

FCC Test Report (Part 15C)

WPT

Test Report no.:	EMC_BO_002033(v1.0)	Date of Report:	13-May-2016
Number of pages:	11	Project support engineer:	Frank Wittmann
Test period:	05. - 13.-May 2016		

Applicant:	Novero Dabendorf GmbH, Märkische Straße 72, 15806 Zossen, Mr. Christian Pauli		
Manufacturer:	Novero Dabendorf GmbH, Märkische Straße 72, 15806 Zossen, Germany		
EUT ident.:	Novero, WCH-184 (WCH-184a, WCH-184b, WCH-184c)		
FCC ID:	RK7184-00	IC ID:	4774A-18400

Referred documents:	CFR 47, FCC rules Part 15 Subpart C, ANSI C63.10 (2013), IC standards RSS-GEN (Issue4) and RSS-216 (Issue 1). Deviations or clarifications to these standards are noted in the related test result under "test method and limit".
----------------------------	---

Testing Laboratory:	novero Test Center, Meesmannstr.103, 44807 Bochum, Germany		
	Tel.:	+49 234/51668-0	e-mail: product-validation@novero.com
	FCC listing no.:	881111	IC recognition no.: 7847A-1
	Laboratory manager:	Jürgen Mitterer	

Test result	The EUT complies with the requirements made in the referred test documents.
--------------------	---

Approver:	Ines Baufeld	Author:	Robert Müller
Title:	Laboratory Quality Manager	Title:	Product Certification Manager
Signature:		Signature:	

This test report may not be reproduced, except in full, without written permission of testing laboratory. The test results in this test report relates only to the tested sample, which is mentioned in this test report. Novero GmbH cannot be made responsible for any generalisations or conclusions drawn from this test report. Modification of the tested sample is prohibited and leads to invalidity of this test report.

1. Summary for FCC Part 15C Test Report

Date of receipt	05-Apr-2016
Testing completed	13-May-2016
The customer's contact person	Christian Pauli
Notes	none

1.1. EUT and Accessory Information

The EUT is an inductive wireless power transfer device (wireless charger) with load management operating at 111kHz. EUT is tested with a self designed and shielded receiver simulator which requests and consumes always maximum rated TX power.

Product	Type	SN	HW	MV	SW	DUT
Wireless charger unit	WCH-184b	--	C1.1	--	0.08	DAB16035E
Wireless charger unit	WCH-184c	--	C1.1	--	0.08	DAB16045E
Artificial load	WCH Rec.	0001	1.0	--	--	DAB16024E
Power cable	--	--	--	--	--	DAB15201E
RF cable with BiasT	--	--	--	--	--	DAB14039

1.2. Summary of Test Results

Section	Section in CFR 47	Section in RSS-GEN or RSS-216 *)	Name of the test	Result
3&4	15.209	4.2.2	Spurious radiated emissions	PASS
-	15.207	4.2.1	AC powerline conducted emissions	NA
5	--	6.6	Occupied Bandwidth	PASS

PASS: The EUT complies with the essential requirements in the standard.
 FAIL: The EUT does not comply with the essential requirements in the standard.
 NP: The test was not performed.
 NA: The test was not applicable.

Note: Standards marked with *) are not listed in accreditation scope.

