

DAkkS
Deutsches
Institut für
Akku- und
Korrosionsschutz

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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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In no case this test report can be considered as a Letter of Approval.

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

2.2 Application details

Date of receipt of order: 2013-07-09
Date of receipt of test item: 2013-07-11
Start of test: 2013-07-11
End of test: 2013-07-19
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 :	RFW121LW		
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
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	RFW121LW	IMEI: 004402242380297	CER-54733- 001 Rev2-x08- 00	OS Version: 10.2.0.519 Build: 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 E	wired headset	Alt. 2 Wired Headset, part number HDW-53005-001	-/-	-/-	-/-
AE F	AC charger	Alt. 1 Fixed Blade Charger, part number HDW-47725-001	-/-	-/-	-/-
AE G	AC charger	Alt. 2 Fixed Blade Charger, part number HDW-46445-001	-/-	-/-	-/-
AE H	AC charger	Folding Blade Charger, part number HDW-34724-001	-/-	-/-	-/-
AE I	AC charger	World Wide Travel Charger, part number HDW-34725-002	-/-	-/-	-/-
AE J	USB cable	1.2m Micro-USB, part number HDW-50071-001	-/-	-/-	-/-
AE K	USB cable	Alt. 1 1.2m Micro-USB, part number HDW-50071-001	-/-	-/-	-/-
AE L	USB cable	1.0m Micro-USB, part number HDW-51800-001	-/-	-/-	-/-
AE M	USB cable	Alt. 1 1.0m Micro-USB, part number HDW-51800-001	-/-	-/-	-/-
AE N	USB cable	Y-Cable, part number HDW-19137-002	-/-	-/-	-/-
AE O	EBC	External Battery Charger, part number HDW-54535-001	-/-	-/-	-/-
AE P	HDMI cable	HDMI Cable, part number HDW-29572-001	-/-	-/-	-/-
AE Q	HDMI monitor	Samsung T220HD	TD22H9MQ 602519M	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) and operation modes

EUT Set-ups for conducted emission

EUT set-up no.*)"	Combination of EUT and AE	operation mode
set. 1	EUT A + AE A + AE F + AE J	GSM 850 idle + charging
set. 2	EUT A + AE B + AE G + AE K	PCS 1900 idle + charging
set. 3	EUT A + AE C + AE N + AE O	UMTS FDD2 idle + charging
set. 4	EUT A + AE D + AE I + AE P + AE Q	UMTS FDD 5 idle + charging
set. 5	EUT A + AE E + AE F + AE L	PCS 1900 idle + charging
set. 6	EUT A + AE A + AE F + AE M	GSM 850 idle + charging

EUT Set-ups for radiated emission

EUT set-up no.*)"	Combination of EUT and AE	operation mode
set. 7	EUT A + AE A + AE F + AE J	GSM 850 idle + charging
set. 8	EUT A + AE B + AE G + AE K	PCS 1900 idle + charging
set. 9	EUT A + AE C + AE H + AE P + AE Q	UMTS FDD2 idle + charging
set. 10	EUT A + AE D + AE I + AE O	UMTS FDD 5 idle + charging
set. 11	EUT A + AE E + AE F + AE L	GSM 850 idle + charging
set. 12	EUT A + AE B + AE G + AE M	PCS 1900 idle + charging
set. 13	EUT A + AE A + AE F + AE J	Bluetooth DH5 TX + charging
set. 14	EUT A + AE B + AE G + AE K	802.11b TX + charging
set. 15	EUT A + AE C + AE H + AE N + AE O	802.11a TX + charging

*) EUT set-up no. is used to simplify the identification of the EUT set-up in this test report.

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 Ø.

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 Ø.

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									
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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)

Frequency- range	FCC part 15 B Class B		FCC part 15 B Class A	
	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

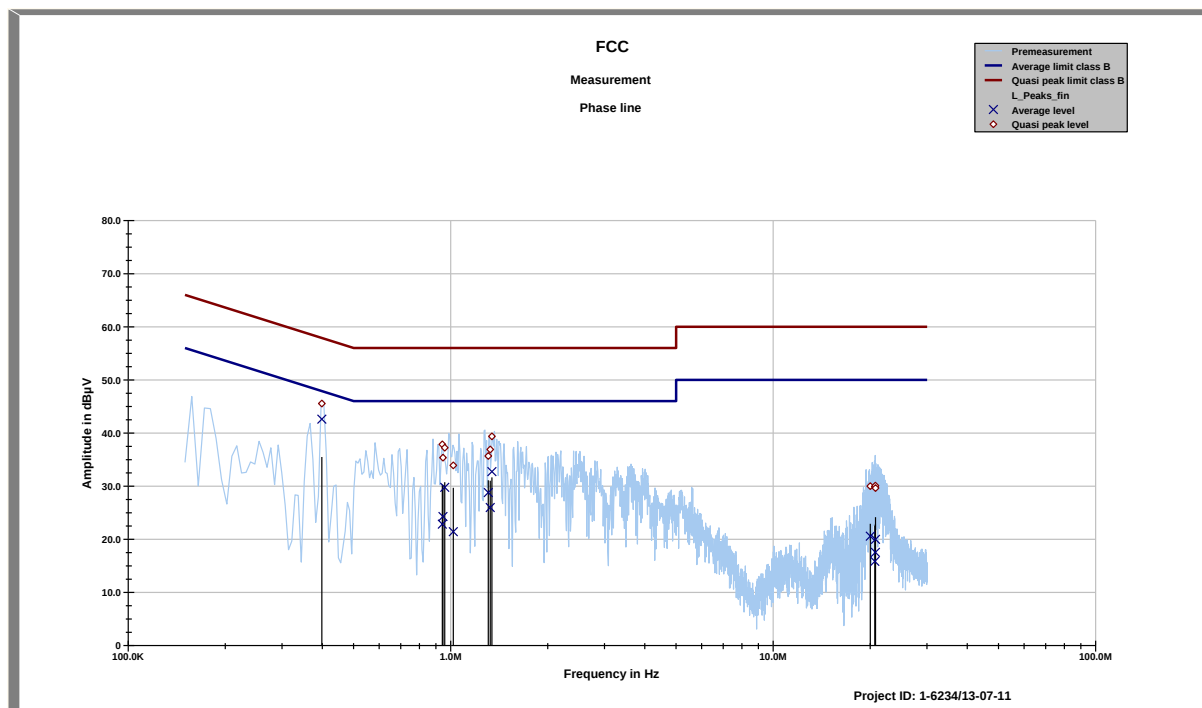
8.1.4 Calibration Information

Device	Serial number	ICT Number	Calibration valid until	Calibration interval
HP 8542 EMI Receiver with RF Filter Unit	3617A00170	300000568	01 / 2014	12 month
ESCI	100083	3000003312	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: 1-6234/13-07-11

12:14:23 PM, Tuesday, July 16, 2013

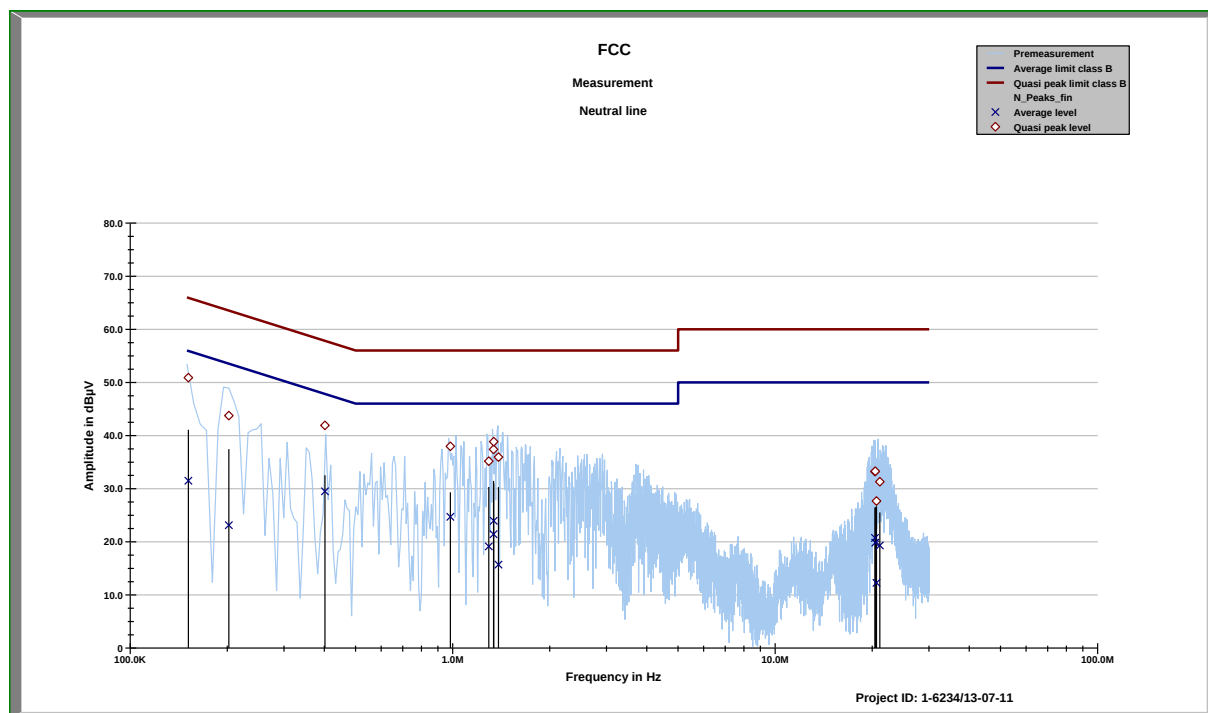
Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.3984	45.56	12.33	42.61	6.29
0.94207	37.86	18.14	22.85	23.15
0.94609	35.36	20.64	24.28	21.72
0.95852	37.23	18.77	29.78	16.22
1.01845	33.90	22.10	21.43	24.57
1.3079	35.67	20.33	28.80	17.20
1.3258	36.90	19.10	25.98	20.02
1.3422	39.38	16.62	32.74	13.26
19.991	30.00	30.00	20.58	29.42
20.662	29.89	30.11	15.83	34.17
20.733	30.10	29.90	17.54	32.46
20.749	29.64	30.36	19.99	30.01

Project ID - 1-6234/13-07-11

EUT - RFW121LW + HS1 + CH1 + USB1

Serial Number - IMEI: 004402242380297

Operating mode - GSM850 idle + charging



FCC

Neutral line tbl

Project ID: 1-6234/13-07-11

12:14:23 PM, Tuesday, July 16, 2013

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.15147	50.89	15.03	31.49	24.47
0.20229	43.74	19.77	23.11	31.39
0.40171	41.91	15.91	29.50	19.31
0.98365	37.98	18.02	24.70	21.30
1.2938	35.17	20.83	19.13	26.87
1.3386	37.39	18.61	21.42	24.58
1.3402	38.84	17.16	23.94	22.06
1.3862	35.95	20.05	15.69	30.31
20.385	33.21	26.79	20.72	29.28
20.421	33.27	26.73	19.83	30.17
20.606	27.68	32.32	12.26	37.74
21.104	31.29	28.71	19.31	30.69

