
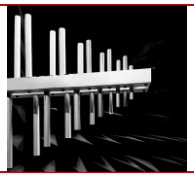
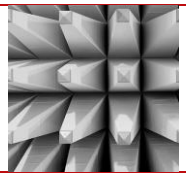

CETECOM™
CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Test Report No.: 1-6234/13-03-14-C

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

Testing Laboratory

CETECOM ICT Services GmbH
Untertürkheimer Straße 6 – 10
66117 Saarbrücken/Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com

Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01

Applicant

Research In Motion Limited
305 Phillip Street
Waterloo, ON N2L 3W8/CANADA
Phone: +1 51 98 88 74 65
Fax: +1 51 98 88 69 06
Contact: Masud Attayi
e-mail: mattayi@rim.com

Manufacturer

Same as Applicant

Test Standard/s

47CFR15	2012-10	Subpart B - Unintentional Radiators

Test Item

Kind of test item:	**Smartphone**
Model name:	**RFX101LW**
FCC ID:	**L6ARFX100LW**
S/N serial number:	IMEI: 004402242373268
HW hardware status:	CER-54735-001 Rev2-04-02
SW software status:	OS Version: 10.2.0.519 Build ID: 546773
Power Supply:	AC 115V/60Hz

This test report is electronically signed and valid without handwritten signature. The public keys can be requested at the test laboratory to verify the electronic signatures.

Test performed:

cn=Joachim Wolsdorfer, o=CETECOM ICT, ou=WLD-110901, email=joachim.wolsdorfer@cetecom.com, c=DE
2013.08.20 10:43:52 +02'00'

Joachim Wolsdorfer
Testing Manager

Test Report authorised:

cn=Jens Hennemann, o=CETECOM ICT, ou=HMN-150710, email=Jens.Hennemann@cetecom.com, c=DE
2013.08.20 10:41:10 +02'00'

Jens Hennemann
Testing Manager

1 Table of contents

2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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This test report is electronically signed and valid without handwritten signature. For verification of the electronical signatures, the public keys can be requested at the testing laboratory.

This test report replaces the test report with the number 1-6234/13-03-14-B and dated 2013-08-13

2.2 Application details

Date of receipt of order:	2013-05-29
Date of receipt of test item:	2013-07-02
Start of test:	2013-07-22
End of test:	2013-07-22
Person(s) present during the test:	-/-

3 Test standard/s:

Test Standard	Version	Test Standard Description
47 CFR 15	2012-10	Subpart B - Unintentional Radiators

4 Test Environment

Temperature:	20°C – 25°C
Relative humidity content:	30 % - 50 %
Air pressure:	1020 hPa
Power supply:	230 V / 50 Hz

5 Test Laboratories sub-contracted

---

6 Information about Test Conditions

6.1 Test Item

Kind of test item :	**Smartphone**		
Type identification :	**RFX101LW**		
Equipment classification:	Equipment for portable use		
Environment classification:	Residential, commercial and light industry		
Supply voltage :	AC 115 V/ 60 Hz		
Ports : **(maximum cable lengths declared by manufacturer)**	**Description**	**Direction**	**Length**
	AC power port:	Input	> 3m
	Signal/control port: Headset	In / output	< 3m
	Signal/control port: HDMI	Output	< 3m
Is mounting position / usual operating position defined?			hand held
Additional information:			
tests have been performed according to customers test plan the radio parts of the device are already tested and not part of this test report			

6.2 EUT: Type, S/N etc. and Short Descriptions Used in this Test Report

short descrip-tion*)	EUT	Type	S/N serial number	HW hardware status	SW software status
EUT A	Smartphone	RFX101LW	IMEI: 004402242373268	CER-54735-001 Rev2-04-02	OS Version: 10.2.0.519 Build ID: 546773

*) EUT short description is used to simplify the identification of the EUT in this test report.

6.3 Auxiliary Equipment (AE): Type, S/N etc. and Short Descriptions

AE descrip -tion*)	Auxiliary equipment	Type	S/N serial number	HW hardware status	SW software status
AE A	wired headset	Wired Headset, part number HDW-44306-003	-/-	-/-	-/-
AE B	wired headset	Alt. 1 Wired Headset, part number HDW-44306-003	-/-	-/-	-/-
AE C	wired headset	Alt. 3 Wired Headset, part number HDW-49299-001	-/-	-/-	-/-
AE D	wired headset	Mono Wired Headset, part number HDW-55351-001	-/-	-/-	-/-
AE F	AC charger	LC NA Charger part number HDW-46445-001	- / -	- / -	- / -
AE I	AC charger	LC NA Charger part number HDW-46445-001	- / -	- / -	- / -
AE L	USB cable	1.2m Micro USB, part number HDW-50071-001	-/-	-/-	-/-
AE M	USB cable	Alt. 1 1.2m Micro USB, part number HDW-50071-001	-/-	-/-	-/-
AE N	USB cable	1.0m Micro USB, part number HDW-51800-001	-/-	-/-	-/-
AE O	USB cable	Alt. 1 1.0m Micro USB, part number HDW-51800-001	-/-	-/-	-/-
AE R	HDMI cable	HDMI Cable 6ft, part number HDW-29572-001	-/-	-/-	-/-
AE S	HDMI monitor	Samsung T220HD	TD22H9M Q602519M	color display TM22WS	-/-

*) AE short description is used to simplify the identification of the auxiliary equipment in this test report.

6.4 EUT Set-up(s)

EUT Set-ups for conducted emission

EUT set-up no.*)	Combination of EUT and AE	operation mode
set. 1	EUT A + AE B + AE F + AE M	PCS1900 idle + charging
set. 2	EUT A + AE C + AE F + AE N	CDMA Cellular (800MHz) idle + charging

EUT Set-ups for radiated emission

EUT operating mode no.*)	Description of operating modes	operation mode
set. 8	EUT A + AE B + AE F + AE M	PCS1900 idle + charging
set. 9	EUT A + AE C + AE I + AE N + AE R + AE S	LTE FDD 4 idle + HDMI out + charging
set. 10	EUT A + AE B + AE F + AE O	LTE FDD 13 (Rx Diversity) idle + charging
set. 11	EUT A + AE B + AE F + AE M	802.11b (CH6) TX+ charging

7 Summary of Test Results

☒ No deviations from the technical specifications were ascertained
☐ There were deviations from the technical specifications ascertained

7.1 Emission

7.1.1 Enclosure

EMI Phenomenon	Frequency range	Basic standard	Result
Radiated Interference Field Strength	30 - 1000 MHz	FCC Part 15 Class B	passed
Radiated Interference Field Strength	> 1 GHz	FCC Part 15 Class B	passed

7.1.2 AC Mains Power Input/Output Ports

EMI Phenomenon	Frequency range	Basic standard	Result
Conducted interference voltage	0,15– 30 MHz	FCC Part 15 Class B	passed

Remarks:

NA1	Not tested because not required by used standard
NA2	Test not applicable because port does not exists
NA3	Test not applicable because port only for services
NA4	Test not applicable because port lengths not longer than 3m
NA5	Not tested because not required by customer
NA6	Not tested because used frequency < 108 MHz

7.2 Measurement and Test Set-up

Note: The test configuration is in accordance with the requirements given in the standards in point 3

7.3 Measurement uncertainty

The uncertainty of the measurement equipment fulfils CISPR 16 and the related European and national standards.

The semi anechoic chamber fulfils the requirements of CISPR 16-1 (ANSI C63.4) for a test volume of 3m ∅.

The uncertainty of the measurement equipment fulfils CISPR 16 and the related European and national standards.

The semi anechoic chamber fulfils the requirements of CISPR 16-1 (ANSI C63.4) for a test volume of 3m ∅.

The table below shows the measurement uncertainties for each measurement method. The expended uncertainty (k=2 or 95%) was calculated with worst case values.

Measurement Method	Frequency area Impulse duration time	Description	Expanded uncertainty (k=2 or 95%)
Radiated Emission FCC part 15 B, ANSI C63.4	30 MHz – 18 GHz	- / -	± 4.28 dB
Conducted Emission FCC part 15 B, ANSI C63.4	9 kHz – 30 MHz	- / -	± 3.49 dB

8 Detailed test results - Emission

8.1 Conducted Emission

8.1.1 Instrumentation for Test (see equipment list)

G 1	G 2	F 21									

8.1.2 Test Plan

EUT set-up	see test details		
Operating mode	**Port / Line**	**Limit**	**Result**
see test details	AC power line	FCC part 15 B Class B	passed

Remark :	Powered by external power supply (115V / 60Hz)

8.1.3 Conducted Limits (Power-Line)

	FCC part 15 B Class B		FCC part 15 B Class A	
Frequency- range	**Quasi-Peak (dBµV)**	**Average (dBµV)**	**Quasi-Peak (dBµV)**	**Average (dBµV)**
0,15 MHz – 0,5 MHz	66-56	56-46	79	66
0,5 MHz -5 MHz	56	46	73	60
5 MHz -30 MHz	60	50	73	60

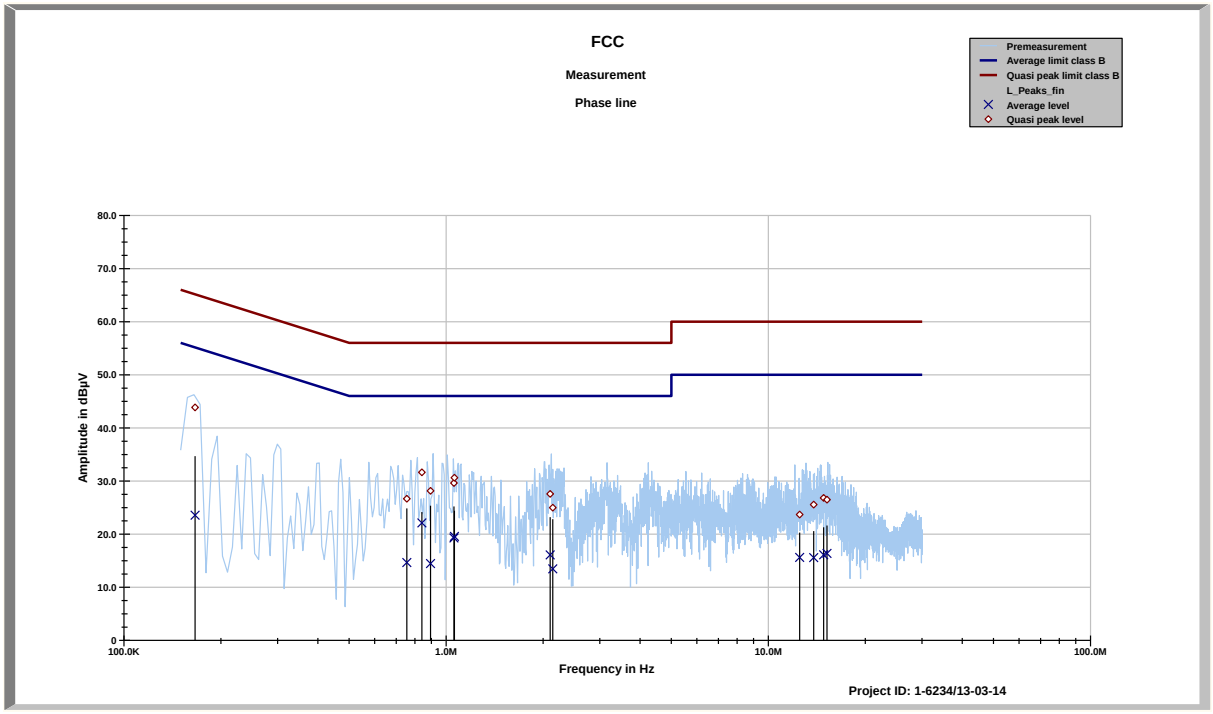
8.1.4 Calibration Information

Device	Serial number	ICT Number	Calibration valid until	Calibration interval
HP 8542 EMI Receiver with RF Filter Unit	3617A00170	300000568	01 / 2014	12 month
VISN ESH 3-Z5	892475/017	300002209	01 / 2014	24 month