1.3. Measurement Uncertainties

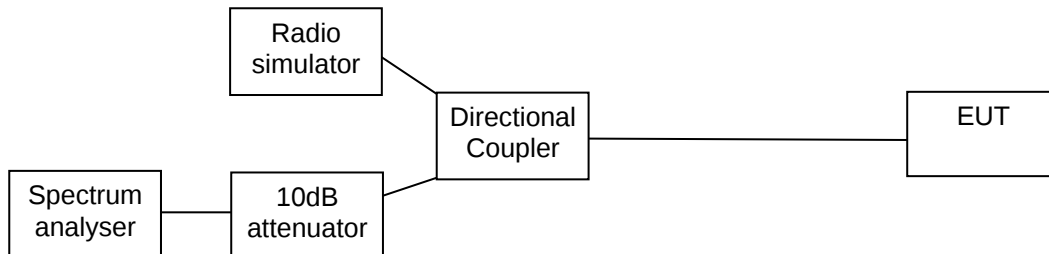
Parameter	Measurement Uncertainty
Radio Frequency	$\pm 3.6 \times 10^{-7}$
Total RF Power, conducted	± 0.79 dB
Emissions, conducted	± 1.67 dB
All emissions, radiated	± 5.38 dB
Temperature	± 0.25 °C
Humidity	± 1.0 %

CONTENTS

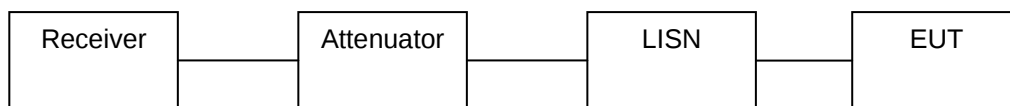
1. SUMMARY FOR FCC PART 15C TEST REPORT	2
1.1. EUT AND ACCESSORY INFORMATION	2
1.2. SUMMARY OF TEST RESULTS.....	2
1.3. MEASUREMENT UNCERTAINTIES	2
2. TEST SETUPS	4
2.1. CONDUCTED RF TEST SETUP.....	4
2.2. AC POWER LINE CONDUCTED EMISSIONS TEST SETUP	4
2.3. RADIATED EMISSIONS TEST SETUP	4
3. RADIATED EMISSIONS BELOW 30MHZ (FCC §15.209, RSS-216 4.2.2)	5
3.1. TEST METHOD AND LIMIT	5
3.2. TEST RESULTS (DAB16035E)	6
3.3. TEST RESULTS (DAB16045E)	7
4. RADIATED EMISSIONS ABOVE 30MHZ (FCC §15.209, RSS-216 4.2.2)	8
4.1. TEST METHOD AND LIMIT	8
4.2. TEST RESULTS	9
5. OCCUPIED BANDWIDTH (RSS-GEN 6.6)	10
5.1. TEST METHOD AND LIMIT	10
5.2. TEST RESULTS	10
6. TEST EQUIPMENT	11
6.1. CONDUCTED MEASUREMENTS	11
6.2. RADIATED MEASUREMENTS	12

2. Test setups

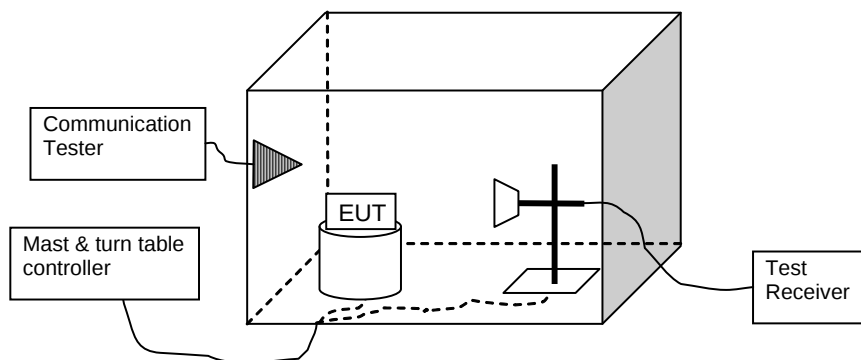
2.1. Conducted RF test setup



2.2. AC power line conducted emissions test setup



2.3. Radiated emissions test setup



3. Radiated emissions below 30MHz (FCC §15.209, RSS-216 4.2.2)

EUT with DUT number	DAB16035E / DAB16045E
Accessories with DUT numbers	DAB16024E (Novero WCH Receiver), DAB15201E (power cable), DAB14039 (RF cable)
Operation Voltage [V] / [Hz]	12 / DC
Result	PASS
Remarks	OP1 (5Ω/5W load, Primary Coil 1)
Temp [°C] / Humidity [%RH]	22.4 / 47.5 / 24.0 / 45.0
Date of measurements	05-Apr-2016 / 13-May-2016
Measured by	Robert Müller

3.1. Test method and limit

The measurement is made according to ANSI C63.10:2013 and RSS-GEN as follows:

The measurement distance is 3m with a shielded loop antenna

The Limit has been adjusted with the distance correction factor (+40dB for 30m distance and +80dB for 300m 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.

