	37.6	75.858	42.3	-4.7	74	36.4	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
1461.4	22.79	13.788	29.49	-6.7	50	27.21	PASSED
1461.8	22.77	13.756	29.57	-6.8	50	27.23	PASSED
2192.7	27.17	22.83	29.97	-2.8	50	22.83	PASSED
2194.8	27.15	22.777	29.95	-2.8	50	22.85	PASSED
3000.6	24.49	16.769	29.19	-4.7	54	29.51	PASSED

RX mode, channel 5095 / 737.5 MHz

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
30.03	23.1	14.289	31.2	-8.1	40	16.9	PASSED
37.875	26.73	21.702	39.83	-13.1	40	13.27	PASSED
40.204	21.41	11.763	36.01	-14.6	40	18.59	PASSED
75.689	16.77	6.894	39.57	-22.8	40	23.23	PASSED
76.958	15.4	5.888	38.1	-22.7	40	24.6	PASSED
601.613	27.58	23.933	42.38	-14.8	47	19.42	PASSED
623.998	27.25	23.041	41.95	-14.7	47	19.75	PASSED
646.413	26.25	20.535	40.35	-14.1	47	20.75	PASSED
649.619	25.41	18.642	39.41	-14	47	21.59	PASSED
738.839	37.55	75.422	50.45	-12.9	47	9.45	PASSED

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

RX mode, channel 5095 / 737.5 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
7829.158	47	223.872	41.6	5.4	74	27	PASSED
7834.365	47.28	231.206	41.88	5.4	74	26.72	PASSED
7842.887	47.2	229.087	41.8	5.4	74	26.8	PASSED
7845.495	46.95	222.587	41.55	5.4	74	27.05	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
7829.158	34.36	52.24	28.96	5.4	54	19.64	PASSED
7834.365	34.34	52.119	28.94	5.4	54	19.66	PASSED
7842.887	34.23	51.464	28.83	5.4	54	19.77	PASSED
7845.495	34.13	50.874	28.73	5.4	54	19.87	PASSED

RX mode, channel 5095 / 737.5 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
1474.5	35.48	59.429	42.48	-7	70	34.52	PASSED
2213.2	40.34	103.992	43.14	-2.8	70	29.66	PASSED
3000.2	37.35	73.706	42.05	-4.7	74	36.65	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
1474.5	22.58	13.459	29.58	-7	50	27.42	PASSED
2213.2	27.1	22.646	29.9	-2.8	50	22.9	PASSED
3000.2	24.3	16.406	29	-4.7	54	29.7	PASSED

RX mode, channel 5155 / 743.5 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
1488.4	36.46	66.527	43.56	-7.1	70	33.54	PASSED
2229.9	40.31	103.633	42.61	-2.3	70	29.69	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
1488.4	22.49	13.32	29.59	-7.1	50	27.51	PASSED
2229.9	27.46	23.605	29.76	-2.3	50	22.54	PASSED

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

RX mode, channel 5095 / 737.5 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
1474.1	36.32	65.464	43.32	-7	70	33.68	PASSED
1475.3	35.96	62.806	42.96	-7	70	34.04	PASSED
2211.9	40.34	103.992	43.14	-2.8	70	29.66	PASSED
2213.6	39.99	99.885	42.69	-2.7	70	30.01	PASSED
3001.4	37.34	73.621	42.04	-4.7	74	36.66	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
1474.1	22.55	13.412	29.55	-7	50	27.45	PASSED
1475.3	22.56	13.428	29.56	-7	50	27.44	PASSED
2211.9	27.1	22.646	29.9	-2.8	50	22.9	PASSED
2213.6	27.1	22.646	29.8	-2.7	50	22.9	PASSED
3001.4	24.35	16.501	29.05	-4.7	54	29.65	PASSED

2.7. LTE7 test results, measured from antenna 2, FM radio is on

RX mode, channel 2775 / 2622.5 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
5243	42.63	135.363	44.13	-1.5	74	31.37	PASSED
7867.8	47	223.872	41.4	5.6	74	27	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
5243	29.74	30.69	31.24	-1.5	54	24.26	PASSED
7867.8	34.05	50.408	28.45	5.6	54	19.95	PASSED