Remarks: All emission components and the shielded room were checked weekly
Cable loss: 0.6 to 2.4 dB (150kHz to 30 MHz)

8.1.5 Test Results of Main

set 1:

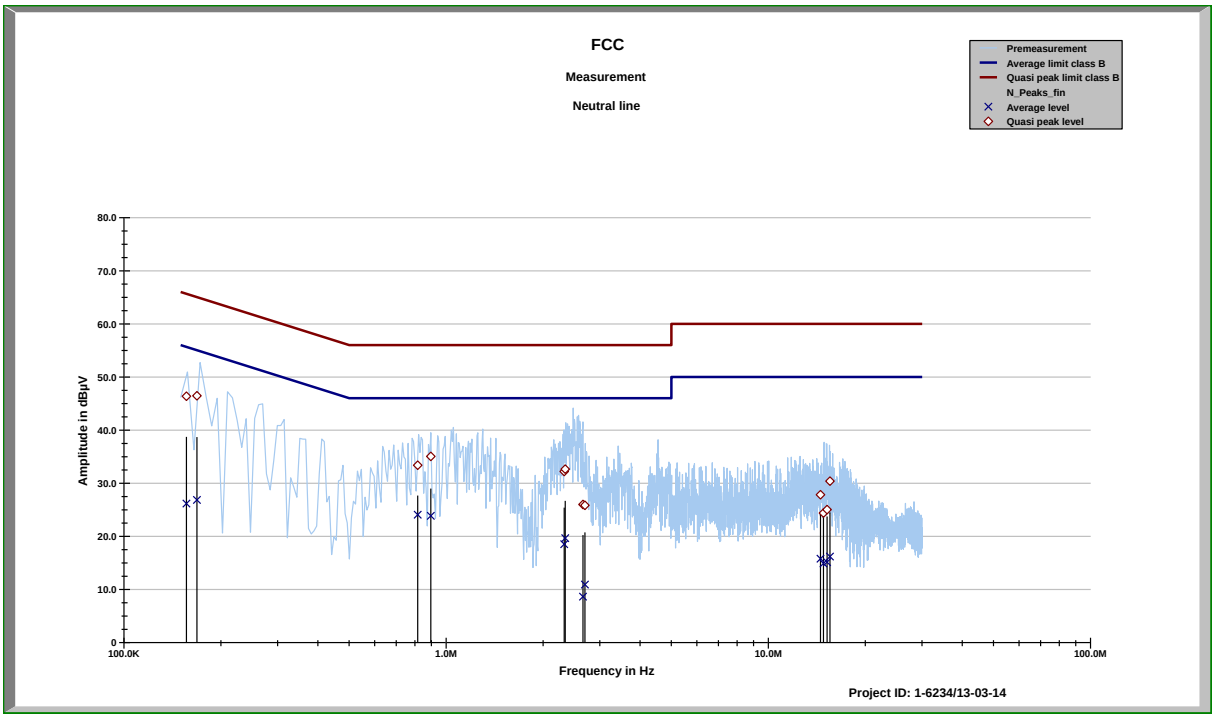


FCC
Phase line tbl
Project ID: 1-6234/13-03-14

10:10:43 AM, Tuesday, June 25, 2013

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
0.16629	43.85	21.30	23.55	31.98
0.75495	26.65	29.35	14.65	31.35
0.84102	31.63	24.37	22.10	23.90
0.89451	28.14	27.86	14.45	31.55
1.057	29.61	26.39	19.26	26.74
1.06082	30.62	25.38	19.57	26.43
2.1028	27.56	28.44	16.07	29.93
2.1419	24.98	31.02	13.45	32.55
12.5006	23.69	36.31	15.62	34.38
13.823	25.56	34.44	15.57	34.43
14.835	26.81	33.19	16.09	33.91
15.2	26.48	33.52	16.37	33.63

Project ID - 1-6234/13-03-14
EUT - RFX101LW + HS2 + CH2 + USB2
Serial Number - imei:004401139609024
Operating mode - PCS1900 idle + charging



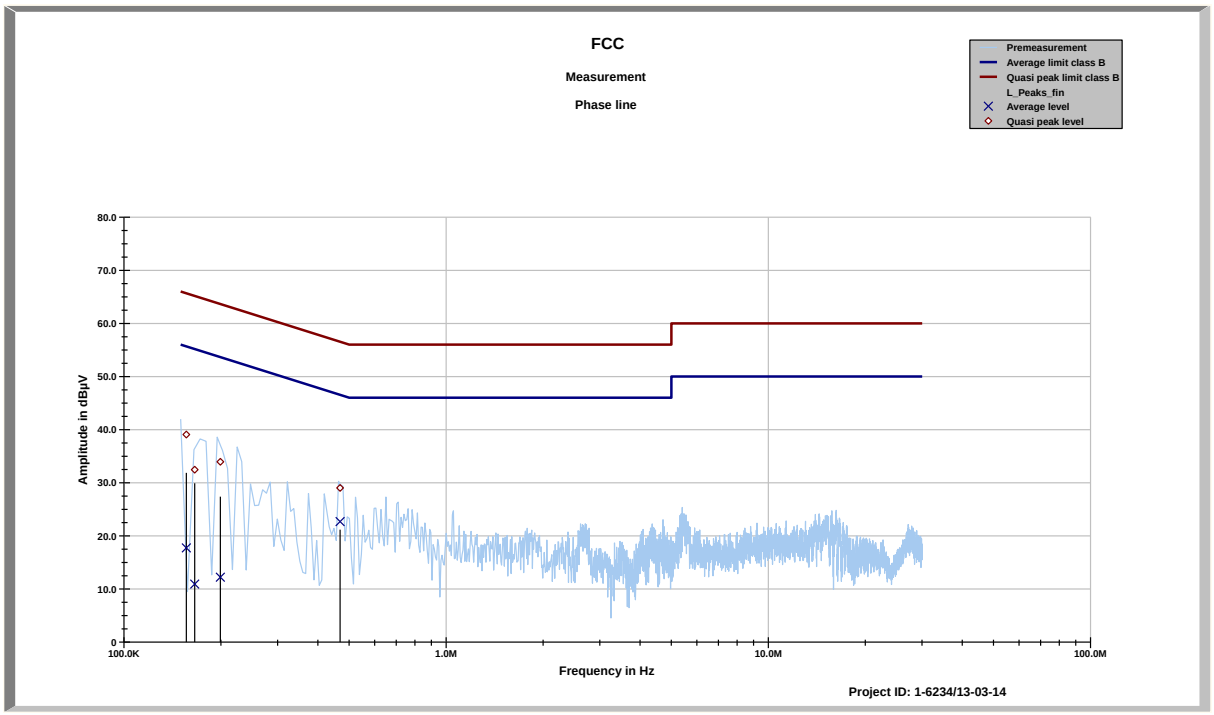
FCC
Neutral line tbl
Project ID: 1-6234/13-03-14

10:10:43 AM, Tuesday, June 25, 2013

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
0.15636	46.38	19.28	26.16	29.66
0.16853	46.45	18.58	26.84	28.63
0.81605	33.39	22.61	24.07	21.93
0.89625	35.04	20.96	23.86	22.14
2.3244	32.20	23.80	18.52	27.48
2.3412	32.65	23.35	19.66	26.34
2.6585	25.99	30.01	8.64	37.36
2.6963	25.83	30.17	10.92	35.08
14.509	27.82	32.18	15.78	34.22
14.819	24.38	35.62	14.90	35.10
15.207	25.03	34.97	15.13	34.87
15.524	30.39	29.61	16.19	33.81

Project ID - 1-6234/13-03-14
EUT - RFX101LW + HS2 + CH2 + USB2
Serial Number - imei:004401139609024
Operating mode - PCS1900 idle + charging

set 2:

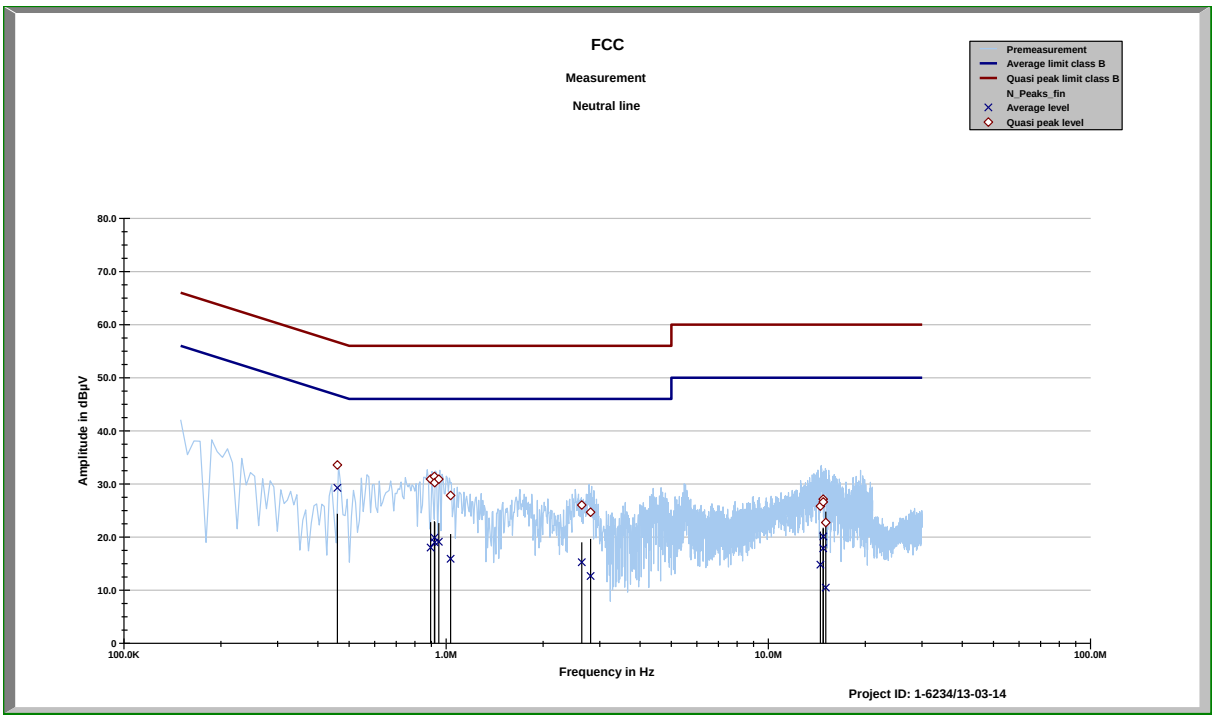


FCC
Phase line tbl
Project ID: 1-6234/13-03-14

10:54:10 AM, Tuesday, July 02, 2013

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
0.15621	39.07	26.59	17.72	38.10
0.16583	32.46	32.71	10.91	44.64
0.19919	33.94	29.71	12.22	42.37
0.46863	29.02	27.51	22.68	24.22