The emissions less than 20 dB below the permissible value are reported.

The measurement results are obtained as described below:

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

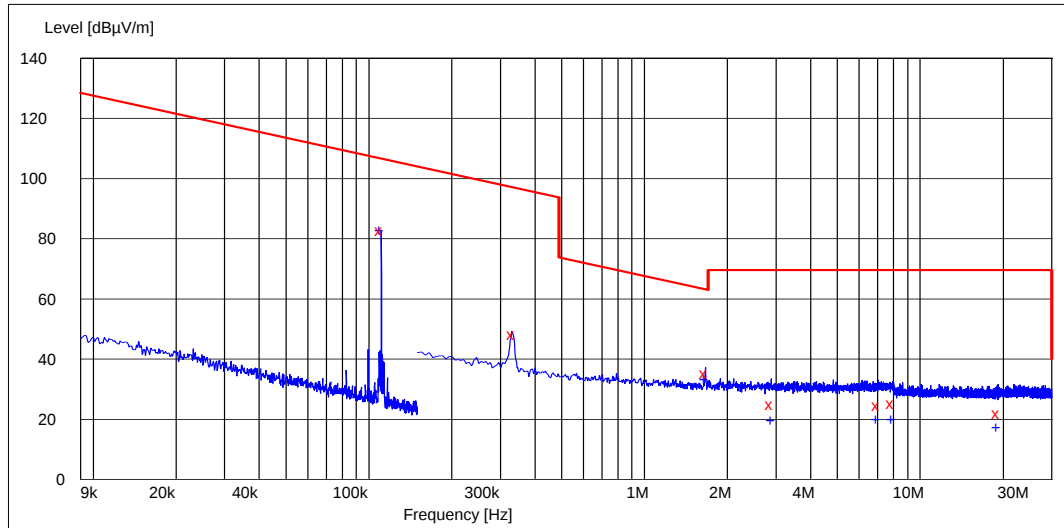
Where U_{RX} is receiver reading and A_{CF} is total correction factor including cable loss, antenna factor and preamplifier gain ($A_{CF} = L_{CABLES} + AF - G_{PREAMP}$).

Limits for spurious radiated emissions measurements (3 m measurement distance)

Frequency range [MHz]	Limit [$\mu V/m$]	Limit [dB $\mu V/m$]	Detector
0.009 – 0.09	10000 * 2400/f(kHz)	128.5 – 93.8	AV
0.09 – 0.11			QP
0.11 – 0.19			AV
0.19 - 0.49			AV
0.490 – 1.705	100 * 24000/f(kHz)	73.8 – 63.0	QP
1.705 – 30.0	100 * 30	69.5	QP

3.2. Test results (DAB16035E)

Peak (<150kHz: RBW: 200Hz, >150kHz: RBW: 10kHz)



QuasiPeak (<150kHz: RBW: 200Hz, >150kHz: RBW: 9kHz)

Frequency [MHz]	Level [dBµV/m]	Transducer [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Polarisation	Azimuth [Deg]	Elevation [Deg]	Result
0.111	82.70	23.30	106.70	24.00	170	VERTICAL	148	90	PASS
0.333	48.10	23.30	97.20	49.10	170	VERTICAL	320	0	PASS
1.663	35.20	23.10	63.20	28.00	170	VERTICAL	320	0	PASS
2.889	24.80	23.10	69.50	44.70	170	VERTICAL	345	90	PASS
7.043	24.70	23.40	69.50	44.80	170	VERTICAL	17	90	PASS
7.935	25.20	23.50	69.50	44.30	170	VERTICAL	3	0	PASS
19.130	22.00	23.50	69.50	47.50	170	VERTICAL	192	0	PASS