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

2.8. LTE 2 + LTE29 CA RX test results

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
1438.9	35.69	60.884	42.59	-6.9	70	34.31	PASSED
1441	35.28	58.076	42.08	-6.8	70	34.72	PASSED
2157.2	39.79	97.611	42.99	-3.2	70	30.21	PASSED
2158.7	40.55	106.537	43.85	-3.3	70	29.45	PASSED
3001.1	38.5	84.14	43.2	-4.7	74	35.5	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
1438.9	22.8	13.804	29.7	-6.9	50	27.2	PASSED
1441	22.6	13.49	29.4	-6.8	50	27.4	PASSED
2157.2	27.02	22.439	30.22	-3.2	50	22.98	PASSED
2158.7	27	22.387	30.3	-3.3	50	23	PASSED
3001.1	25.03	17.844	29.73	-4.7	54	28.97	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
1444.1	35.95	62.734	42.65	-6.7	70	34.05	PASSED
1445.7	36.19	64.491	42.89	-6.7	70	33.81	PASSED
2168.6	40.1	101.158	43.4	-3.3	70	29.9	PASSED
3001.5	38.5	84.14	43.2	-4.7	74	35.5	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
1444.1	23	14.125	29.7	-6.7	50	27	PASSED
1445.7	22.94	14.028	29.64	-6.7	50	27.06	PASSED
2168.6	26.94	22.233	30.24	-3.3	50	23.06	PASSED
3001.5	25.64	19.143	30.34	-4.7	54	28.36	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
1449.2	35.41	58.952	42.21	-6.8	70	34.59	PASSED
2177.7	40.04	100.462	43.14	-3.1	70	29.96	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
1449.2	22.25	12.957	29.05	-6.8	50	27.75	PASSED
2177.7	27.08	22.594	30.18	-3.1	50	22.92	PASSED

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

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
35.525	26.6	21.38	38.3	-11.7	40	13.4	PASSED
39.603	29.08	28.445	43.28	-14.2	40	10.92	PASSED
76.641	25.96	19.861	48.66	-22.7	40	14.04	PASSED
77.423	25.78	19.454	48.38	-22.6	40	14.22	PASSED
307.204	23.07	14.24	43.07	-20	47	23.93	PASSED
310.401	22.83	13.852	42.83	-20	47	24.17	PASSED
313.607	25.52	18.88	45.52	-20	47	21.48	PASSED
315.224	13.77	4.881	33.77	-20	47	33.23	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
7820.042	46.89	221.055	41.59	5.3	74	27.11	PASSED
7827.458	47.54	238.232	42.14	5.4	74	26.46	PASSED
7833.669	47.46	236.048	42.06	5.4	74	26.54	PASSED
7842.486	47.13	227.248	41.73	5.4	74	26.87	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
7820.042	34.29	51.82	28.99	5.3	54	19.71	PASSED
7827.458	34.4	52.481	29	5.4	54	19.6	PASSED
7833.669	34.36	52.24	28.96	5.4	54	19.64	PASSED
7842.486	34.28	51.761	28.88	5.4	54	19.72	PASSED

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

RX mode, channel 3100 / 2655 MHz

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
38.376	28.19	25.674	41.59	-13.4	40	11.81	PASSED
42.694	25.99	19.93	42.29	-16.3	40	14.01	PASSED
97.986	63.08	1425.608	84.98	-21.9	40	-23.08	*PASSED
598.397	32.36	41.495	47.16	-14.8	47	14.64	PASSED
601.583	32.74	43.351	47.54	-14.8	47	14.26	PASSED
604.79	33.1	45.186	48	-14.9	47	13.9	PASSED
607.996	32.57	42.511	47.37	-14.8	47	14.43	PASSED
611.202	31.45	37.368	46.25	-14.8	47	15.55	PASSED
624.008	31.72	38.548	46.42	-14.7	47	15.28	PASSED
626.785	12.56	4.246	27.16	-14.6	47	34.44	PASSED

*98.0 MHz frequency is FM-Radio signal and thus ignored."

RX mode, channel 3100 / 2655 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
7827.052	47.61	240.16	42.21	5.4	74	26.39	PASSED
7830.562	47.87	247.457	42.47	5.4	74	26.13	PASSED
7837.174	47.03	224.647	41.63	5.4	74	26.97	PASSED
7853.006	47.73	243.501	42.23	5.5	74	26.27	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
7827.052	34.34	52.119	28.94	5.4	54	19.66	PASSED
7830.562	34.32	52	28.92	5.4	54	19.68	PASSED
7837.174	34.31	51.94	28.91	5.4	54	19.69	PASSED
7853.006	34.08	50.582	28.58	5.5	54	19.92	PASSED

RX mode, channel 3100 / 2655 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
5309.8	41.99	125.748	43.59	-1.6	74	32.01	PASSED
7965.6	47.37	233.615	41.27	6.1	74	26.63	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
5309.8	29.02	28.249	30.62	-1.6	54	24.98	PASSED
7965.6	34.92	55.719	28.82	6.1	54	19.08	PASSED

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

RX mode, channel 3425 / 2687.5 MHz

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
5373.6	42.86	138.995	44.26	-1.4	74	31.14	PASSED
8062.4	47.71	242.941	41.41	6.3	74	26.29	PASSED

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

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Limit [dBµV/m]	Margin	Results
5373.6	29.86	31.117	31.26	-1.4	54	24.14	PASSED
8062.4	34.81	55.017	28.51	6.3	54	19.19	PASSED

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

3. Test Equipment

3.1. 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

3.2. 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

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122

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

TCC Microsoft Salo Laboratory
P.O.Box(86)
Joensuunkatu 7E
FIN-24101 SALO, FINLAND
Tel. +358 (0) 7180 08000
Fax. +358 71 80 44122