Project ID - 1-6234/13-03-14
EUT - RFX101LW + HS3 + CH2 + USB3
Serial Number - imei:004401139609024
Operating mode - CDMA 800 idle + charging



FCC
Neutral line tbl
Project ID: 1-6234/13-03-14

10:54:10 AM, Tuesday, July 02, 2013

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
0.45953	33.57	23.13	29.27	17.89
0.89485	30.91	25.09	18.03	27.97
0.9195	31.40	24.60	19.88	26.12
0.92174	30.24	25.76	19.01	26.99
0.94898	30.89	25.11	19.12	26.88
1.03247	27.83	28.17	15.91	30.09
2.6355	26.03	29.97	15.27	30.73
2.8061	24.67	31.33	12.67	33.33
14.498	25.81	34.19	14.80	35.20
14.794	27.14	32.86	17.88	32.12
14.796	26.61	33.39	20.11	29.89
15.065	22.73	37.27	10.48	39.52

Project ID - 1-6234/13-03-14
EUT - RFX101LW + HS3 + CH2 + USB3
Serial Number - imei:004401139609024
Operating mode - CDMA 800 idle + charging

8.1.6 Signal strength calculation

Calculation formula:
SS = UR + CF + VC

List of abbreviations:
SS ► signal strength
UR ► voltage at the receiver
CF ► loss of the cable and filter (passband filter 130 kHz – 30 MHz)
VC ► correction factor of the ISN (ESH3-Z5)

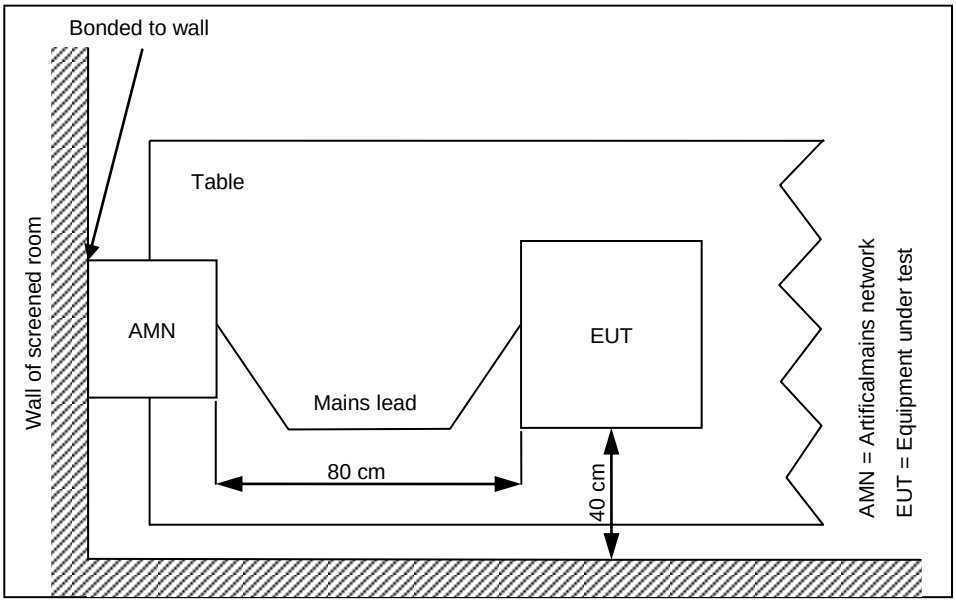
List with correction factors:

Frequency [MHz]	CF [dB]	VC [dB]
0,150	9,80	1,42
1,000	9,80	0,41
5,000	9,90	0,32
10,000	9,90	0,23
15,000	10,00	0,39
20,000	10,00	1,19
25,000	10,20	1,55
30,000	10,30	1,31

Example calculation:
For example at 10,000 000 MHz the measured Voltage (UR) is 37,62 dBµV, the loss of the cable and filter (CF) is 9,90 dB and the correction factor of the ISN (VC) is 0,23 dB the final result will be calculated:
SS [dBµV] = 37,62 [dBµV] + 9,90 [dB] + 0,23 [dB] = 47,75 [dBµV] (244, 06 µV)

8.1.7 Test Set-up

According to EMC basic standard **ANSI 63.4**



8.2 Electromagnetic Radiated Emissions (Distance 10 m)

8.2.1 Instrumentation for Test (see equipment list)

F 1	F 2	F 4b	F 5	F 6	F 7	F 8	F 21				

8.2.2 Test Plan

EUT set-up	see test details		
Operating mode	**Application**	**Limit**	**Result**
see test details	Enclosure	FCC part 15 B Class B	passed

Remarks:	Powered by external power supply (115V / 60Hz)

8.2.3 Radiated Limits

Frequency- range	**FCC part 15 B Class B**	**FCC part 15 B Class A**
30 MHz – 88 MHz	30 dBµV/m	39,1 dBµV/m
88 MHz – 216 MHz	33,5 dBµV/m	43,5 dBµV/m
216 MHz – 960 MHz	36 dBµV/m	46,4 dBµV/m
960 MHz – 40000 MHz	44 dBµV/m	49,5 dBµV/m
	* This values are recalculated from the class B limits at 3 m antenna distance in §15.109 (g 2) of the FCC rules	.

8.2.4 Calibration Information

Device	**Serial number**	**ICT Number**	**Calibration valid until**	**Calibration interval**
ESCI 3 Receiver	100083/003	300003312	01/2014	12 month
Trilog Antenna	9163-295	300003787	05/2014	24 month
Remarks: System check of all relevant devices and the chamber (weekly)				

8.2.5 Test Results

set 8:

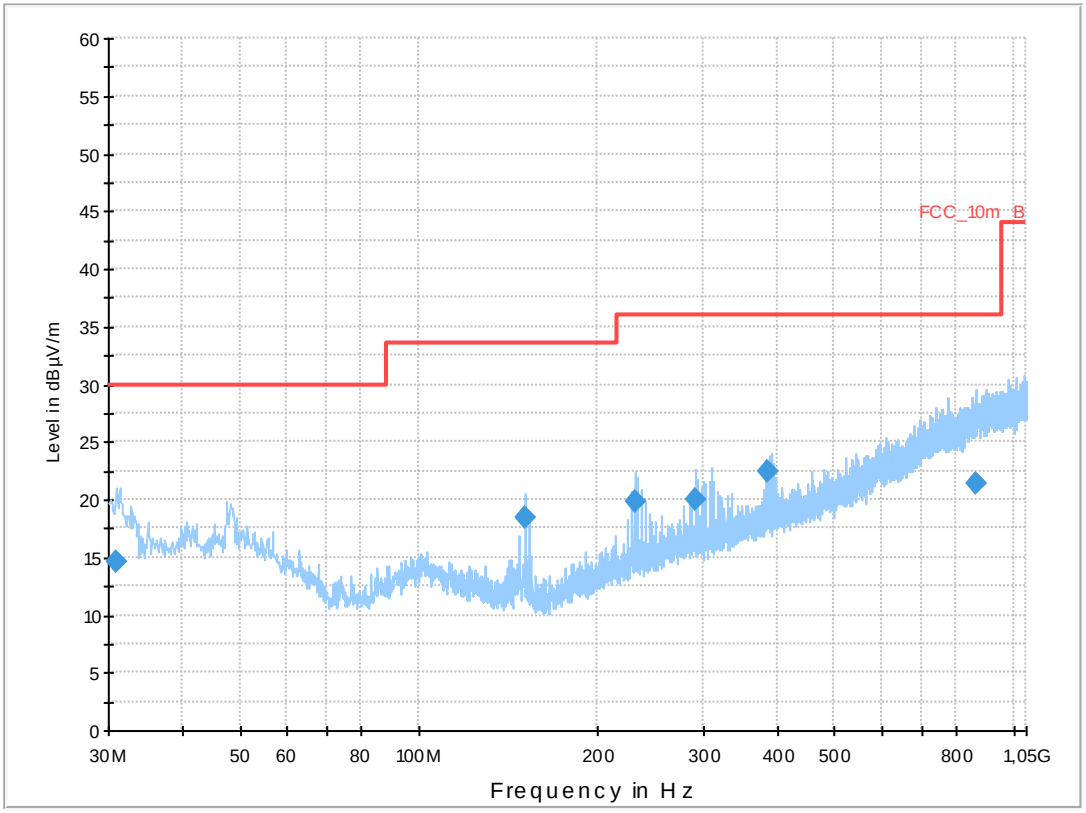
Common Information

EUT:	RFX101LW + HS2 + CH2 + USB2
Serial Number:	imei:004401139609024
Test Description:	FCC part 15 B class B @ 10 m
Operating Conditions:	PCS 1900 idle + charging
Operator Name:	Wolsdorfer
Comment:	AC 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Receiver:	[ESCI 3]
Level Unit:	dBµV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
30.973350	14.7	1000.0	120.000	221.0	V	26.0	12.6	15.3	30.0	
150.381600	18.5	1000.0	120.000	100.0	V	31.0	8.9	15.0	33.5	
230.426550	19.8	1000.0	120.000	113.0	V	54.0	12.7	16.2	36.0	
291.223650	20.0	1000.0	120.000	324.0	H	34.0	14.3	16.0	36.0	
387.201750	22.5	1000.0	120.000	100.0	V	3.0	16.7	13.5	36.0	
862.262700	21.4	1000.0	120.000	200.0	V	23.0	24.7	14.6	36.0	

set 9:

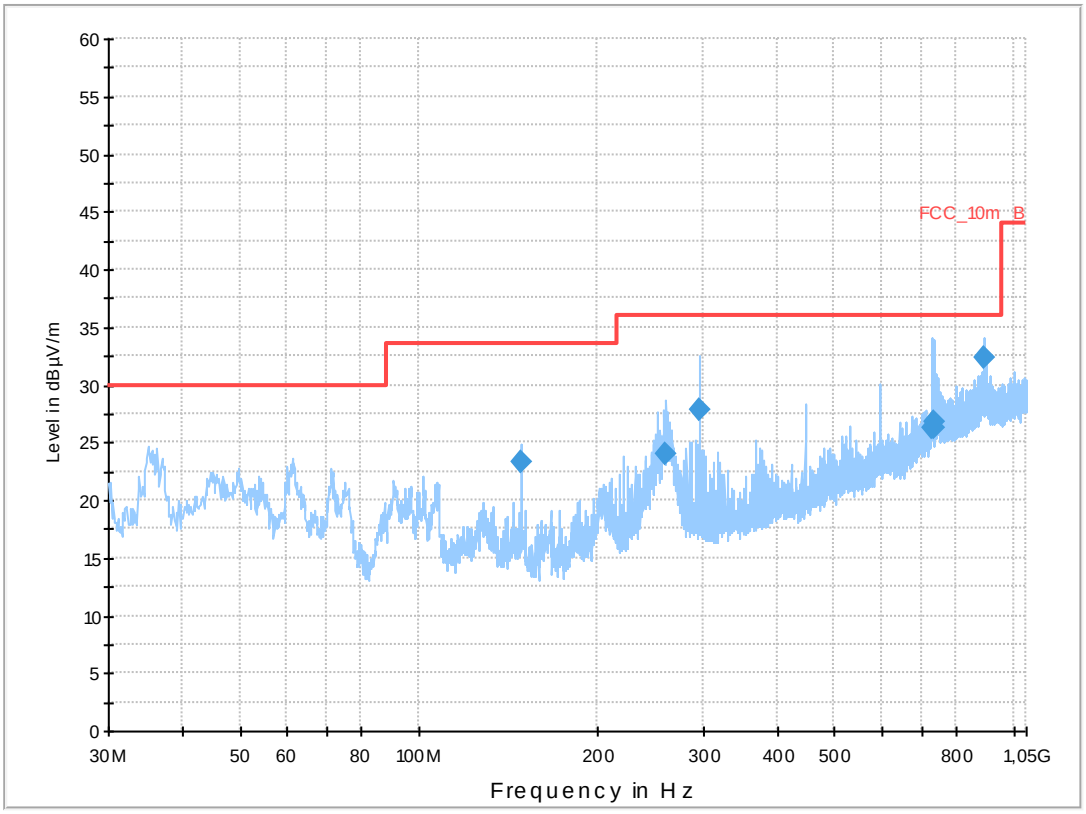
Common Information

EUT:	RFX101LW + HS3 + CH11 + USB 3 + HDMI cable
Serial Number:	IMEI: 004402242373268
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	LTE FDD4 idle + HDMI out + charging
Operator Name:	Wolsdorfer
Comment:	AC 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Receiver:	[ESCI 3]
Level Unit:	dBµV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
148.501950	23.3	1000.0	120.000	400.0	H	98.0	8.9	10.2	33.5	
260.620350	24.0	1000.0	120.000	100.0	V	251.0	13.6	12.0	36.0	
297.016650	27.9	1000.0	120.000	106.0	V	36.0	14.4	8.1	36.0	
730.709400	26.2	1000.0	120.000	132.0	H	36.0	23.2	9.8	36.0	
733.952550	26.2	1000.0	120.000	100.0	H	35.0	23.3	9.8	36.0	
736.524600	26.9	1000.0	120.000	100.0	H	39.0	23.3	9.1	36.0	
890.982450	32.4	1000.0	120.000	285.0	H	90.0	25.1	3.6	36.0	

set 10:

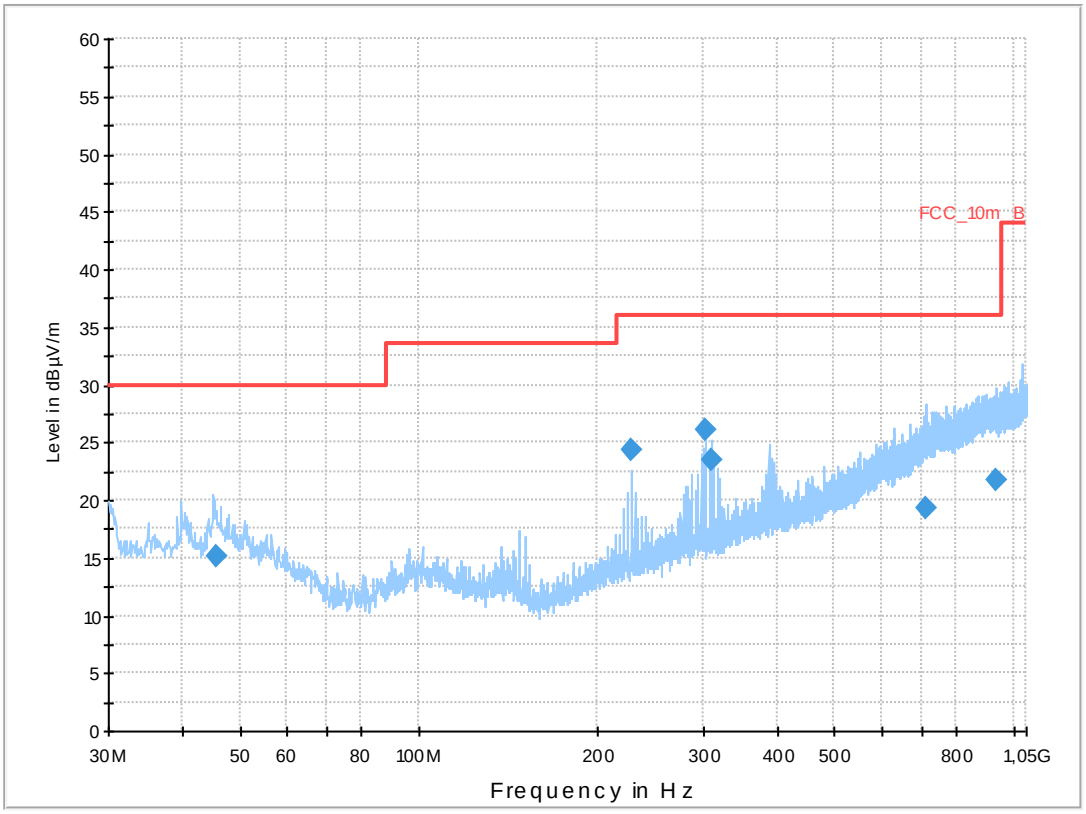
Common Information

EUT:	RFX101LW + HS2 + CH2 + USB 4
Serial Number:	imei:004401139609024
Test Description:	FCC part 15 B class B @ 10 m
Operating Conditions:	LTE FDD13 (Rx diversity) idle + charging
Operator Name:	Wolsdorfer
Comment:	AC 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Receiver:	[ESCI 3]
Level Unit:	dBµV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
45.619050	15.2	1000.0	120.000	100.0	V	-18.0	13.3	14.8	30.0	
227.200800	24.4	1000.0	120.000	278.0	H	315.0	12.6	11.6	36.0	
303.997800	26.1	1000.0	120.000	400.0	H	45.0	14.6	9.9	36.0	
310.407900	23.5	1000.0	120.000	400.0	H	53.0	14.8	12.5	36.0	
713.515200	19.4	1000.0	120.000	394.0	V	205.0	22.8	16.6	36.0	
931.976700	21.8	1000.0	120.000	400.0	H	304.0	25.3	14.2	36.0	

set 11:

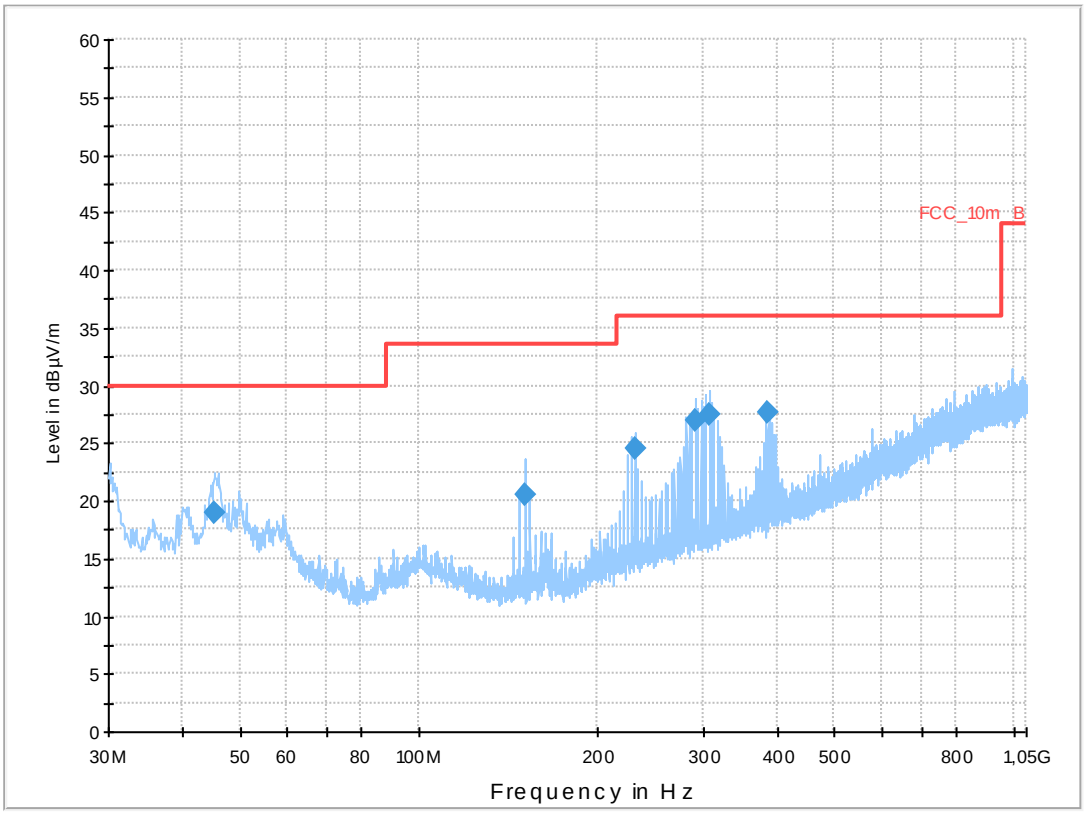
Common Information

EUT:	RFX101LW + HS2 + CH2 + USB2
Serial Number:	IMEI: 004401139609024
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	TX WLAN b mode + charging
Operator Name:	Hennemann
Comment:	AC 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Receiver:	[ESCI 3]
Level Unit:	dBµV/m