No further emissions found less than 20dB to the regulatory limit

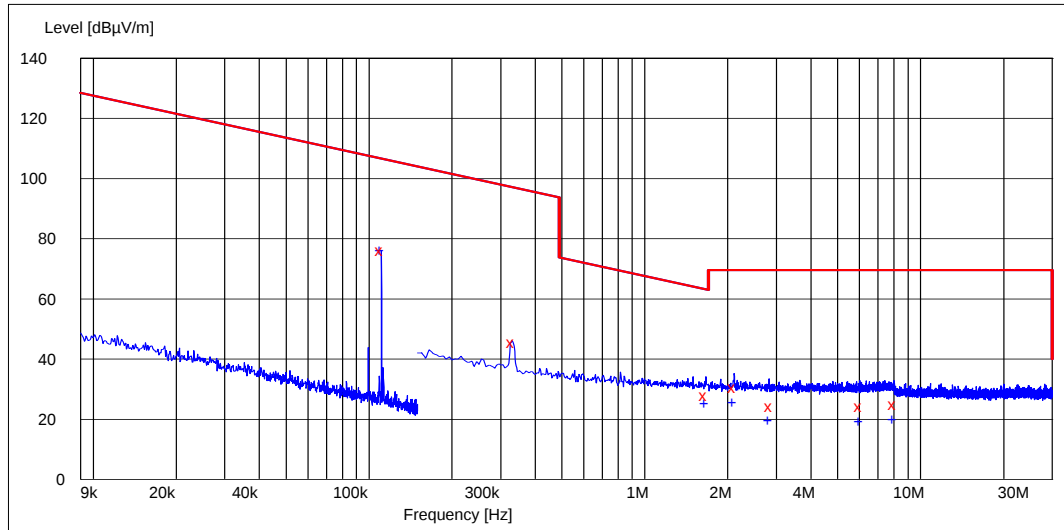
Average (<150kHz: RBW: 200Hz, >150kHz: RBW: 9kHz)

Frequency [MHz]	Level [dBµV/m]	Transducer [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Polarisation	Azimuth [Deg]	Elevation [Deg]	Result
0.111	82.70	23.20	106.70	24.00	170	VERTICAL	148	90	PASS
1.663	33.10	23.10	63.20	30.10	170	VERTICAL	305	0	PASS
2.916	19.70	23.10	69.50	49.80	170	VERTICAL	349	90	PASS
7.012	19.80	23.40	69.50	49.70	170	VERTICAL	338	90	PASS
7.949	20.10	23.50	69.50	49.40	170	VERTICAL	11	0	PASS
19.187	17.40	23.50	69.50	52.10	170	VERTICAL	18	0	PASS

No further emissions found less than 20dB to the regulatory limit

3.3. Test results (DAB16045E)

Peak (<150kHz: RBW: 200Hz, >150kHz: RBW: 10kHz)



QuasiPeak (<150kHz: RBW: 200Hz, >150kHz: RBW: 9kHz)

Frequency [MHz]	Level [dBμV/m]	Transducer [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Polarisation	Azimuth [Deg]	Elevation [Deg]	Result
0.111	76.10	23.20	106.70	30.60	170	VERTICAL	213	90	PASS
0.332	45.70	23.20	97.20	51.50	170	VERTICAL	210	90	PASS
1.661	27.90	23.10	63.20	35.30	170	VERTICAL	135	90	PASS
2.106	30.50	23.00	69.50	39.00	170	VERTICAL	16	0	PASS
2.854	24.40	23.10	69.50	45.10	170	VERTICAL	356	90	PASS
6.052	24.30	23.40	69.50	45.20	170	VERTICAL	119	90	PASS
8.022	24.80	23.50	69.50	44.70	170	VERTICAL	288	90	PASS