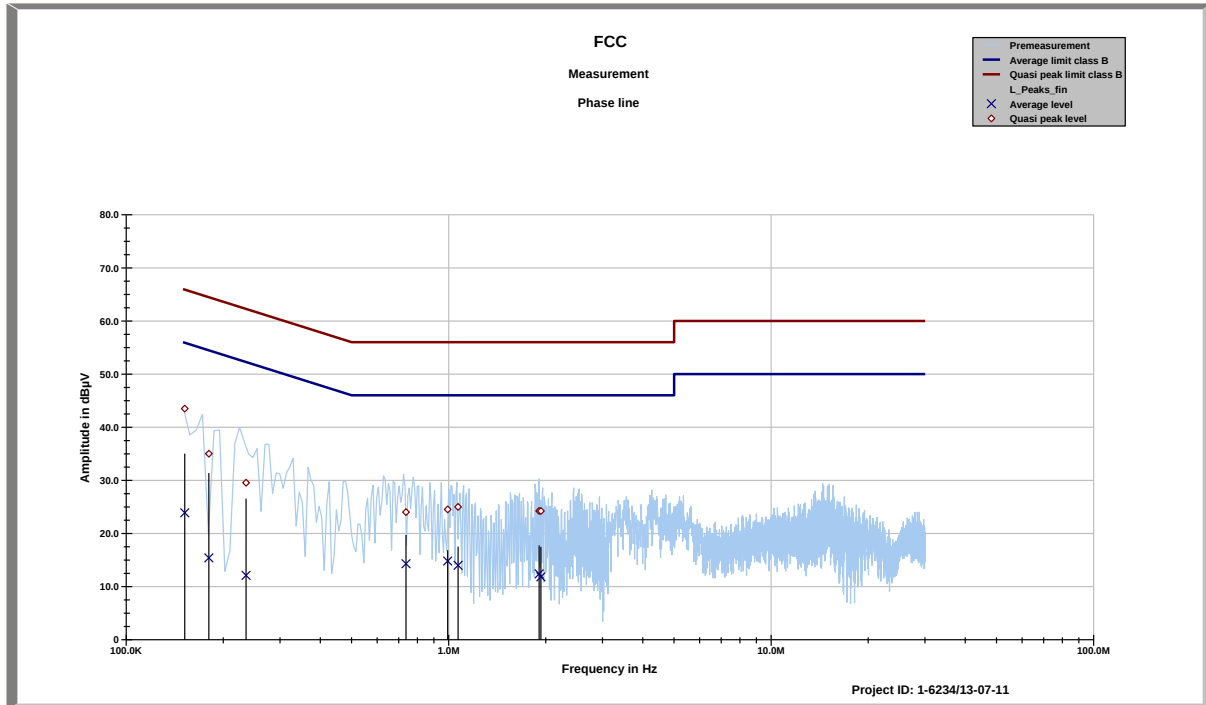
Project ID - 1-6234/13-07-11

EUT - RFW121LW + HS1 + CH1 + USB1

Serial Number - IMEI: 004402242380297

Operating mode - GSM850 idle + charging

set 2:



FCC

Phase line tbl

Project ID: 1-6234/13-07-11

12:42:03 PM, Tuesday, July 16, 2013

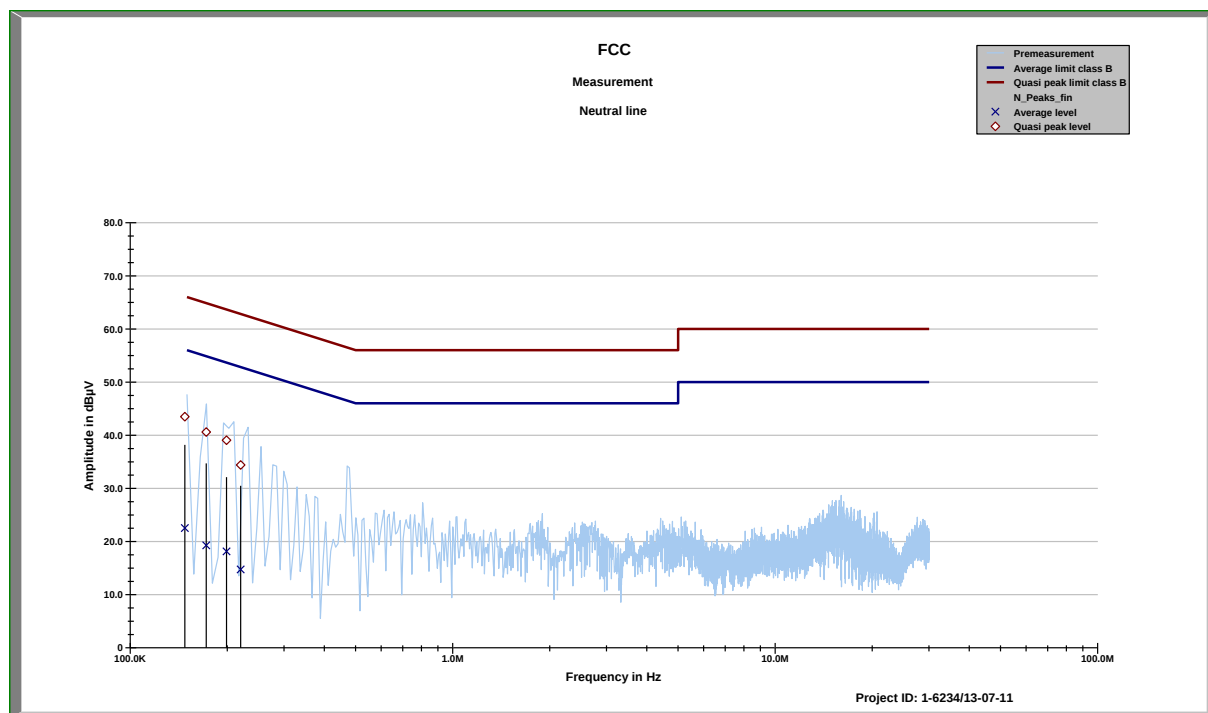
Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.15188	43.50	22.40	23.88	32.06
0.1804	35.00	29.46	15.39	39.74
0.23537	29.54	32.72	12.11	41.45
0.73694	24.02	31.98	14.30	31.70
0.99244	24.52	31.48	14.80	31.20
1.0696	24.99	31.01	14.00	32.00
1.9073	24.23	31.77	12.39	33.61
1.9306	24.22	31.78	11.82	34.18

Project ID - 1-6234/13-07-11

EUT - RFW121LW + HS2 + CH2 + USB2

Serial Number - IMEI: 004402242380297

Operating mode - PCS1900 idle + charging



FCC

Neutral line tbl

Project ID: 1-6234/13-07-11

12:42:03 PM, Tuesday, July 16, 2013

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBμV	dBμV	dBμV	dBμV
0.14773	43.48		22.52	
0.17211	40.59	24.27	19.26	36.11
0.19898	39.06	24.59	18.14	36.46
0.22006	34.40	28.42	14.74	39.26

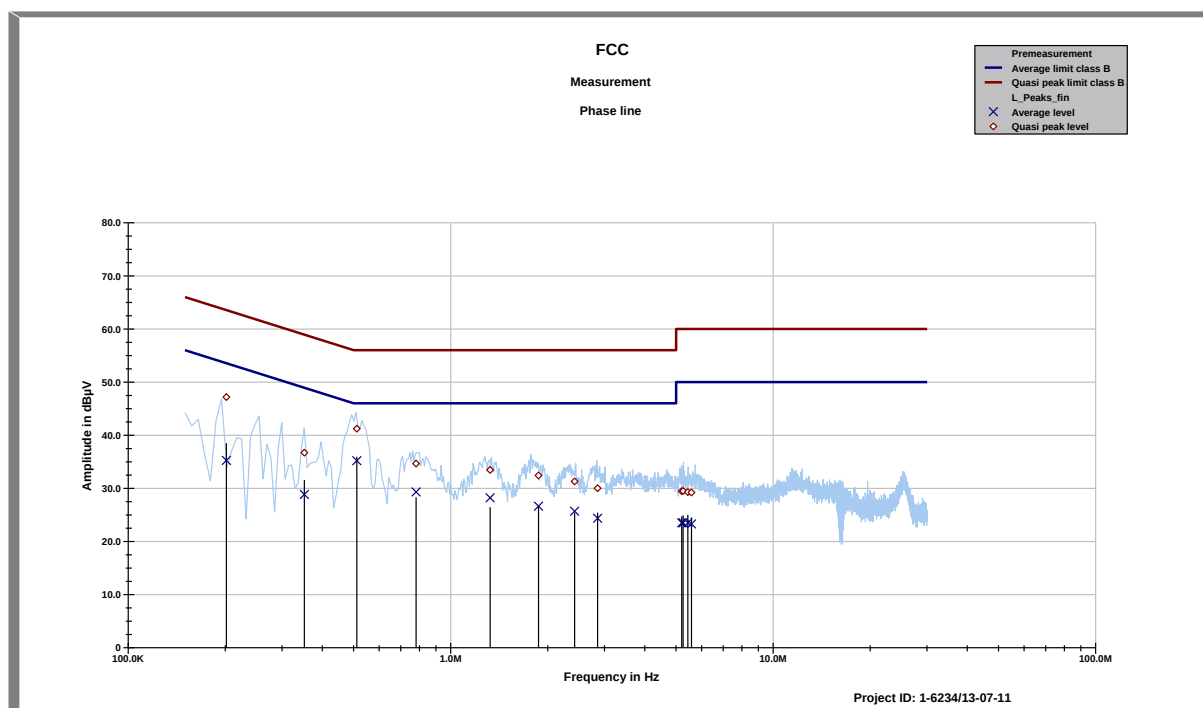
Project ID - 1-6234/13-07-11

EUT - RFW121LW + HS2 + CH2 + USB2

Serial Number - IMEI: 004402242380297

Operating mode - PCS1900 idle + charging

set 3:



FCC

Phase line tbl

Project ID: 1-6234/13-07-11

01:00:56 PM, Tuesday, July 16, 2013

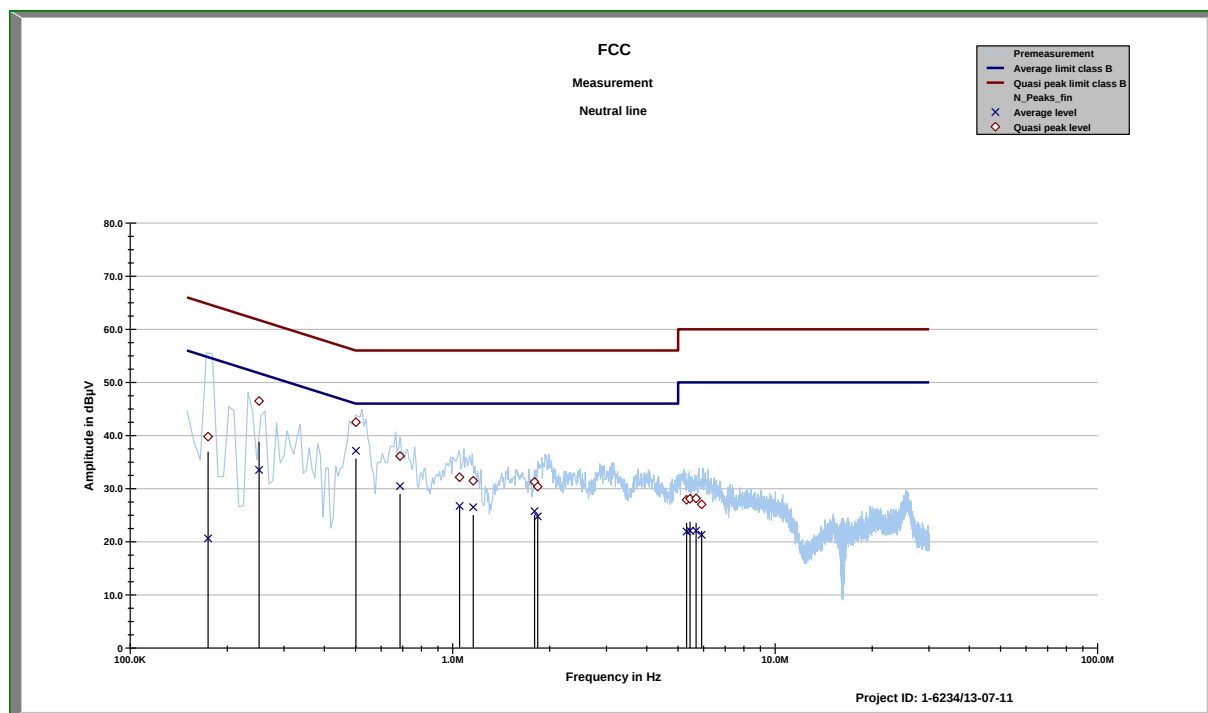
Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.20165	47.18	16.37	35.25	19.27
0.35171	36.71	22.21	28.85	21.38
0.51156	41.23	14.77	35.19	10.81
0.78076	34.66	21.34	29.32	16.68
1.3254	33.48	22.52	28.22	17.78
1.8716	32.42	23.58	26.64	19.36
2.4221	31.29	24.71	25.69	20.31
2.8541	30.02	25.98	24.36	21.64
5.2019	29.46	30.54	23.51	26.49
5.2554	29.51	30.49	23.51	26.49
5.4363	29.28	30.72	23.50	26.50
5.5794	29.21	30.79	23.30	26.70

Project ID - 1-6234/13-07-11

EUT - RFW121LW + HS3 + CH3 + USB5 + EBC

Serial Number - IMEI: 004402242380297

Operating mode - UMTS FDD 2 idle + charging



FCC

Neutral line tbl

Project ID: 1-6234/13-07-11

01:00:56 PM, Tuesday, July 16, 2013

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.17436	39.80	24.95	20.63	34.67
0.25093	46.49	15.24	33.52	19.60
0.5011	42.51	13.49	37.13	8.87
0.68665	36.12	19.88	30.48	15.52
1.05042	32.15	23.85	26.74	19.26
1.15791	31.47	24.53	26.50	19.50
1.7934	31.27	24.73	25.77	20.23
1.8344	30.38	25.62	24.76	21.24
5.3111	27.90	32.10	21.91	28.09
5.4424	28.09	31.91	22.08	27.92
5.6827	28.16	31.84	22.07	27.93
5.9127	27.04	32.96	21.31	28.69

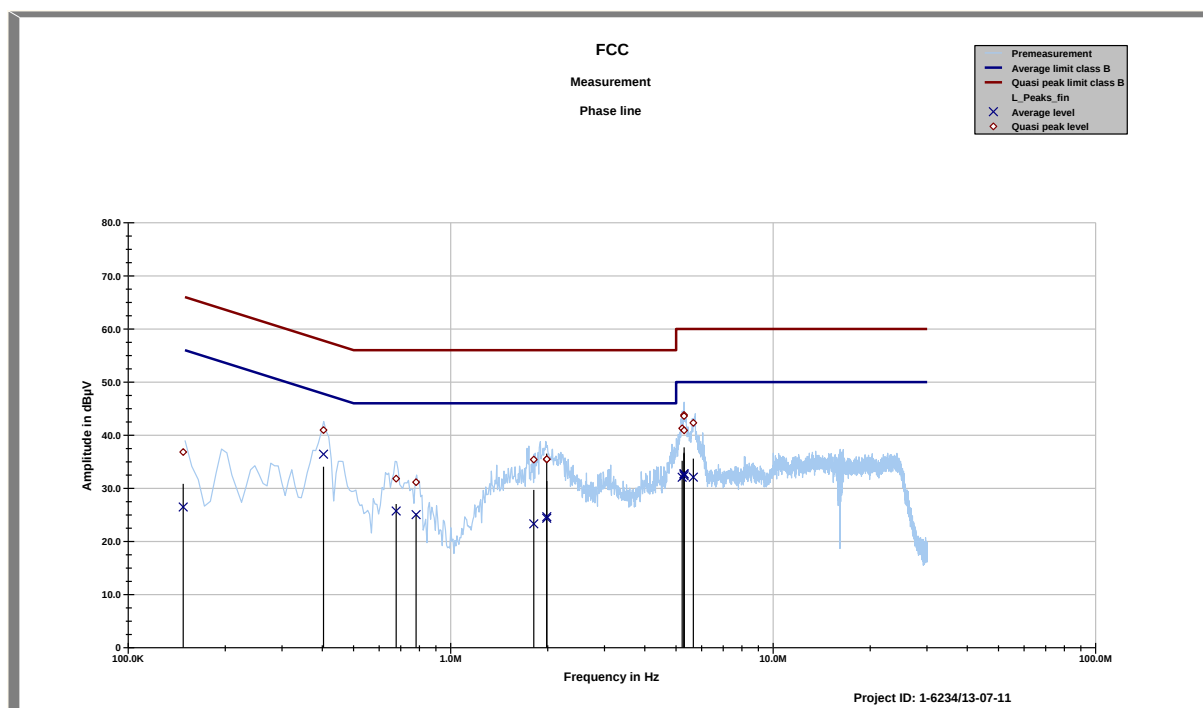
Project ID - 1-6234/13-07-11

EUT - RFW121LW + HS3 + CH3 + USB5 + EBC

Serial Number - IMEI: 004402242380297

Operating mode - UMTS FDD 2 idle + charging

set 4:



FCC

Phase line tbl

Project ID: 1-6234/13-07-11

01:21:37 PM, Tuesday, July 16, 2013

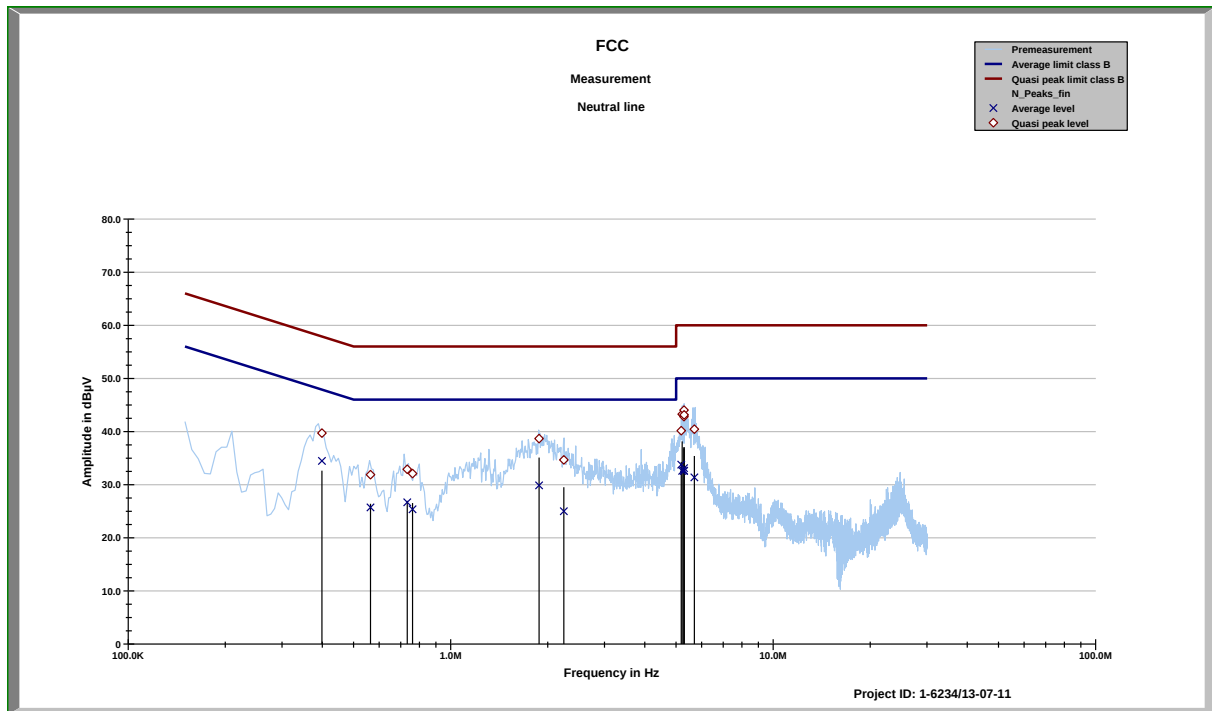
Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.14811	36.82	---	26.48	---
0.40321	40.96	16.83	36.42	12.34
0.67735	31.83	24.17	25.72	20.28
0.78097	31.16	24.84	25.04	20.96
1.8097	35.42	20.58	23.31	22.69
1.9841	35.44	20.56	24.36	21.64
1.9854	35.49	20.51	24.66	21.34
5.221	41.29	18.71	32.08	17.92
5.2903	43.81	16.19	32.76	17.24
5.2911	43.60	16.40	32.66	17.34
5.2943	40.91	19.09	32.36	17.64
5.6527	42.33	17.67	32.11	17.89

Project ID - 1-6234/13-07-11

EUT - RFW121LW + HS4 + CH4 + HDMI

Serial Number - IMEI: 004402242380297

Operating mode - UMTS FDD 5 idle + charging + video out HDMI



FCC

Neutral line tbl

Project ID: 1-6234/13-07-11

01:21:37 PM, Tuesday, July 16, 2013

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.39866	39.71	18.17	34.46	14.43
0.56391	31.88	24.12	25.72	20.28
0.73302	32.90	23.10	26.68	19.32
0.76171	32.08	23.92	25.36	20.64
1.8789	38.66	17.34	29.86	16.14
2.2423	34.66	21.34	25.00	21.00
5.1853	40.16	19.84	33.77	16.23
5.218	43.26	16.74	32.59	17.41
5.286	42.80	17.20	32.60	17.40
5.2904	44.03	15.97	33.11	16.89
5.2921	43.14	16.86	32.62	17.38
5.6941	40.43	19.57	31.36	18.64