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
45.375300	18.9	1000.0	120.000	100.0	V	152.0	13.3	11.1	30.0	
150.369450	20.5	1000.0	120.000	106.0	V	53.0	8.9	13.0	33.5	
230.392350	24.5	1000.0	120.000	113.0	V	140.0	12.7	11.5	36.0	
291.212700	26.9	1000.0	120.000	100.0	V	256.0	14.3	9.1	36.0	
307.188750	27.4	1000.0	120.000	100.0	V	243.0	14.7	8.6	36.0	
387.203250	27.7	1000.0	120.000	100.0	V	162.0	16.7	8.3	36.0	

8.2.6 Hardware Set-up

Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.42
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table (vertical): Cable_EN_1GHz (1005) Correction Table (horizontal): Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12
	EMC 32 Version 8.52

8.2.7 Signal strength calculation

Calculation formula:
$SS = U_R + CL + AF$

List of abbreviations:

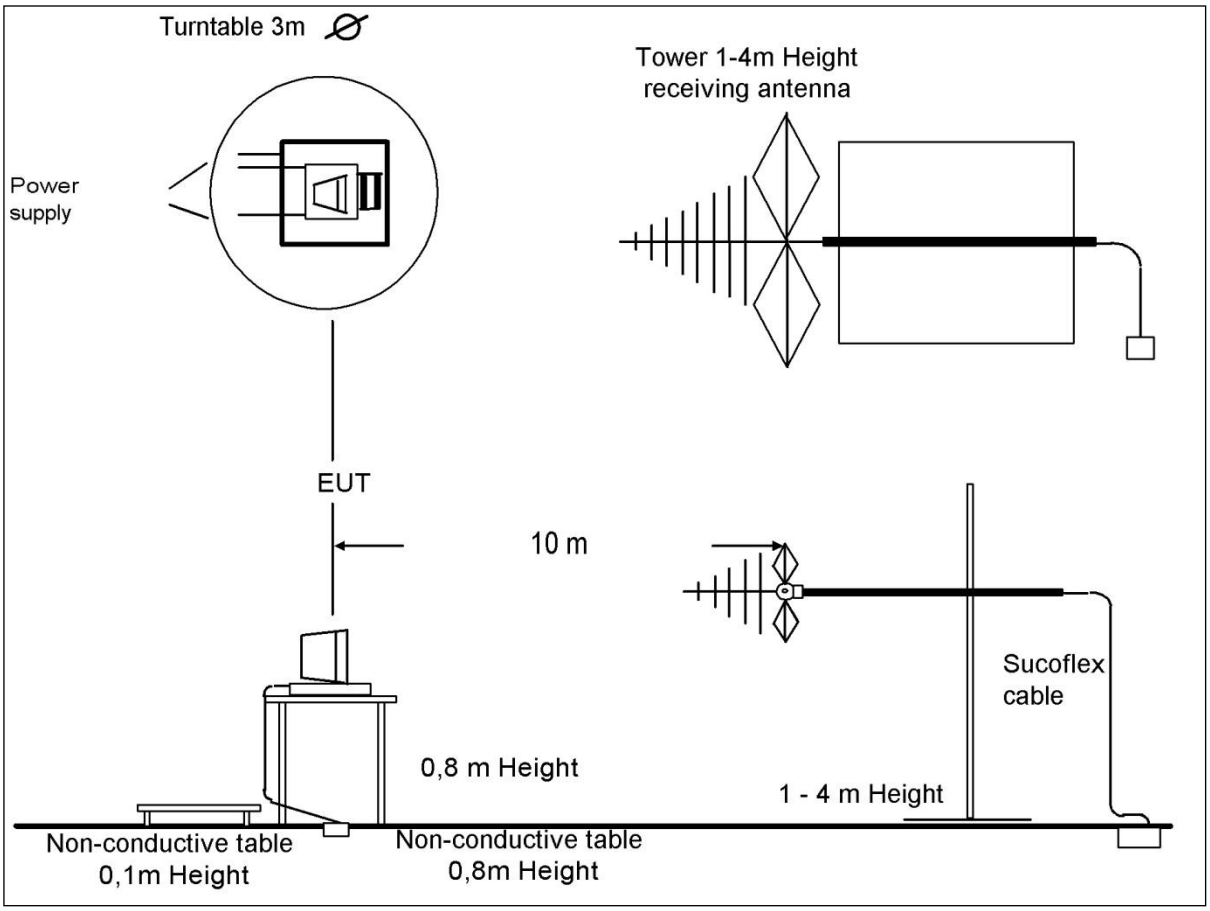
SS	►	signal strength
U_R	►	voltage at the receiver
CL	►	loss of the cable
AF	►	antenna factor

List with correction factors:

Frequency [MHz]	CL [dB]	AF [dBµV/m]
30,000	0,20	12,30
100,000	0,60	11,30
200,000	1,10	10,60
300,000	1,30	13,20
400,000	1,60	15,30
500,000	1,90	16,80
600,000	2,00	18,80
700,000	2,20	20,30
800,000	2,30	21,50
900,000	2,40	22,80
1000,000	2,50	23,30

Example calculation:
For example at 500,000 000 MHz the measured Voltage (U_R) is 12,35 dBµV/m, the loss of the cable (CL) is 1,90 dB and the antenna factor (AF) is 16,80 dBµV/m the final result will be calculated:
SS [dBµV] = 12,35 [dBµV/m] + 1,90 [dB] + 16,80 [dBµV/m] = 31,05 [dBµV/m] (35,69 µV/m)

8.2.8 Test Set-up



8.3 Electromagnetic Radiated Emissions (Distance 5 m)

8.3.1 Instrumentation for Test (see equipment list)

F 1	F 6	F 21	F 29	F 30	F 33						

8.3.2 Test Plan

EUT set-up	set 7 – set 13		
Operating mode	**Application**	**Limit**	**Result**
see test details	Enclosure	FCC part 15 class B	passed

Remarks:	The measured values are recalculated from 5m to 3m distance Powered by external power supply (115V / 60Hz)

8.3.3 Radiated Limits

Frequency- range	**47CFR15: (FCC part 15 B) Class B**	**47CFR15: (FCC part 15 B) Class A ***
30 MHz – 88 MHz	40 dBµV/m	49,1 dBµV/m
88 MHz – 216 MHz	43,5 dBµV/m	53,5 dBµV/m
216 MHz – 960 MHz	46 dBµV/m	56,4 dBµV/m
960 MHz – 18000 MHz	54 dBµV/m	59,5 dBµV/m
		* This values are recalculated from the class A limits at 10 m antenna distance in §15.109 (g 2) of the FCC rules.

8.3.4 Calibration Information

Device	**Serial number**	**ICT Number**	**Calibration valid until**	**Calibration interval**
ESU 26	100037	300003555	01/2014	12 month
Horn Antenna	9120B188	300003896	06/2015	24 month
Remarks: System check of all relevant devices and the chamber (weekly)				

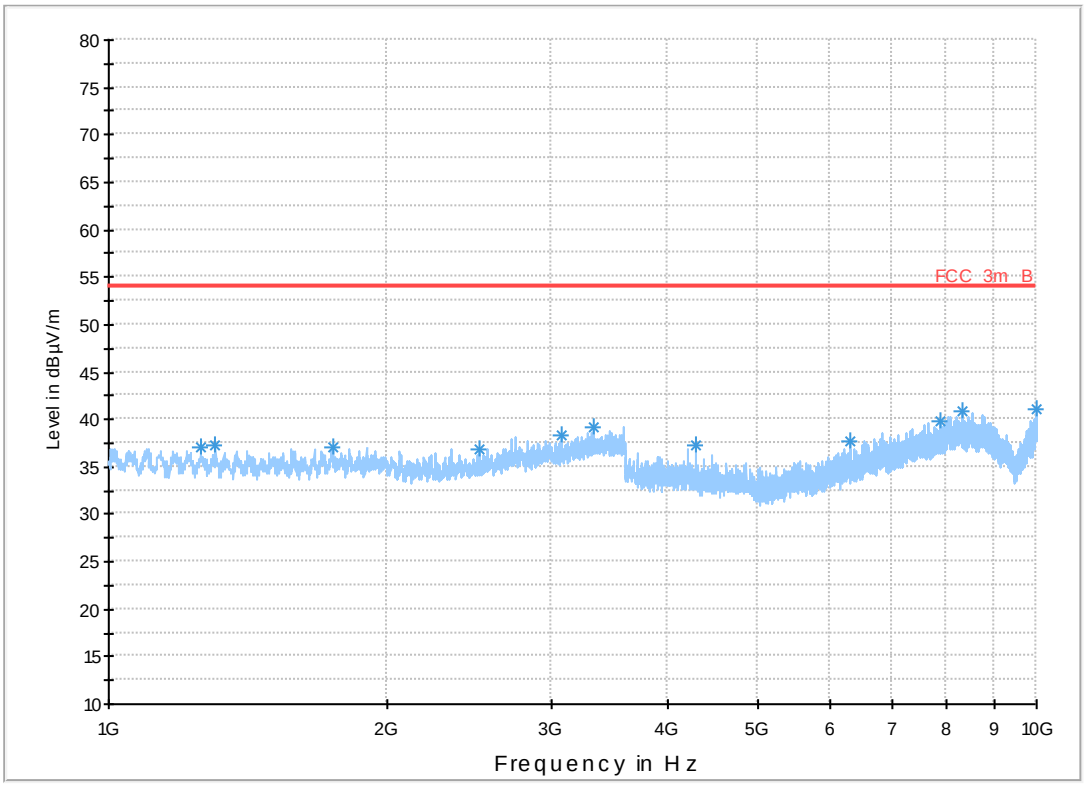
8.3.5 Test Results

set 8:

Common Information

EUT:	RFX101LW + HS2 + CH2 + USB2
Serial Number:	imei:004401139609024
Test Description:	FCC part 15 B class B @ 10 m
Operating Conditions:	PCS 1900 idle + charging
Operator Name:	Wolsdorfer
Comment:	AC 115 V / 60 Hz