No further emissions found less than 20dB to the regulatory limit

Average (<150kHz: RBW: 200Hz, >150kHz: RBW: 9kHz)

Frequency [MHz]	Level [dBμV/m]	Transducer [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Polarisation	Azimuth [Deg]	Elevation [Deg]	Result
0.111	76.10	23.20	106.70	30.60	170	VERTICAL	212	90	PASS
1.663	25.20	23.10	63.20	38.00	170	VERTICAL	116	90	PASS
2.107	25.70	23.00	69.50	34.80	170	VERTICAL	0	90	PASS
2.828	19.60	23.10	69.50	49.90	170	VERTICAL	356	0	PASS
6.038	19.40	23.40	69.50	50.10	170	VERTICAL	144	90	PASS
8.001	19.90	23.50	69.50	49.60	170	VERTICAL	259	90	PASS

No further emissions found less than 20dB to the regulatory limit

4. Radiated emissions above 30MHz (FCC §15.209, RSS-216 4.2.2)

EUT with DUT number	DAB16035E
Accessories with DUT numbers	DAB16024E (Novero WCH Receiver), DAB15201E (power cable), DAB14039 (RF cable)
Operation Voltage [V] / [Hz]	12 / DC
Result	PASS
Remarks	OP1 (5Ω/5W load, Primary Coil 1)
Temp [°C] / Humidity [%RH]	22.4 / 47.5
Date of measurements	05-Apr-2016
Measured by	Robert Müller

4.1. Test method and limit

The measurement is made according to ANSI C63.10:2013 and RSS-GEN as follows:

Below 1GHz:

The Preliminary Measurement and the Final Measurement is performed in 3m distance by rotating the turntable of 360 degrees and moving the antenna height between 1-4m.

The Preliminary Measurement is performed with floor absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system.

The Final Measurement is performed without floor absorbers, if the Preliminary Measurement results are closer than 20 dB to the permissible limit.

Between 1-3GHz:

The Preliminary Measurement and the Final Measurement is performed in 3m distance by rotating the turntable of 360 degrees at fixed height.

The Preliminary Measurement and the Final Measurement with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system.

The Final Measurement is performed, if the Preliminary Measurement results are closer than 20 dB to the permissible limit.

Above 3GHz:

The Preliminary Measurement and the Final Measurement is performed in 1.5m distance by rotating the turntable of 360 degrees at fixed height.

The Preliminary Measurement and the Final Measurement with absorbers on the floor and measuring antenna at fixed height using 2-axis EUT position system.

The Final Measurement is performed, if the Preliminary Measurement results are closer than 20 dB to the permissible limit.

General:

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The EUT is placed at nonconductive plate at the turntable center.

The emissions less than 20 dB below the permissible value are reported.

The measurement results are obtained as described below:

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

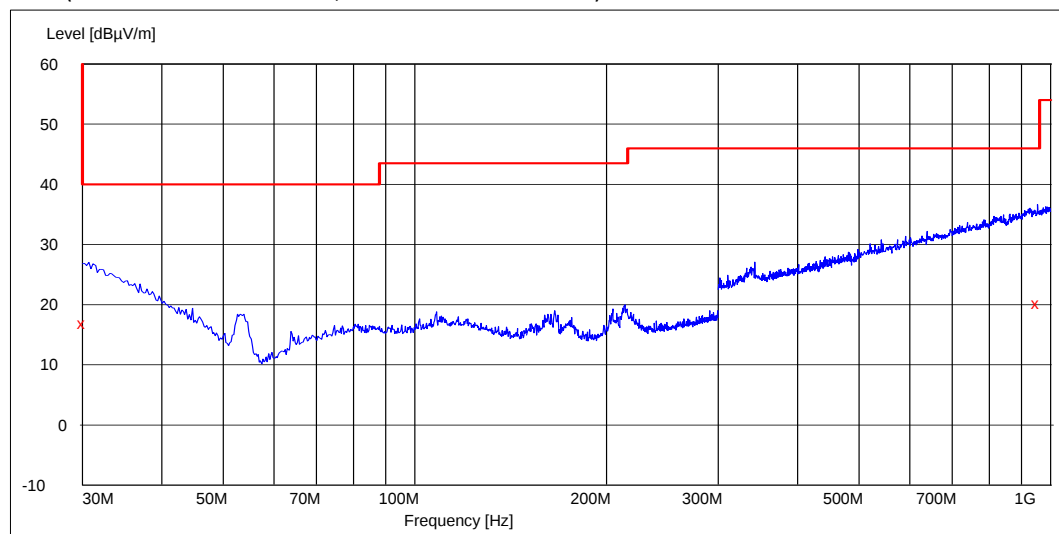
Where U_{RX} is receiver reading and A_{CF} is total correction factor including cable loss, antenna factor and preamplifier gain ($A_{CF} = L_{CABLES} + AF - G_{PREAMP}$).

Limits for spurious radiated emissions measurements (3 m measurement distance)

Frequency range [MHz]	Limit [$\mu\text{V/m}$]	Limit [$\text{dB}\mu\text{V/m}$]	Detector
30 – 88	100	40	QP
88 – 216	150	43.5	QP
216 – 960	200	46	QP
960 – 1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

4.2. Test results

Peak (<300MHz: RBW: 300kHz, >300MHz: RBW: 1MHz)



QuasiPeak (RBW: 120kHz)

Frequency [MHz]	Level [$\text{dB}\mu\text{V/m}$]	Transducer [dB]	Limit [$\text{dB}\mu\text{V/m}$]	Margin [dB]	Height [cm]	Polarisation	Azimuth [Deg]	Result
30.10	16.80	-12.80	40.00	23.20	151	VERTICAL	308	PASS
954.01	20.30	-16.30	46.00	25.70	283	VERTICAL	39	PASS

No emissions found less than 20dB to the regulatory limit

5. Occupied bandwidth (RSS-GEN 6.6)

EUT with DUT number	DAB16035E
Accessories with DUT numbers	DAB16024E (Novero WCH Receiver), DAB15201E (power cable), DAB14039 (RF cable)
Operation Voltage [V] / [Hz]	12 / DC
Result	PASS
Remarks	OP1 (5Ω/5W load, Primary Coil 1)
Temp [°C] / Humidity [%RH]	22.4 / 47.5
Date of measurements	08-Apr-2016
Measured by	Robert Müller

5.1. Test method and limit

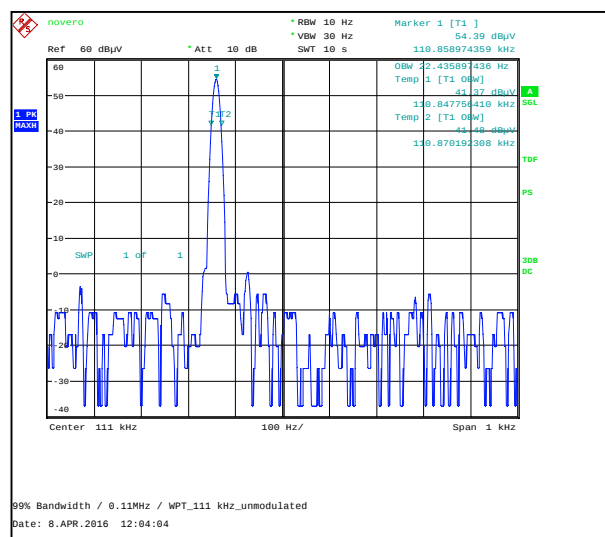
The measurement is made according to IC standard RSS-GEN 6.6.

Limits for 99% dB bandwidth measurements

Limit [MHz]
N/A

5.2. Test results

frequency [kHz]	99% bandwidth [kHz]	Result
110.86	0.02244	PASS



6. Test Equipment

6.1. Conducted measurements

Equipment	Manufacturer	Type	Serial No.	Calibration	Interval
Communication tester	Agilent	N4010A	MY46320388	14-Jul-14	3 years
Communication tester	R&S	CMU200	101138	13-Aug-13	3 years
EMI Testreceiver	R&S	ESU 26	100077/026	22-Oct-15	2 years
Power Supply	Agilent	E3632A	KR75303332	28-Oct-15	2 years
Climatic Chamber	Vötsch	VT 4004	566031450010	09-Sep-14	2 years
Power Sensor	ETS Lindgren	7002-006	7202040	09-Dec-15	3 years
Signal Generator	R&S	SMP02	828269 / 008	08-Jul-14	3 years
Vector Signal Generator	R&S	SMJ100A	100845	20-Aug-14	2 years
Directional Coupler	Tyco	0.5 - 18GHz	2026-6010-10	06-Apr-16	1 year
Cable	Huber+Suhner	Sucoflex 104 / 0.3m	199748/4	06-Apr-16	1 year
Cable	Huber+Suhner	Sucoflex 104 / 0.5m	123746/4	06-Apr-16	1 year
Cable	Huber+Suhner	Sucoflex 104 / 1.2m	143748/4	06-Apr-16	1 year
Cable	Huber+Suhner	Sucoflex 104 / 1.3m	143781/4	06-Apr-16	1 year
Splitter	Mini-Circuits	ZN2PD2-50	SF002300417	06-Apr-16	1 year
Directional Coupler	M/A-Com	2026-6003-20	001	06-Apr-16	1 year
Cable	Huber+Suhner	Sucoflex 104 / 1.3m	125434/4	06-Apr-16	1 year
Cable	Huber+Suhner	Sucoflex 104 / 1.3m	126838/4	06-Apr-16	1 year
Attenuator	Huber+Suhner	10dB	002	06-Apr-16	1 year

6.2. Radiated measurements

Equipment	Manufacturer	Type	Serial No.	Calibration	Interval
Chamber	ETS	RFD-F/ A-100	3069	30- Jun 14	3 years
Control Room	ETS	RFD-100	3070	-	-
Communication Tester	R&S	CMU200	101138	13-Aug-13	3 years
Signal Generator	R&S	SMP02	828269 / 008	08-Jul-14	3 years
Signal Generator	R&S	SML01	100651	23-Sep-14	3 years
Bluetooth Tester	Anritsu	MT 8850A	6k00001358	14-Jul-14	3 years
Power Supply	Agilent	E3632A	MY40011318	28-Oct-15	1 year
Antenna	R&S	HL562	100191	06-Nov-15	3 years
Antenna	EMCO	3115	98105588	17-Jun-15	3 years
Antenna	Schwarzbeck	BBHA9120LF	1298	24-Oct-14	3 years
Antenna	EMCO	3160-09	001814-006	-	-
EMI Test Receiver	R&S	ESI 26	827769/010	21-Oct-15	2 years
Band Reject Filter	Wainwright	Ch 9750/1950 MHz	0371133	31-Mar-16	1 year
Band Reject Filter	Wainwright	Ch 2.4-2.4835GHz	371124	31-Mar-16	1 year
Notch filter GSM 1800	Wainwright	TCH700/1747,8 MHz	0371136	31-Mar-16	1 year
Notch filter GSM 1900	Wainwright	TCH661/1880 MHz	0371137	31-Mar-16	1 year
Notchfilter GSM 900	Wainwright	TCH62/902,4 MHz	0371135	31-Mar-16	1 year
Notchfilter GSM 850	Wainwright	TCH190/836,& MHz	0371134	31-Mar-16	1 year