FCC_1_10_B_5m

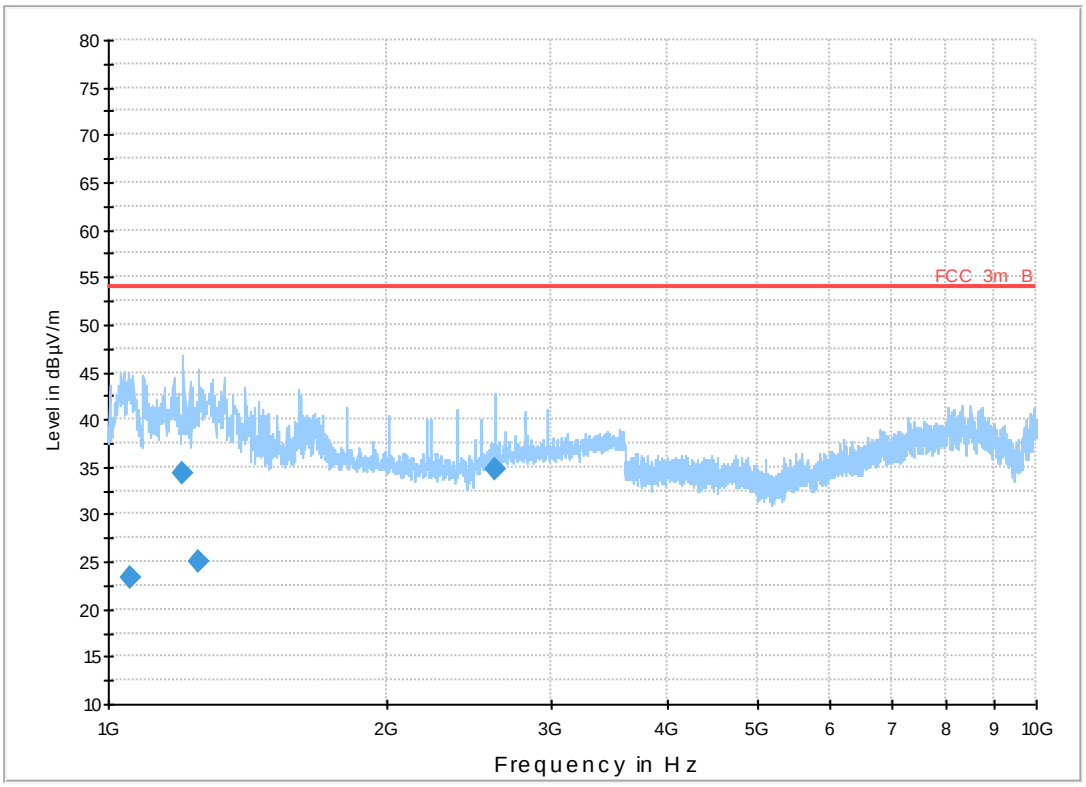


set 9:

Common Information

EUT:	RFX101LW + HS3 + CH11 + USB 3 + HDMI cable
Serial Number:	IMEI: 004402242373268
Test Description:	FCC part 15 class B
Operating Conditions:	LTE FDD4 idle + HDMI out + charging
Operator Name:	Wolsdorfer
Comment:	AC 115 V / 60 Hz

FCC_1_10_B_5m



Final Result 1

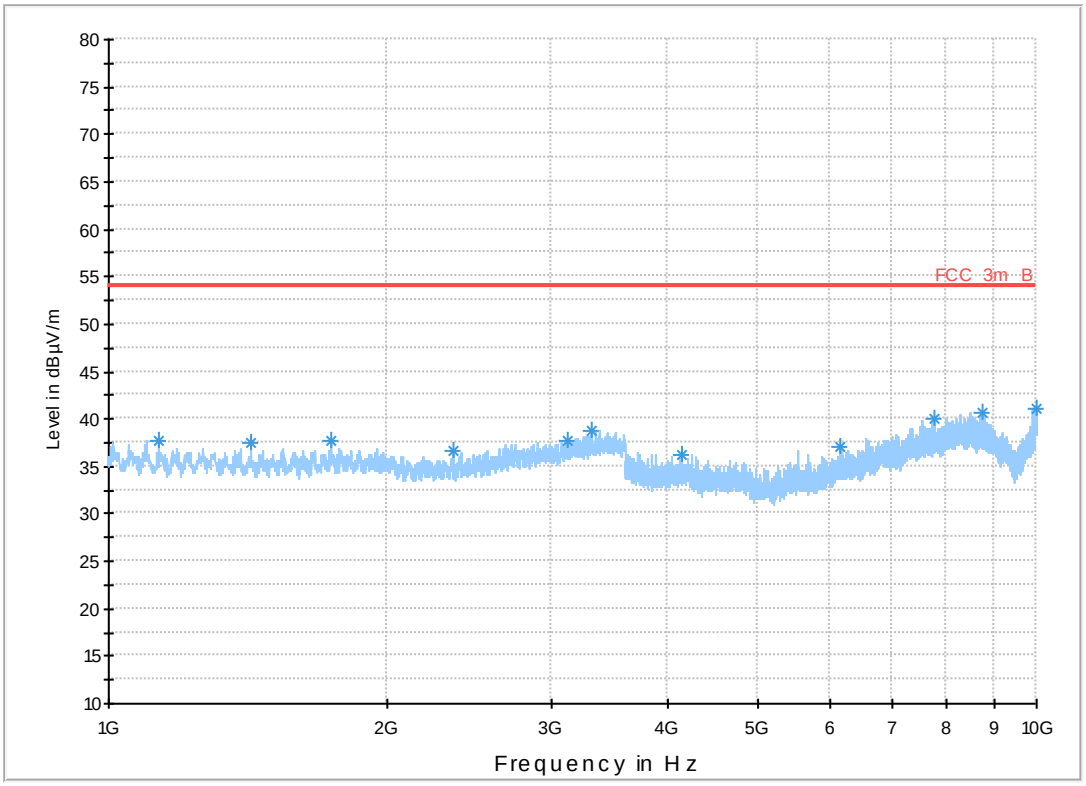
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1055.344369	23.2	100.0	1000.000	100.0	H	0.0	-4.6	30.8	54.0	
1203.829012	34.3	100.0	1000.000	100.0	V	125.0	-4.7	19.7	54.0	
1253.089408	25.1	100.0	1000.000	100.0	H	259.0	-4.7	28.9	54.0	
2608.765599	34.7	100.0	1000.000	100.0	V	74.0	-3.9	19.3	54.0	

set 10:

Common Information

EUT:	RFX101LW + HS2 + CH2 + USB 4
Serial Number:	imei:004401139609024
Test Description:	FCC part 15 B class B
Operating Conditions:	LTE FDD13 idle + charging
Operator Name:	Wolsdorfer
Comment:	AC 115 V / 60 Hz

FCC_1_10_B_5m



8.3.6 Hardware Set-up

Subrange 1

Frequency Range:	1 GHz - 10 GHz
Receiver:	ESU [ESU 26] @ GPIB0 (ADR 17), SN 100037/026, FW 4.43
Signal Path:	1_6_EN FW 1.0 Correction Table: 3_5m Correction Table: LNA_EN (matix)
Antenna:	BBHA 9120 B Correction Table (vertical): BBHA9120 Correction Table (horizontal): BBHA9120 Correction Table (vertical): Cable_Horn_EN (1103) Correction Table (horizontal): Cable_Horn_EN (1103)
Antenna Tower:	Generic Tripod [Generic Tripod] @ GPIB0 (ADR 19), SN ?
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

8.3.7 Signal strength calculation

Calculation formula:
$SS = U_R + CL + AF + PA + DC$

List of abbreviations:

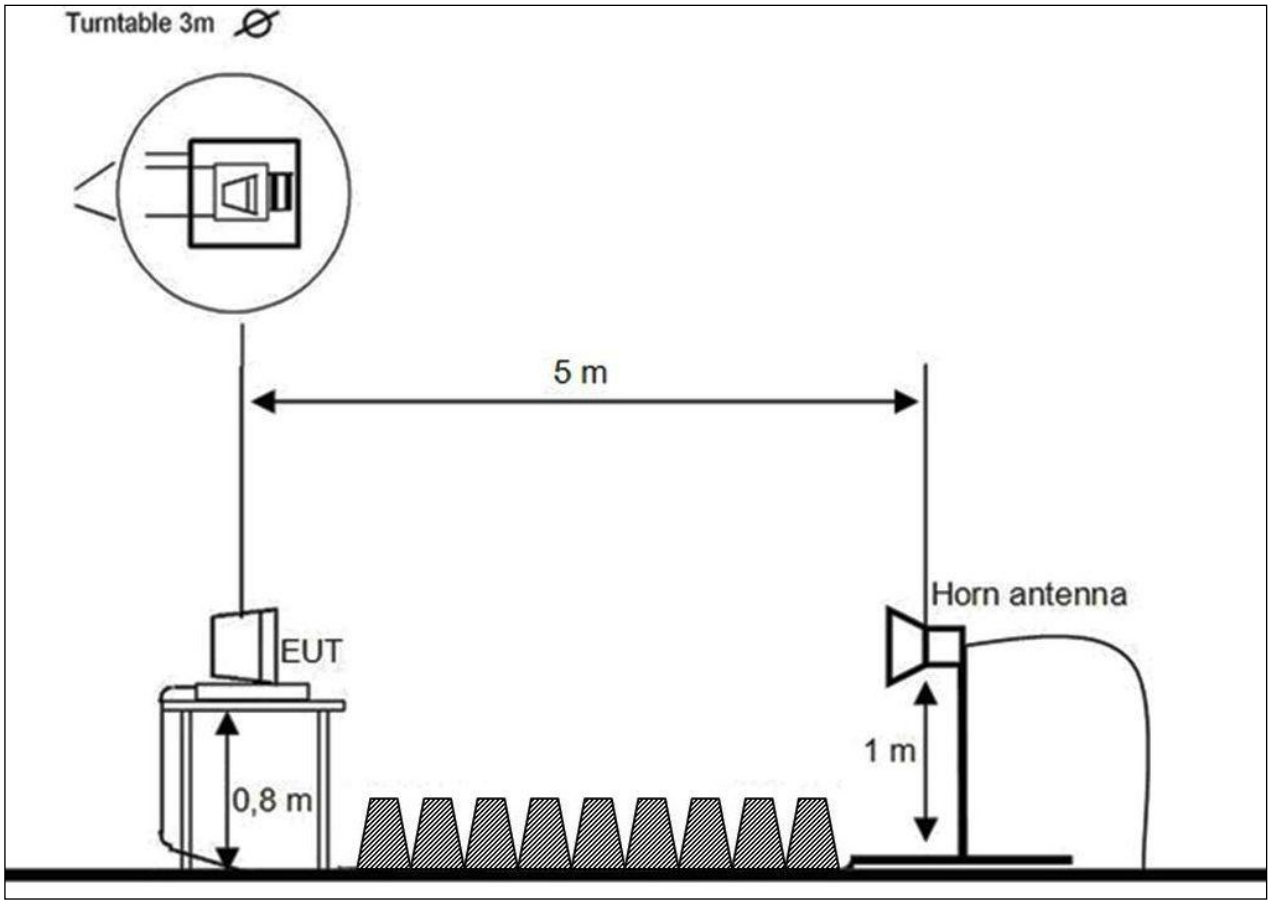
SS	►	signal strength
U_R	►	voltage at the receiver
CL	►	loss of the cable and gain of the preamp
AF	►	antenna factor
DC	►	distance correction (results measured on 5 m calculated to 3 m)

List with correction factors:

Frequency [GHz]	CL [dB]	AF [dBµV/m]	DC [dB]
1,000	-35,50	26,20	4,40
1,500	-35,20	26,10	4,40
2,000	-35,10	26,70	4,40
2,500	-35,00	26,50	4,40
3,000	-34,70	27,60	4,40
3,500	-34,80	28,40	4,40
4,000	-35,00	28,60	4,40
4,500	-34,90	28,90	4,40
5,000	-34,80	29,30	4,40
5,500	-34,35	29,80	4,40
6,000	-34,00	30,30	4,40
6,500	-33,50	31,20	4,40
7,000	-33,10	31,20	4,40
7,500	-33,40	31,70	4,40
8,000	-33,80	32,10	4,40
8,500	-33,75	32,30	4,40
9,000	-33,70	31,70	4,40
9,500	-33,50	29,40	4,40
10,000	-33,40	33,00	4,40

Example calculation:
For example at 4,000 000 000 GHz the measured Voltage (U_R) is 46,13 dBµV/m, the loss of the cable (CL) is -35,00 dB, the antenna factor (AF) is 28,60 dBµV/m and the distance correction (DC) is 4,40 dB the final result will be calculated:
SS [dBµV] = 46,13 [dBµV/m] + (-35,00) [dB] + 28,60 [dBµV/m] + 4,4 [dB] = 44,13 [dBµV/m] (160,88 µV/m)

8.3.8 Test Set-up



set 11:

Results: customer demand measurement

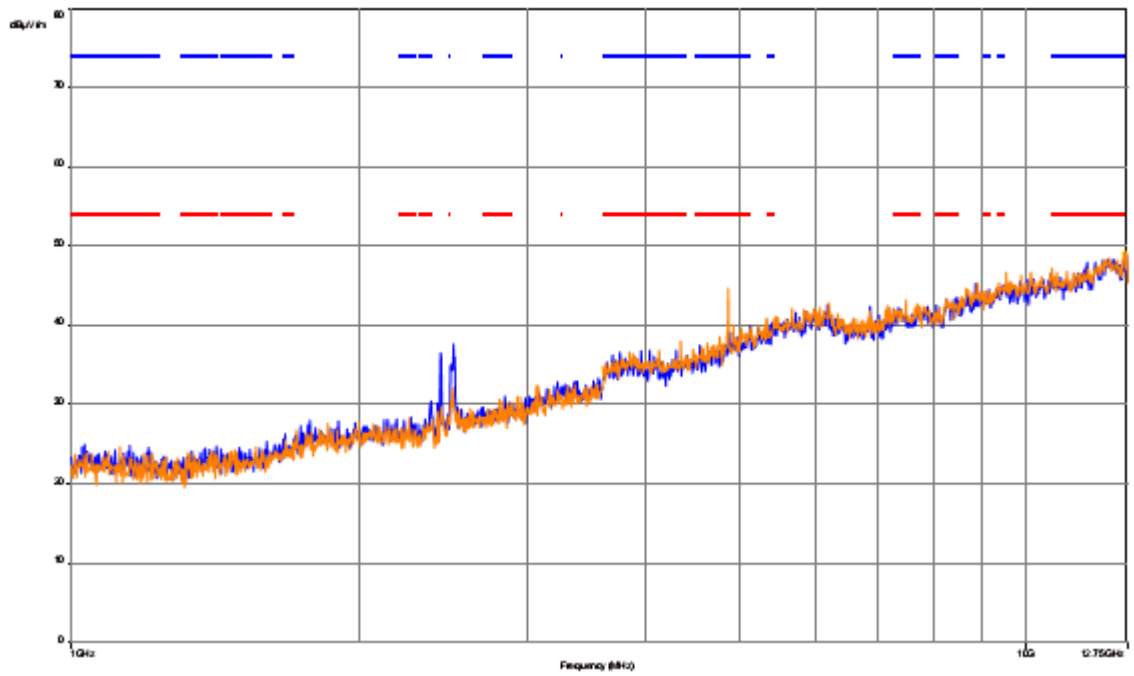
TX Spurious Emissions Radiated [dBµV/m]								
TX mode + periphery equipment								
TX mode + periphery equipment			-/-			-/-		
F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]	F [MHz]	Detector	Level [dBµV/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			-/-			-/-		
All detected emissions are more than 10 dB below the limit!			-/-			-/-		
Measurement uncertainty			± 3 dB					

Result: **Passed**

Common Information

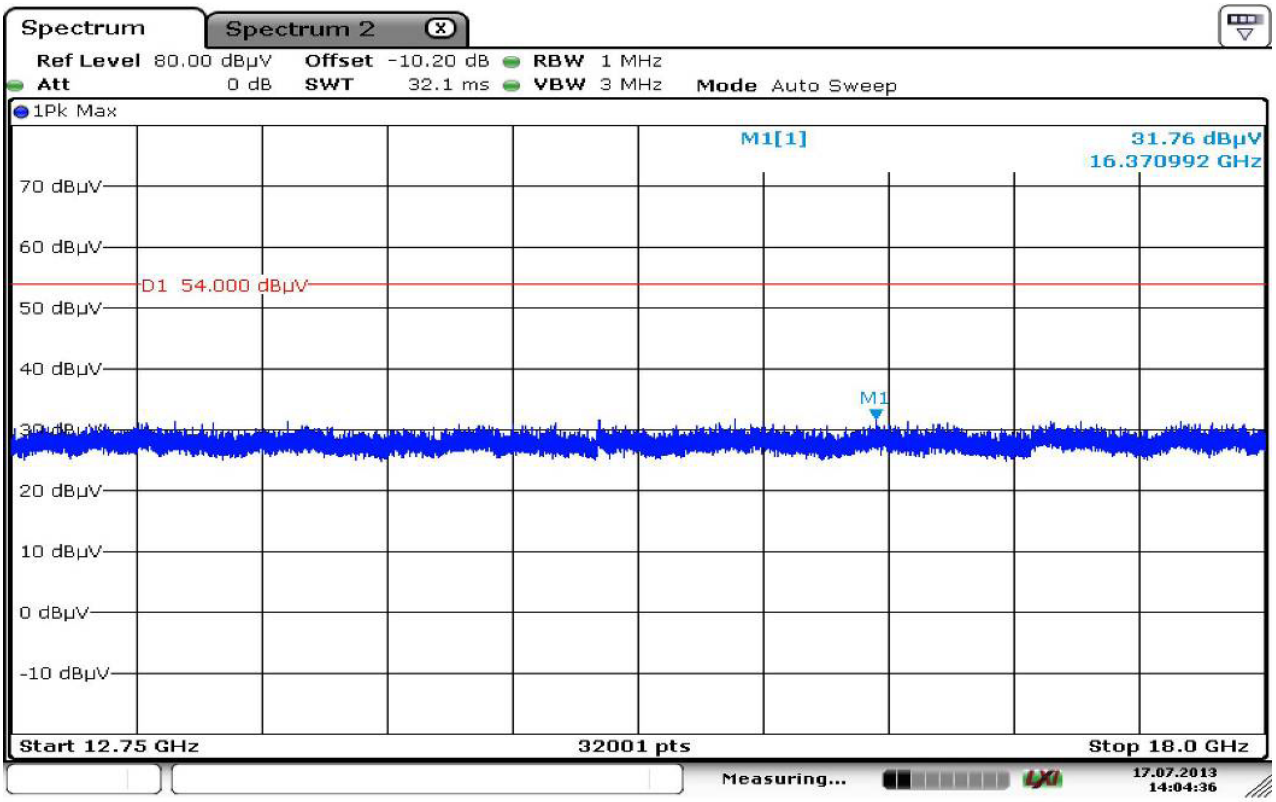
EUT:	RFX101LW + HS2 + CH2 + USB2
Serial Number:	IMEI: 004401139609024
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	TX WLAN b mode + charging
Operator Name:	Hennemann
Comment:	AC 115 V / 60 Hz

Plot 2: 1 GHz to 12.75 GHz, vertical & horizontal polarization



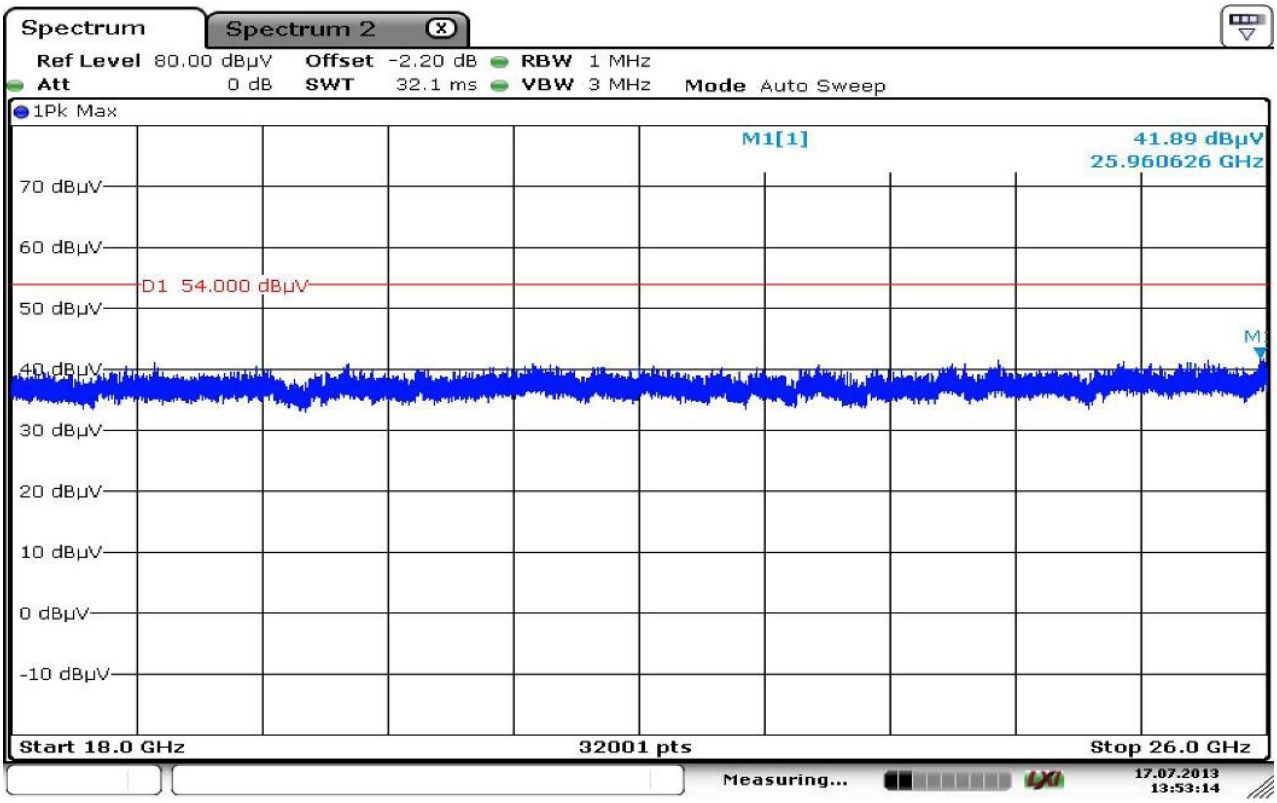
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: 12.75 GHz to 18 GHz, vertical & horizontal polarization



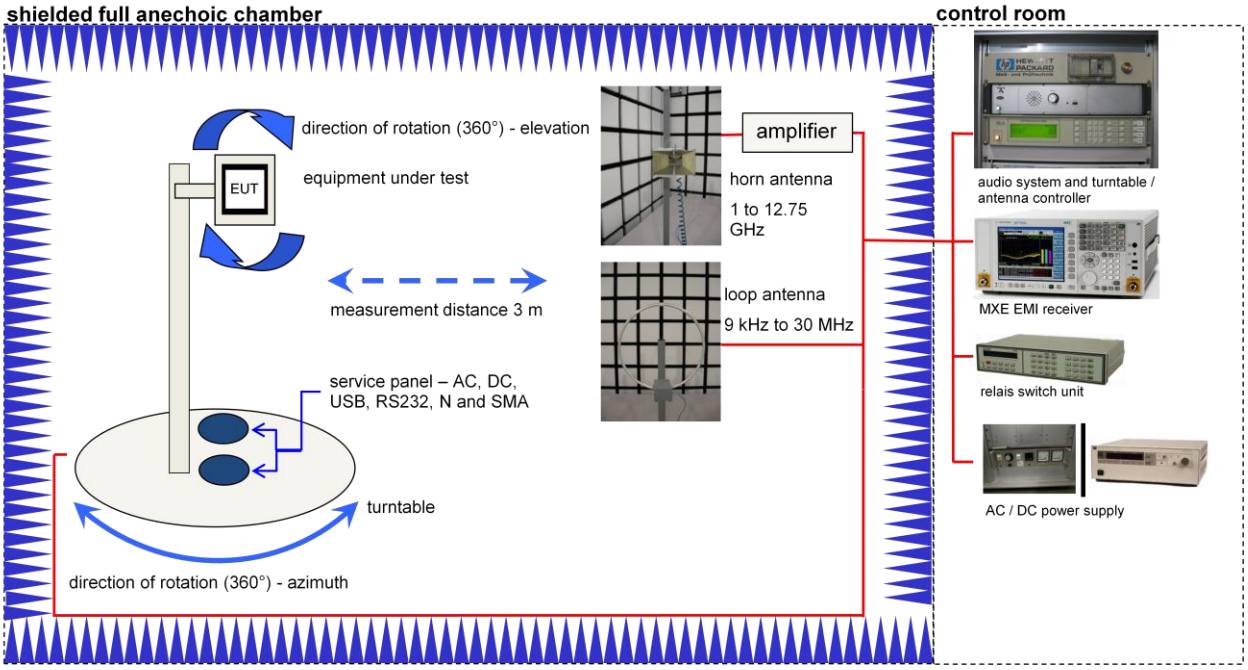
Date: 17.JUL.2013 14:04:36

Plot 4: 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 17.JUL.2013 13:53:14

8.3.9 Hardware Set-up (set 14 and set 15 – 1 to 40GHz)



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351
Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789
Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032
Active Loop Antenna	6502	EMCO	2210	300001015
Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996
Switch / Control Unit	3488A	HP Meßtechnik	*	300000199
Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156
Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erfi	91350	300001155
Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997
Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143

8.3.10 Radiated measurements 12.75 GHz to 25 GHz

Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda		300000786
Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300000486
Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268
Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517

9 Test equipment and ancillaries used for tests

To simplify the identification of the test equipment and/or ancillaries which were used, the reporting of the relevant test cases only refer to the test item number as specified in the table below.

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal identification
	Radiated emission in chamber F				
F-1	Control Computer	F+W		FW0502032	300003303
F-2	Trilog-Antenna	Schwarzbeck	VULB 9163	9163-295	---
F-3a	Amplifier	Veritech Microwave Inc.	0518C-138	- / -	- / -
F-4b	Switch	HP	3488A	- / -	300000368
F-5	EMI Test receiver	R&S	ESCI	100083	300003312
F-6	Turntable Interface-Box	EMCO / ETS-LINDGREN	Model 105637	44583	300003747
F-7	Tower/Turntable Controller	EMCO / ETS-LINDGREN	Model 2090	64672	300003746
F-8	Tower	EMCO / ETS-LINDGREN	Model 2175	64762	300003745
F-9	Ultra Notch-Filter Rejected band Ch. 62	WRCD		9	
	Radiated immunity in chamber F				
F-10	Control Computer	F+W		FW0502032	300003303
F-11	Signal Generator	HP	8665A	2833A00112	300001373
F-13	RF-Amplifier	ar	100W1000M1	13161	300003410
F-14	Stacked Logper Antenna	Schwarzbeck	STLP9128 E	9128 E 013	300003408
F-15	RF-Amplifier	BONN	BLWA 0810-250	129100	300004536
F-16	Directional Coupler	ar	DC7144A	312786	300003411
F-17	Horn Antenna	ar	AT 4002	19739	300000633
F-18	Power Meter	R&S	NRV	860327/024	F033
F-19	Power sensor	R&S	URV5-Z2	839080/005	300002844.02
F-20	Power sensor	R&S	URV5-Z2	830755/057	F032
	Harmonics and flicker in front of chamber F				
F-21	Flicker and Harmonics Test System	Spitzenberger & Spies	PHE4500/B I PHE4500/B II	B5983 B5984	300000210
F-28	Power Supply	Hewlett Packard	6032 A	2920 A 04466	300000580
	Radiated emission in chamber F > 1GHz				
F-29	Horn antenna	Schwarzbeck	BBHA 9120 B	188	300003896
F-30	Amplifier	ProNova	0518C-138	005	F 024
F-31	Amplifier	Miteq	42-00502650-28-5A	1103782	300003379
F-32	Horn antenna	Emco	3115	9709-5289	300000213
F-33	Spectrum Analyzer	R&S	ESU26	100037	300003555
F-34	Loop antenna	EMCO	6502	8905-2342	300000256

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
11	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
2	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
3	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B5979	300000210	ne		
4	n. a.	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	09.01.2013	09.01.2014
5	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	14.07.2011	14.07.2013
6	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
7	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
8	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
9	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
10	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	16.01.2013	16.01.2014
11	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKl!	08.05.2013	08.05.2015
12	n. a.	Active Loop Antenna 10 kHz to 30 MHz	6502	EMCO	2210	300001015	ne		
13	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
14	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
15	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
16	n. a.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
17	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014
18	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
19	A025	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda		300000786	ne		
20	A027	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300000486	ne		
21	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	12.01.2012	12.01.2015
22	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal identification
	Conducted emission in chamber G				
G-1	EMI Receiver	Hewlett Packard	8542 E	3617A00170	300000568
G-2	V-ISN	Rohde & Schwarz	ESH 3-Z5	892475/017	300002209
G-2a	V-ISN	Rohde & Schwarz	ESH 2-Z5	892602/024	300000587
G-3	2-Wire ISN	Schaffner	ISN T200	19075	300003422
G-4	4-Wire ISN	Schaffner	ISN T400	22325	300003423
G-5	Shielded wire ISN	Schaffner	ISN ST08	22583	300003433
G-6	Unshielded 8 wire ISN	Teseq	ISN T800	26113	300003833
G-7	Unshielded 8 wire ISN	Teseq	ISN T8-Cat. 6	26374	300003851
G-8	RF Current probe	FCC	F-33-4	46	300003257
G-9	V-ISN	Schaffner	ISN PLC-150	21579	300003318
G-10	V-ISN	Schaffner	ISN PLC-25-30	21584	300003319
G 10a	PLC Filter	TESEQ	Filter PLC	23436	300003598
G 10b	Coupling unit 75 Ohm	Fiedler	AC	----	300003272.04
	Conducted immunity in chamber G				
G-11	Signal generator	R&S	SMG	8610647025	300000204.01
G-12	RF-Amplifier	BONN	BSA 0125-75	066502-01	300003545
G-13	Power Meter	R&S	URV 5	837723/025	300002844.01
G-14	Power Sensor	R&S	URV 5-Z2	832874/021	300002239
G-15	Directional coupler	emv	DC 2000	9401-1677	300000592
G-16	Attenuator 6dB	Alan	50HP6-100 N	121048 0348	300003148
G-17	EM-Injection Clamp	FCC	203i	232	300000626
G-18	CDN	FCC	FCC-801-M3-16	237	300000627
G-19	CDN	FCC	FCC-801-T2	78	300000629
G-20	CDN	FCC	FCC-801-AF 2	62	300000630
G-21	CDN	FCC	FCC-801-AF 4	61	300000631
G-22	CDN	FCC	FCC-801-M1	2027	300002761
G-23	CDN	Lüthi	CDN 801-M2/M3	9350105	300000534
G-24	Transformator for 50Hz Loop Antenna	EM-Test	MC2630	0200-10	300002659.01
G-25	50Hz Loop Antenna	EM-Test	MS 100	none	300002659
	Surge, Burst, Dips and Interruptions in chamber G				
G-26	Hybrid-Generator	EM-Test	UCS 500N5	V112711033	300004257
G-27	Motor Variac	EM-Test	MV 2616	0600-01	300002658
G-28	Capacitive Coupling Clamp	MWB	KKS 100	---	300000589
G-29a	Coupling Decoupling Network	EMC-Partner	CDN-2000-06-32	158	300004108
G-29	Coupling Decoupling Network	EMC-Partner	CDN-UTP	00014	300003226
	ESD in chamber G				
G-30	ESD generator	Schaffner	NSG 435	308	300002249
	Emission on bench in chamber G				
G-31	Absorbing Clamp	R&S	MDS-21	832 231/006	300000527
	generic in chamber G				
G-32	power supply	Hewlett Packard	6038A	2848A06673	300001512

10 Observations

No observations, exceeding those reported with the single test cases, have been made.

Annex A: Photographs of the test set-up

see external document:
1-6234-13-03-14_AnnexD.pdf

Annex B: Photographs of the EUT

see external document:
1-6234-13-03-14_AnnexA.pdf

Annex C: Document history

Version	Applied changes	Date of release
-/-	Initial release	2013-02-08
-A	editorial changes	2013-08-08
-B	editorial changes	2013-08-13
-C	AE list changes	2013-08-20

Annex D: Further information

Glossary

DUT	-	Device under Test
EMC	-	Electromagnetic Compatibility
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	not applicable
S/N	-	Serial Number
SW	-	Software