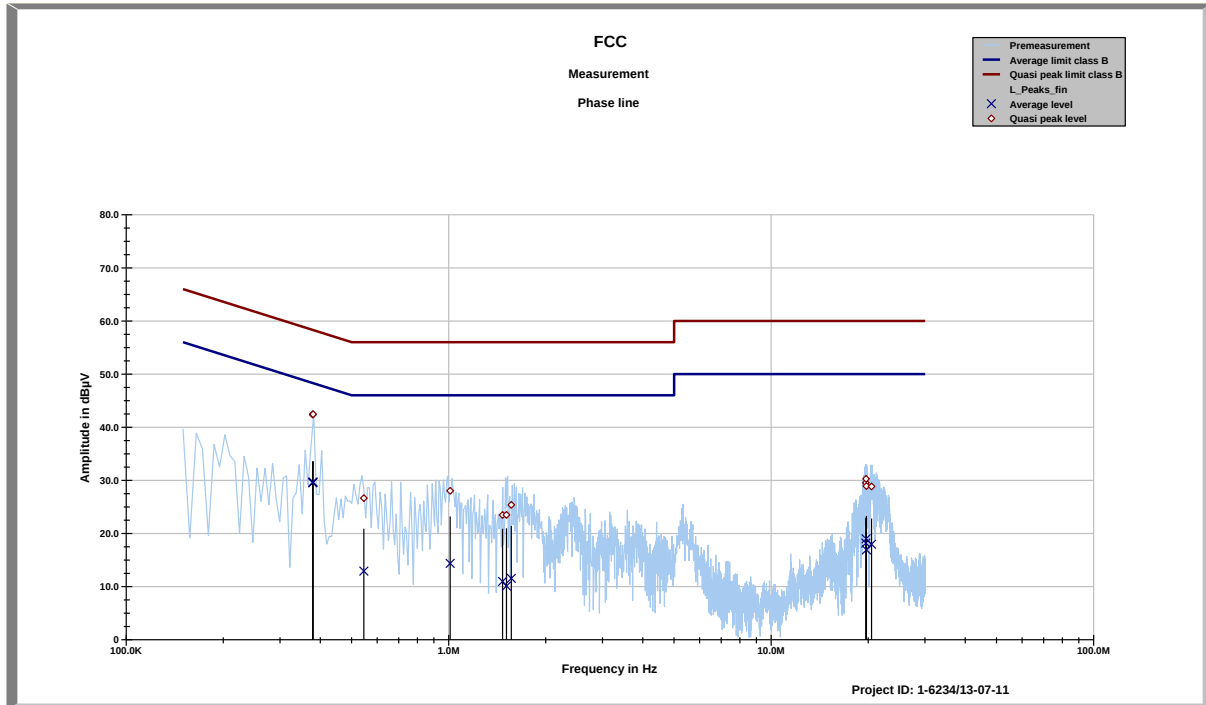
Project ID - 1-6234/13-07-11

EUT - RFW121LW + HS4 + CH4 + HDMI

Serial Number - IMEI: 004402242380297

Operating mode - UMTS FDD 5 idle + charging + video out HDMI

set 5:



FCC

Phase line tbl

Project ID: 1-6234/13-07-11

01:46:44 PM, Tuesday, July 16, 2013

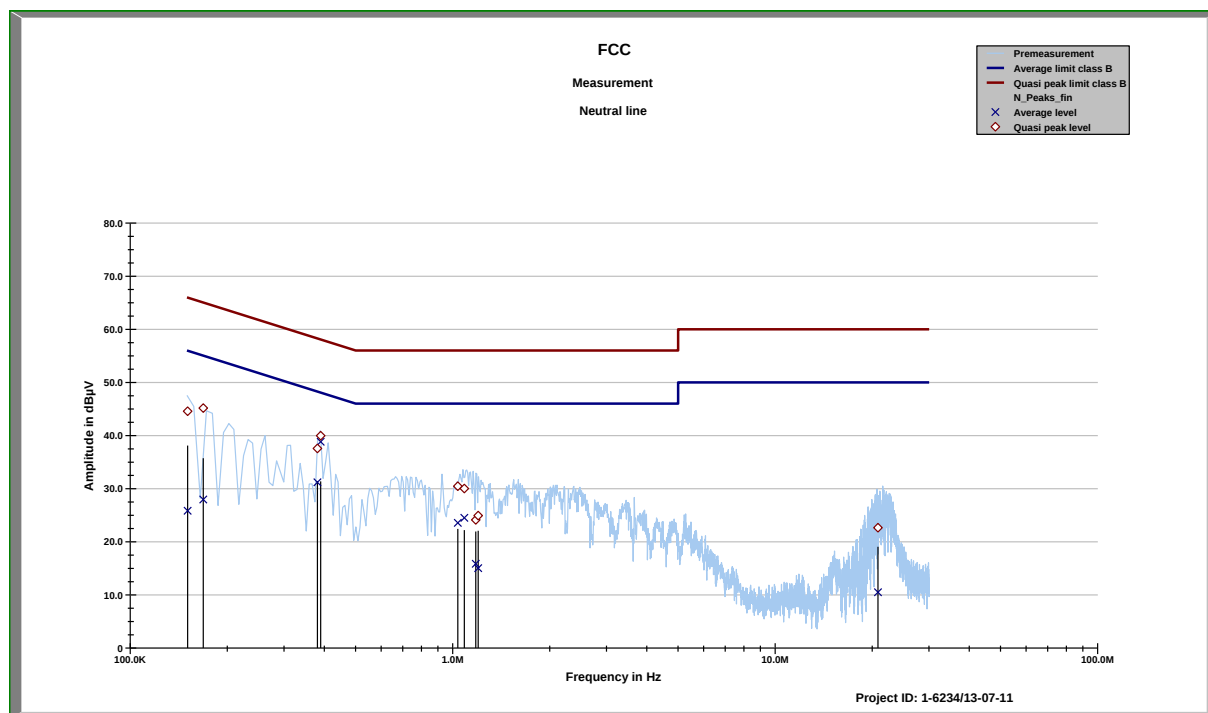
Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.37895	42.39	15.91	29.58	19.88
0.37898	42.40	15.90	29.55	19.91
0.37961	42.44	15.85	29.68	19.76
0.54573	26.64	29.36	12.92	33.08
1.01066	28.02	27.98	14.37	31.63
1.4689	23.46	32.54	10.97	35.03
1.5101	23.49	32.51	10.10	35.90
1.5632	25.38	30.62	11.55	34.45
19.654	29.55	30.45	18.17	31.83
19.677	30.29	29.71	19.00	31.00
19.728	28.92	31.08	16.91	33.09
20.465	28.85	31.15	17.97	32.03

Project ID - 1-6234/13-07-11

EUT - RFW121LW + HS5 + CH1 + USB3

Serial Number - IMEI: 004402242380297

Operating mode - PCS1900 idle + charging



FCC

Neutral line tbl

Project ID: 1-6234/13-07-11

01:46:44 PM, Tuesday, July 16, 2013

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.15075	44.57	21.39	25.84	30.14
0.16851	45.17	19.86	27.95	27.52
0.38074	37.57	20.70	31.20	18.21
0.38952	39.96	18.11	38.82	10.33
1.03686	30.46	25.54	23.56	22.44
1.0867	30.02	25.98	24.51	21.49
1.17889	24.12	31.88	15.86	30.14
1.19951	24.93	31.07	15.04	30.96
20.824	22.66	37.34	10.49	39.51

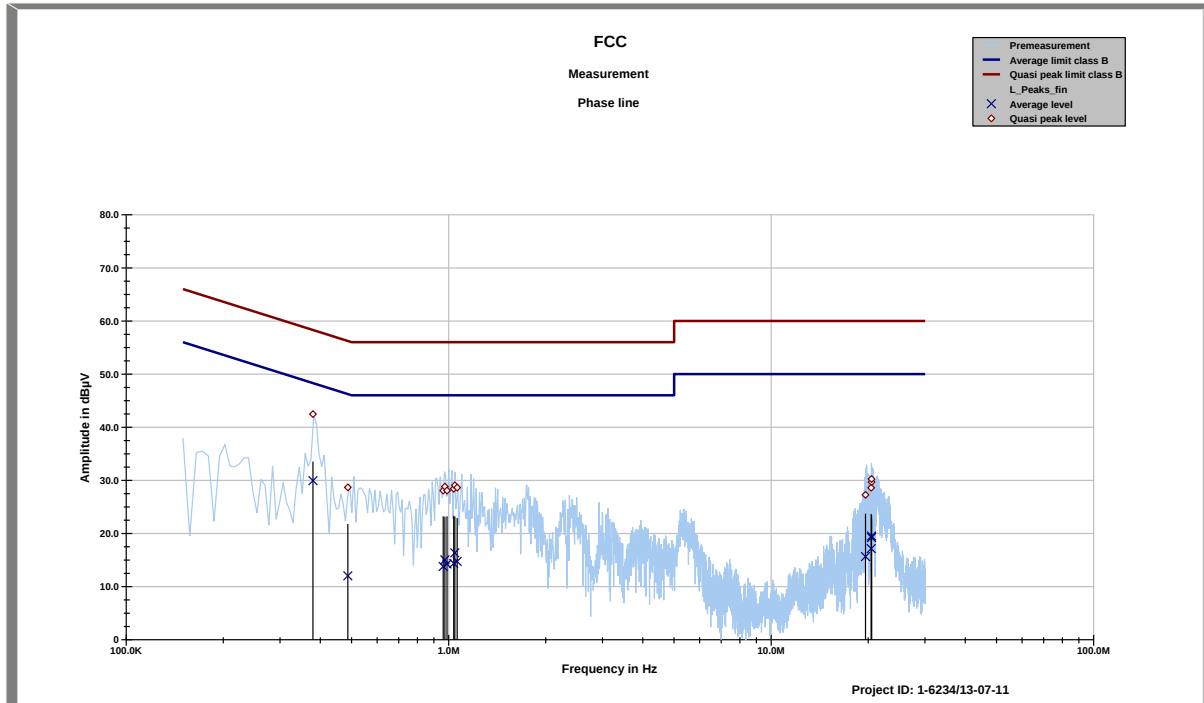
Project ID - 1-6234/13-07-11

EUT - RFW121LW + HS5 + CH1 + USB3

Serial Number - IMEI: 004402242380297

Operating mode - PCS1900 idle + charging

set 6:



FCC

Phase line tbl

Project ID: 1-6234/13-07-11

02:10:11 PM, Tuesday, July 16, 2013

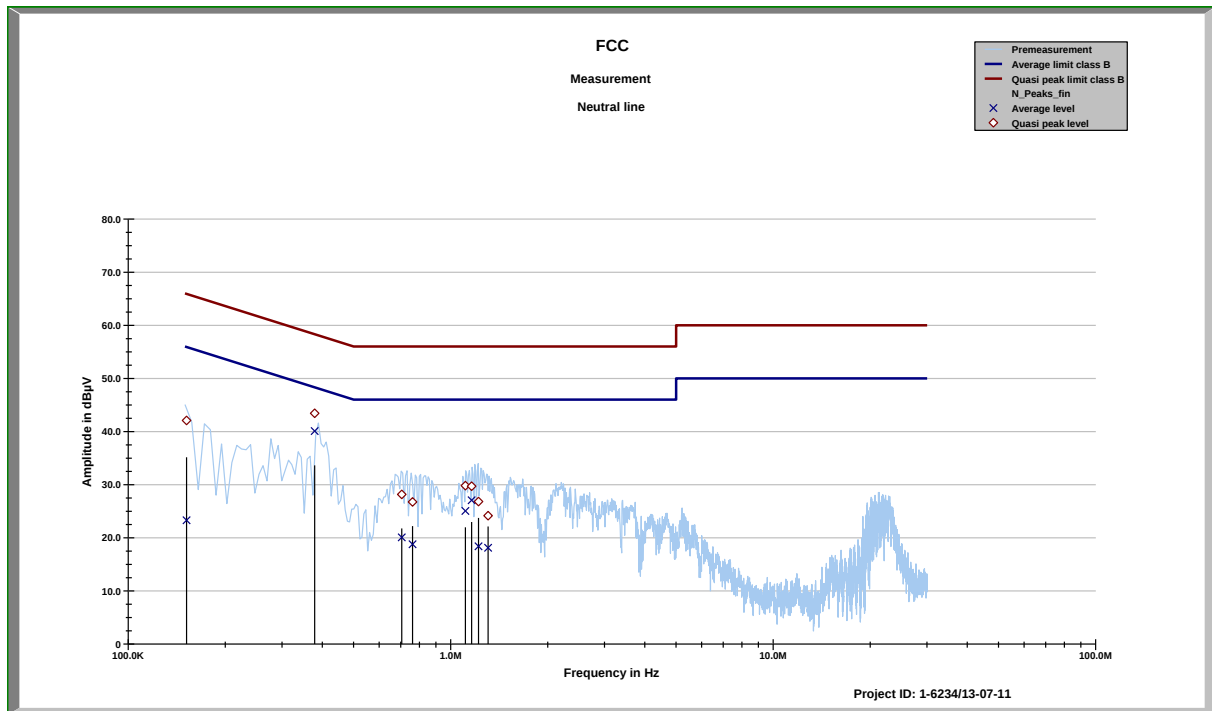
Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.3795	42.47	15.82	29.93	19.51
0.48666	28.66	27.56	12.02	34.36
0.96142	28.08	27.92	13.79	32.21
0.97301	28.82	27.18	15.04	30.96
0.98816	28.08	27.92	14.25	31.75
1.03645	28.40	27.60	14.36	31.64
1.04474	29.05	26.95	16.35	29.65
1.06194	28.64	27.36	14.73	31.27
19.604	27.27	32.73	15.64	34.36
20.412	28.61	31.39	17.15	32.85
20.465	29.69	30.31	19.22	30.78
20.468	30.25	29.75	19.51	30.49

Project ID - 1-6234/13-07-11

EUT - RFW121LW + HS1 + CH1 + USB4

Serial Number - IMEI: 004402242380297

Operating mode - GSM850 idle + charging



FCC

Neutral line tbl

Project ID: 1-6234/13-07-11

02:10:11 PM, Tuesday, July 16, 2013

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.15172	42.08	23.82	23.30	32.65
0.37855	43.42	14.89	40.09	9.38
0.70495	28.16	27.84	20.07	25.93
0.7617	26.75	29.25	18.77	27.23
1.11079	29.80	26.20	25.04	20.96
1.16121	29.71	26.29	27.05	18.95
1.21957	26.81	29.19	18.39	27.61
1.3063	24.16	31.84	18.11	27.89

Project ID - 1-6234/13-07-11

EUT - RFW121LW + HS1 + CH1 + USB4

Serial Number - IMEI: 004402242380297

Operating mode - GSM850 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

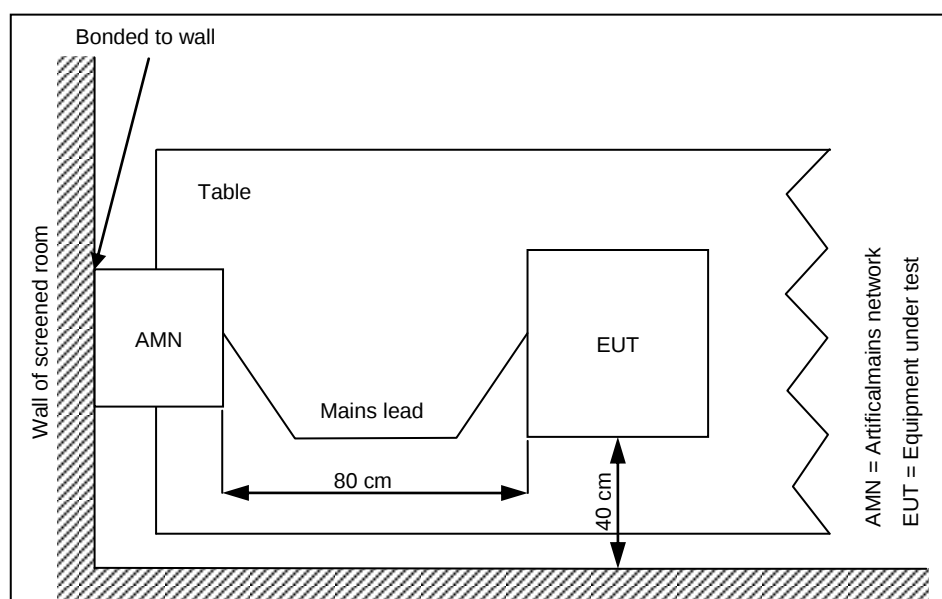
Example calculation:

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:

$$SS \text{ [dB}\mu\text{V]} = 37,62 \text{ [dB}\mu\text{V]} + 9,90 \text{ [dB]} + 0,23 \text{ [dB]} = \underline{47,75 \text{ [dB}\mu\text{V]}} \text{ (244, 06 } \mu\text{V)}$$

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				
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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 dB μ V/m	39,1 dB μ V/m
88 MHz – 216 MHz	33,5 dB μ V/m	43,5 dB μ V/m
216 MHz – 960 MHz	36 dB μ V/m	46,4 dB μ V/m
960 MHz – 40000 MHz	44 dB μ V/m	49,5 dB μ V/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 7:

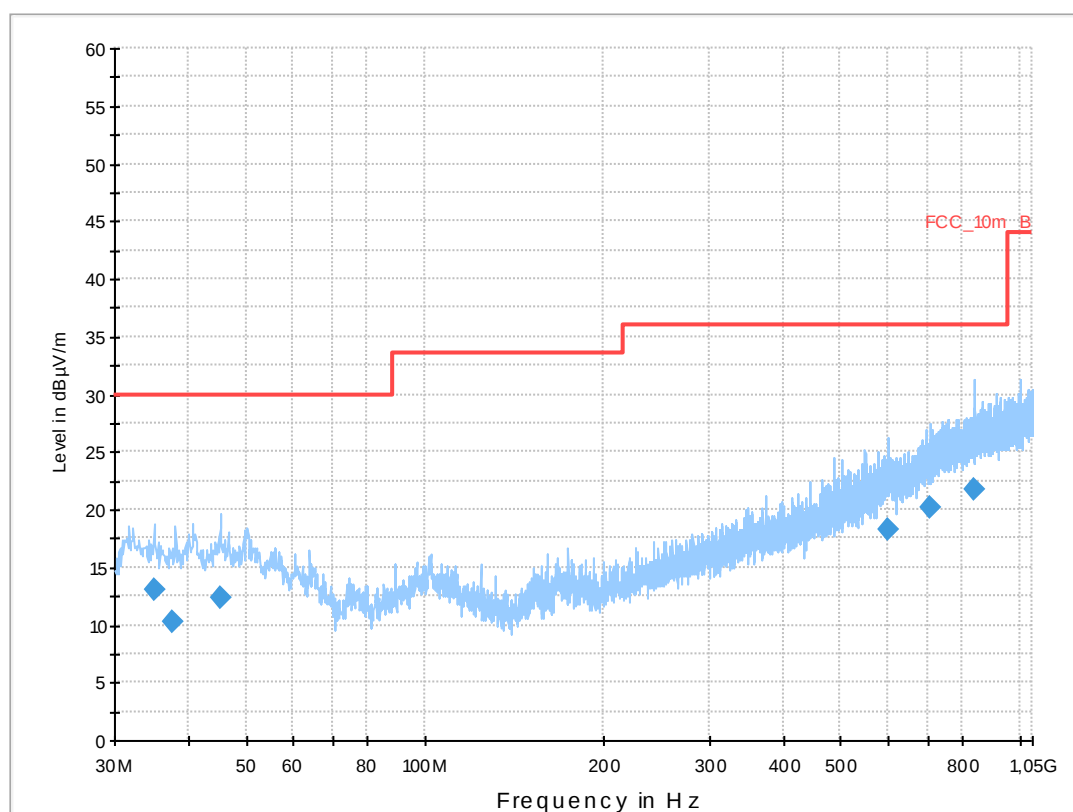
Common Information

EUT: RFW121LW + HS1 + CH 1+ USB1
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: GSM 850 idle + charging
 Operator Name: Hennemann
 Comment: AC 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dB μ V/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 (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
35.033550	13.0	1000.0	120.000	154.0	V	81.0	13.0	17.0	30.0	
37.633200	10.2	1000.0	120.000	154.0	V	-10.0	13.2	19.8	30.0	
45.111150	12.4	1000.0	120.000	98.0	V	-9.0	13.3	17.6	30.0	
600.822300	18.3	1000.0	120.000	170.0	H	81.0	20.8	17.7	36.0	
708.563400	20.2	1000.0	120.000	170.0	H	87.0	22.7	15.8	36.0	
839.658300	21.8	1000.0	120.000	170.0	V	88.0	24.4	14.2	36.0	

set 8:

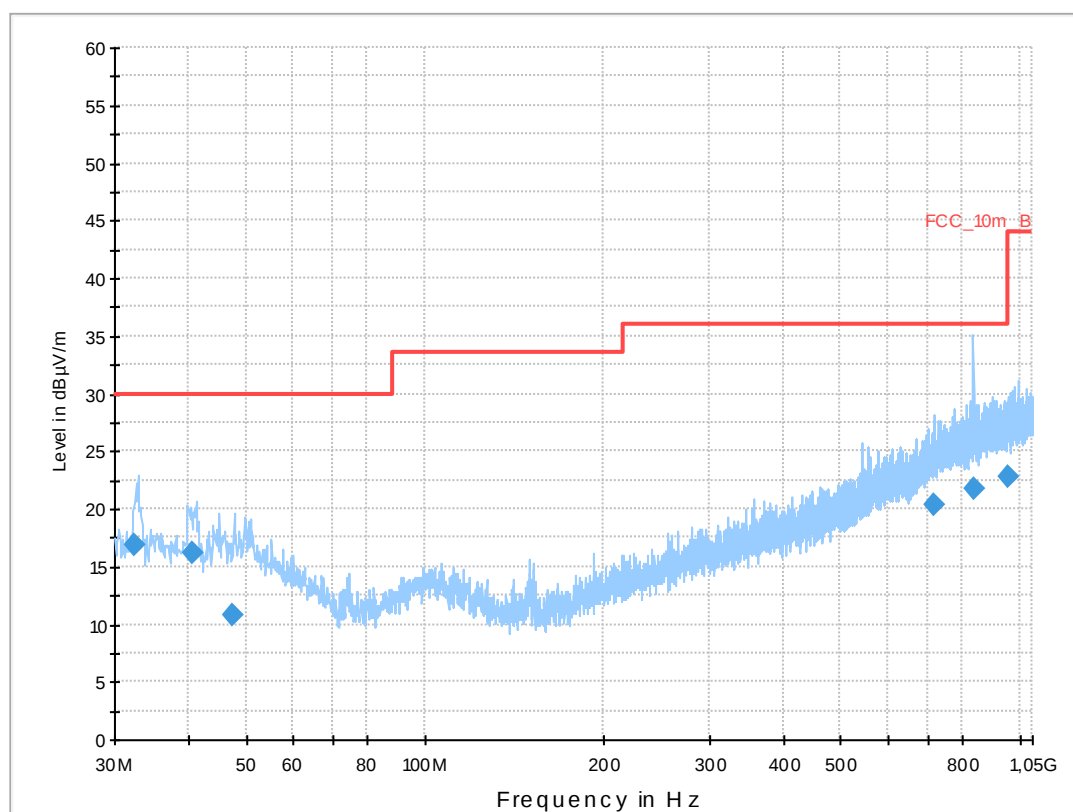
Common Information

EUT: RFW121LW + HS2 + CH2 + USB2
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: PCS 1900 idle + 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: dB μ V/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 (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
32.301150	16.9	1000.0	120.000	161.0	V	261.0	12.8	13.1	30.0	
40.522800	16.1	1000.0	120.000	120.0	V	280.0	13.4	13.9	30.0	
47.597400	10.8	1000.0	120.000	98.0	V	180.0	13.3	19.2	30.0	
716.130750	20.3	1000.0	120.000	170.0	V	81.0	22.9	15.7	36.0	
835.110750	21.8	1000.0	120.000	170.0	V	280.0	24.3	14.2	36.0	
958.911600	22.7	1000.0	120.000	152.0	V	180.0	25.4	13.3	36.0	

set 9:

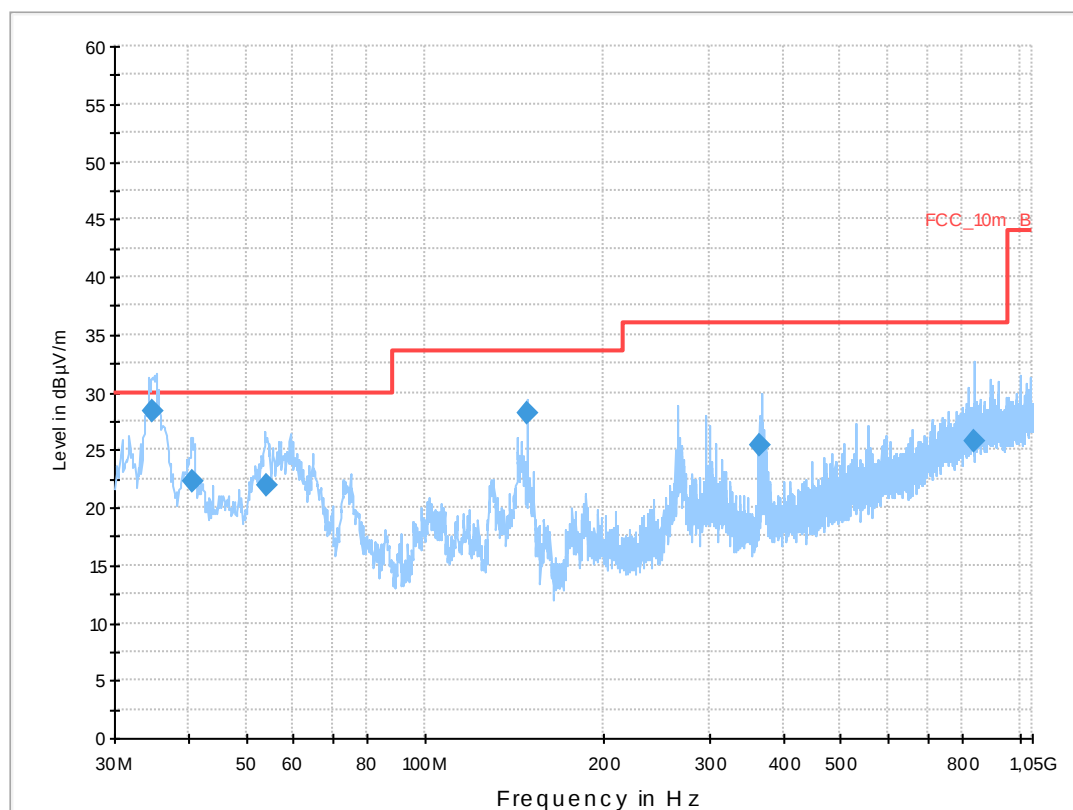
Common Information

EUT: RFW121LW + HS3 + CH3 + HDMI cable
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: UMTS FDD 2 idle + charging + HDMI video out
 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: dB μ V/m

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



Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
34.846650	28.4	1000.0	120.000	98.0	V	81.0	13.0	1.6	30.0	
40.676100	22.2	1000.0	120.000	98.0	V	170.0	13.4	7.8	30.0	
53.959950	21.9	1000.0	120.000	98.0	V	100.0	13.0	8.1	30.0	
148.512600	28.2	1000.0	120.000	98.0	V	271.0	8.9	5.3	33.5	
366.426600	25.4	1000.0	120.000	98.0	V	190.0	16.3	10.6	36.0	
840.030900	25.7	1000.0	120.000	170.0	V	272.0	24.4	10.3	36.0	

set 10:

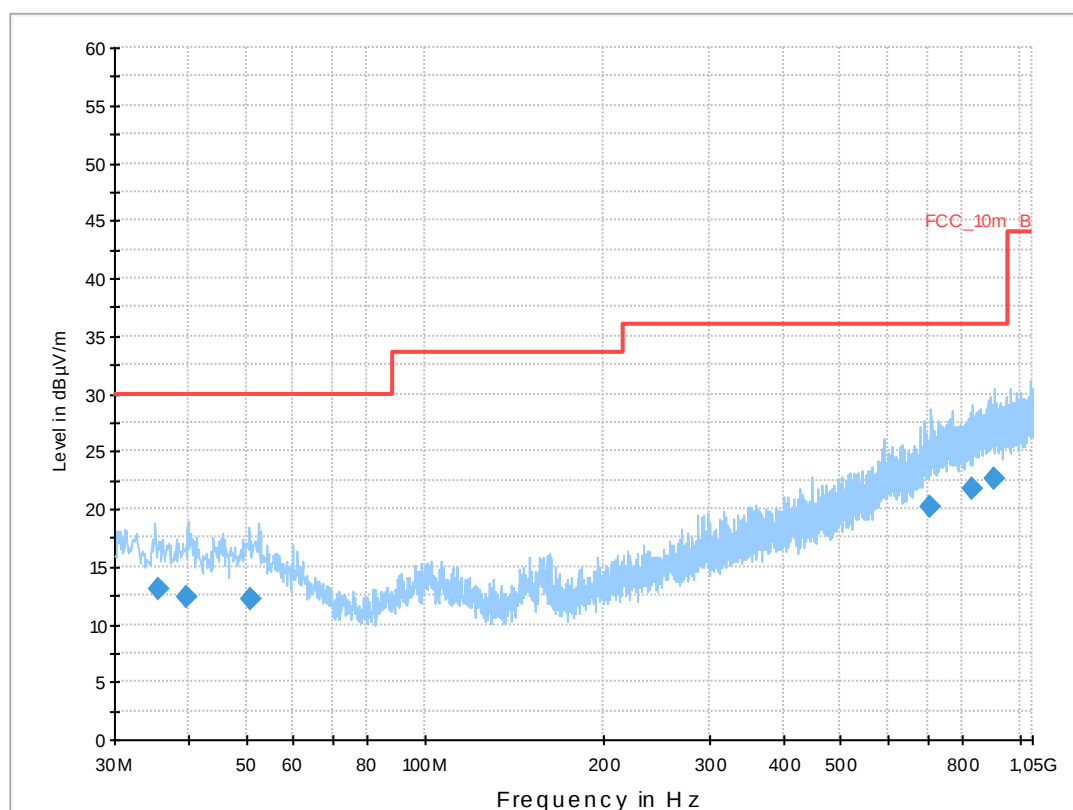
Common Information

EUT: RFW121LW + HS4 + CH 4 + EBC
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: UMTS FDD 5 idle + 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	Preamplifier
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
35.501550	13.1	1000.0	120.000	147.0	V	100.0	13.1	16.9	30.0	
39.755400	12.4	1000.0	120.000	142.0	V	190.0	13.4	17.6	30.0	
50.873100	12.2	1000.0	120.000	170.0	V	264.0	13.3	17.8	30.0	
709.474950	20.2	1000.0	120.000	170.0	V	2.0	22.7	15.8	36.0	
831.929700	21.8	1000.0	120.000	170.0	H	260.0	24.3	14.2	36.0	
906.311250	22.6	1000.0	120.000	170.0	H	268.0	25.2	13.4	36.0	

set 11:

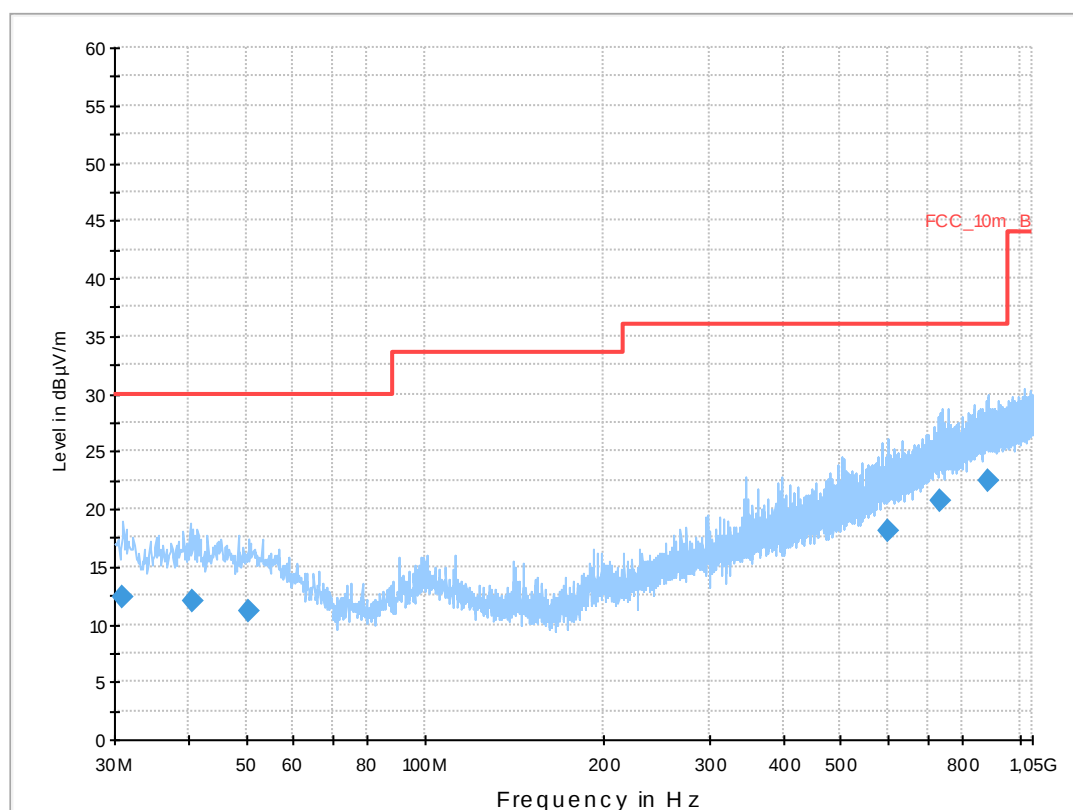
Common Information

EUT: RFW121LW + HS5 + CH1 + USB3
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: GSM 850 idle + 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: dB μ V/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 (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
31.011000	12.4	1000.0	120.000	161.0	V	10.0	12.6	17.6	30.0	
40.601550	12.1	1000.0	120.000	98.0	V	-4.0	13.4	17.9	30.0	
50.628450	11.1	1000.0	120.000	170.0	V	264.0	13.3	18.9	30.0	
599.066100	18.1	1000.0	120.000	142.0	H	2.0	20.8	17.9	36.0	
732.995850	20.7	1000.0	120.000	170.0	H	92.0	23.3	15.3	36.0	
886.363650	22.5	1000.0	120.000	98.0	V	260.0	25.0	13.5	36.0	

set 12:

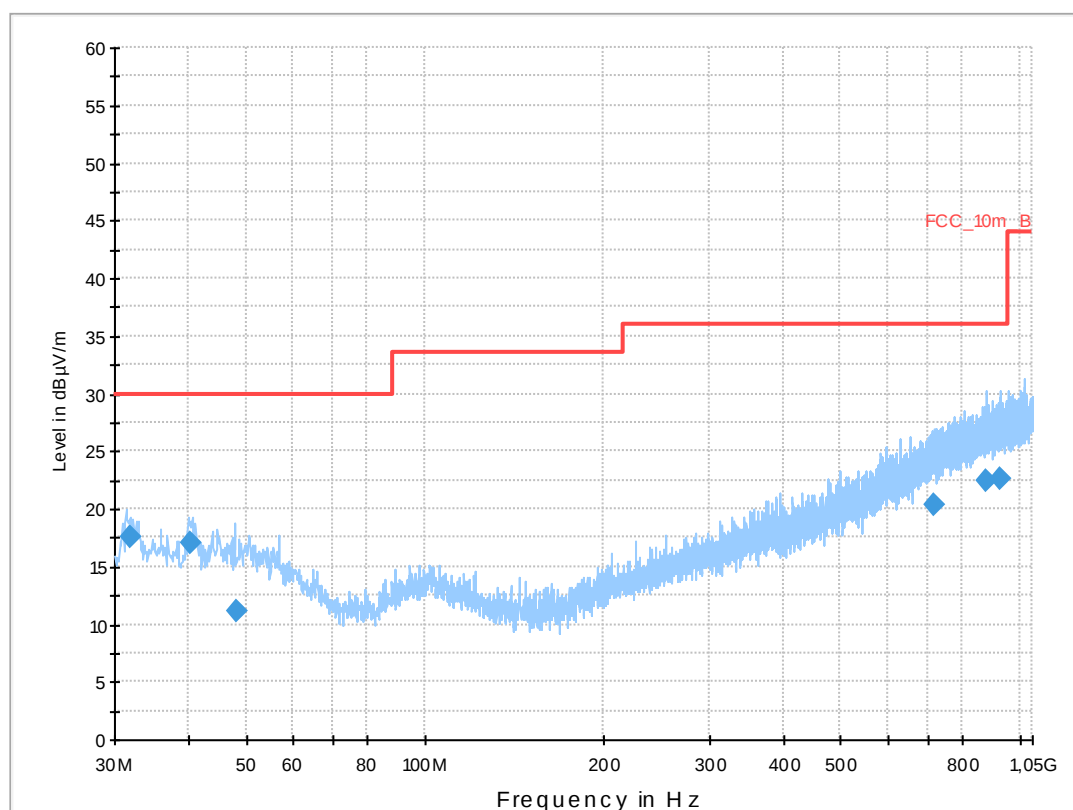
Common Information

EUT: RFW121LW + HS2 + CH2 + USB4
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: PCS 1900 idle + 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: dB μ V/m

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



Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
31.887150	17.6	1000.0	120.000	160.0	V	272.0	12.7	12.4	30.0	
40.405200	17.0	1000.0	120.000	170.0	V	272.0	13.4	13.0	30.0	
48.238500	11.1	1000.0	120.000	98.0	V	170.0	13.3	18.9	30.0	
720.258750	20.4	1000.0	120.000	170.0	H	177.0	23.0	15.6	36.0	
878.893350	22.5	1000.0	120.000	170.0	H	261.0	24.9	13.5	36.0	
925.638450	22.6	1000.0	120.000	170.0	V	90.0	25.3	13.4	36.0	

set 13:

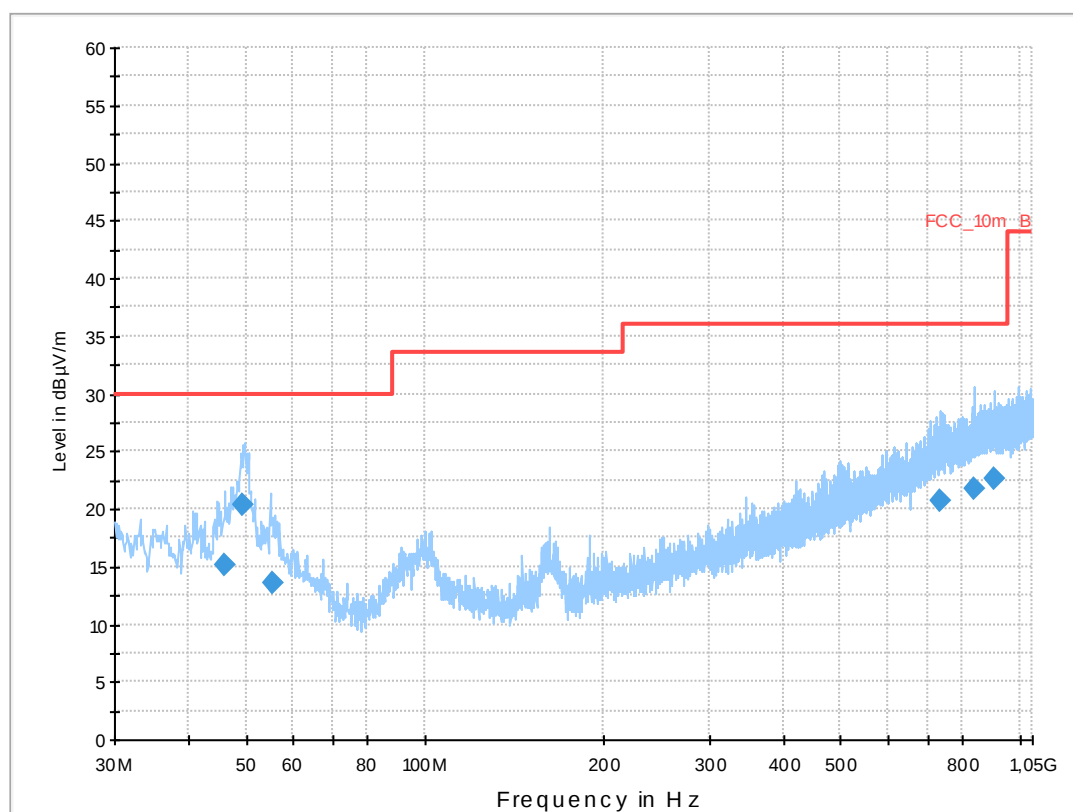
Common Information

EUT: RFW121LW + HS1 + CH1 + USB1
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: TX BT (DH5) + 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
46.027350	15.2	1000.0	120.000	98.0	V	85.0	13.3	14.8	30.0	
49.495800	20.3	1000.0	120.000	98.0	V	171.0	13.4	9.7	30.0	
55.336950	13.5	1000.0	120.000	170.0	V	90.0	12.8	16.5	30.0	
734.500650	20.7	1000.0	120.000	111.0	V	190.0	23.3	15.3	36.0	
838.345650	21.8	1000.0	120.000	98.0	V	10.0	24.4	14.2	36.0	
907.546500	22.6	1000.0	120.000	170.0	V	80.0	25.2	13.4	36.0	

set 14:

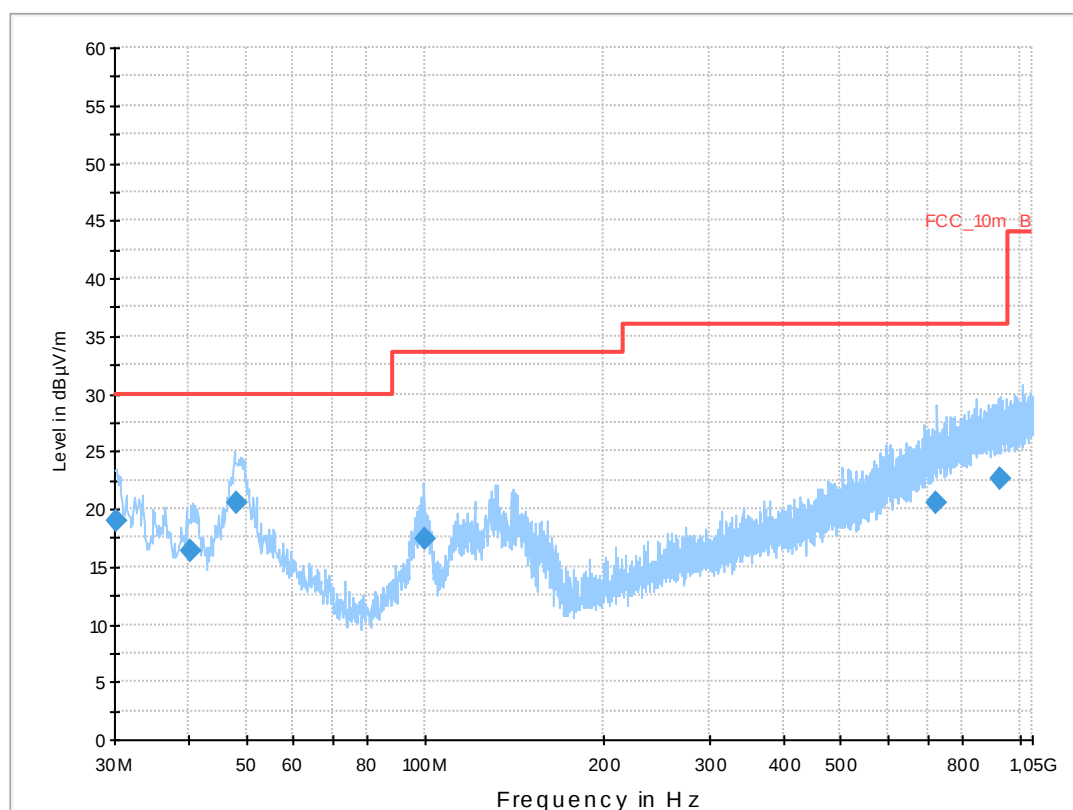
Common Information

EUT: RFW121LW + HS2 + CH2 + USB2
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: TX WLAN b-mode, 1 Mbit/s, Ch. 6 + 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: dB μ V/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 (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
30.227253	19.0	1000.0	120.000	133.0	V	80.0	12.5	11.0	30.0	
40.199850	16.4	1000.0	120.000	98.0	V	280.0	13.4	13.6	30.0	
48.071100	20.6	1000.0	120.000	98.0	V	-5.0	13.3	9.4	30.0	
99.647550	17.5	1000.0	120.000	170.0	V	272.0	11.9	16.0	33.5	
725.929650	20.5	1000.0	120.000	170.0	V	-5.0	23.1	15.5	36.0	
924.252900	22.6	1000.0	120.000	170.0	V	87.0	25.3	13.4	36.0	

set 15:

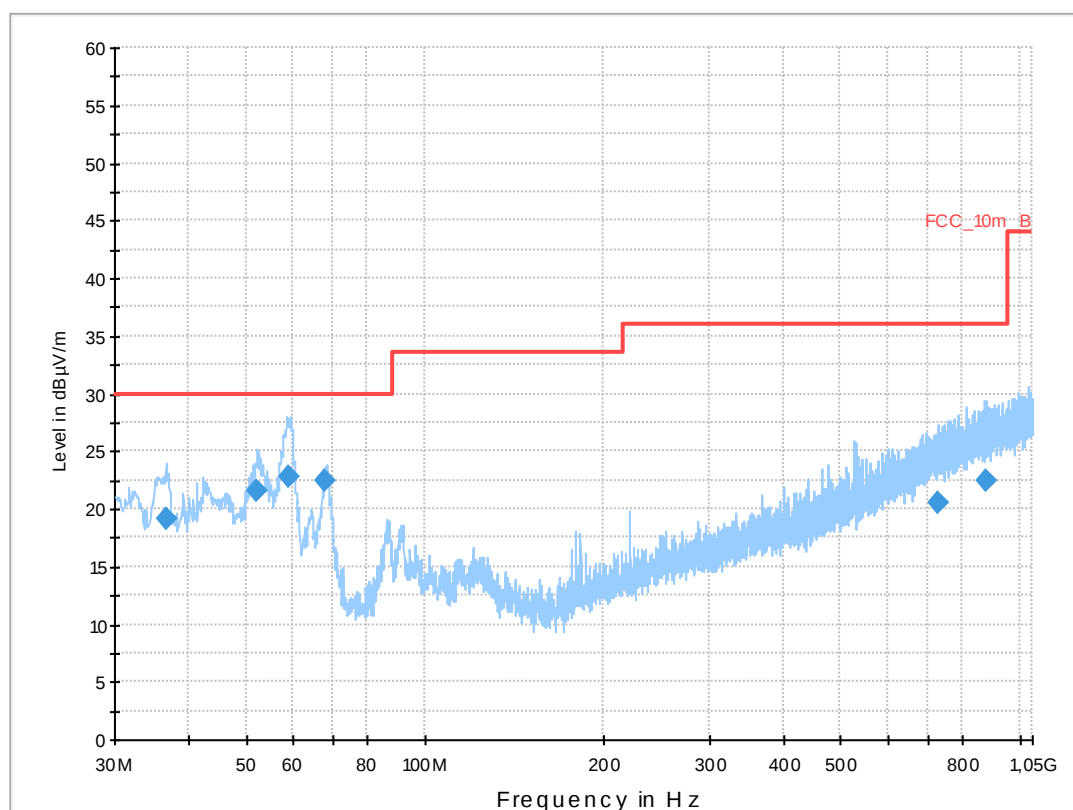
Common Information

EUT: RFW121LW + HS3 + CH3 + USB5 + EBC
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: TX WLAN a-mode, 1 Mbit/s, Ch. 36 + 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: dB μ V/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 (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
36.751800	19.1	1000.0	120.000	145.0	V	10.0	13.2	10.9	30.0	
51.894750	21.5	1000.0	120.000	98.0	V	2.0	13.2	8.5	30.0	
58.820250	22.9	1000.0	120.000	170.0	V	10.0	11.9	7.1	30.0	
67.863750	22.5	1000.0	120.000	170.0	V	-10.0	9.8	7.5	30.0	
728.802750	20.6	1000.0	120.000	170.0	V	190.0	23.2	15.4	36.0	
881.318250	22.5	1000.0	120.000	170.0	H	170.0	25.0	13.5	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:

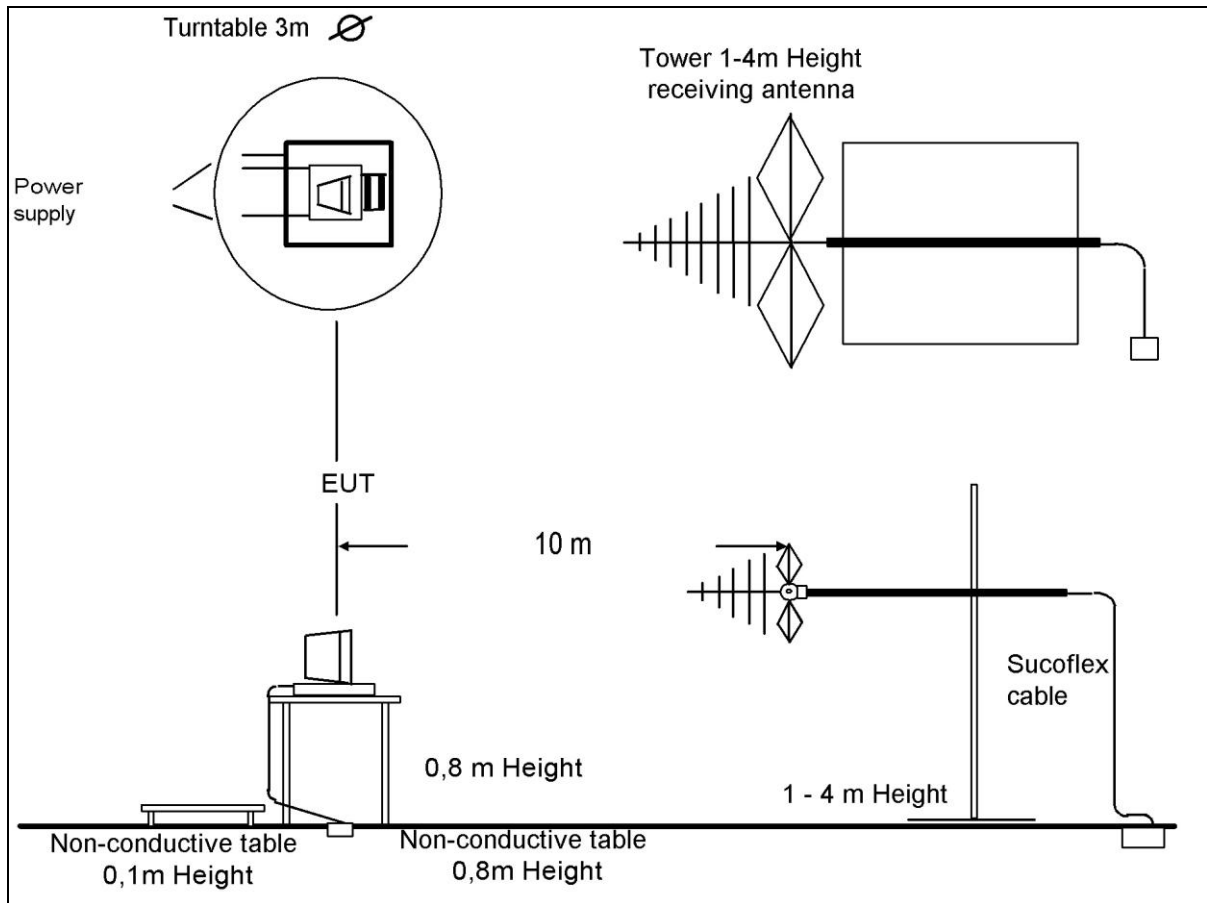
Frequency [MHz]	CL [dB]	AF [dB μ V/m]
30,000	0,20	12,30
100,000	0,60	11,30
200,000	1,10	10,60
300,000	1,30	13,20
400,000	1,60	15,30
500,000	1,90	16,80
600,000	2,00	18,80
700,000	2,20	20,30
800,000	2,30	21,50
900,000	2,40	22,80
1000,000	2,50	23,30

Example calculation:

For example at 500,000 000 MHz the measured Voltage (U_R) is 12,35 dB μ V/m, the loss of the cable (CL) is 1,90 dB and the antenna factor (AF) is 16,80 dB μ V/m the final result will be calculated:

$$SS \text{ [dB}\mu\text{V]} = 12,35 \text{ [dB}\mu\text{V/m]} + 1,90 \text{ [dB]} + 16,80 \text{ [dB}\mu\text{V/m]} = \underline{31,05 \text{ [dB}\mu\text{V/m]}} \text{ (35,69 } \mu\text{V/m)}$$

8.2.8 Test Set-up



8.3 Electromagnetic Radiated Emissions (> 1GHz)

8.3.1 Instrumentation for Test (see equipment list)

F 1	F 6	F 21	F 29	F 30	F 33						
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8.3.2 Test Plan

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

Remarks:	The measured values are recalculated from 5m to 3m distance (set 7-set 12) 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 dB μ V/m	49,1 dB μ V/m
88 MHz – 216 MHz	43,5 dB μ V/m	53,5 dB μ V/m
216 MHz – 960 MHz	46 dB μ V/m	56,4 dB μ V/m
960 MHz – 18000 MHz	54 dB μ V/m	59,5 dB μ V/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)

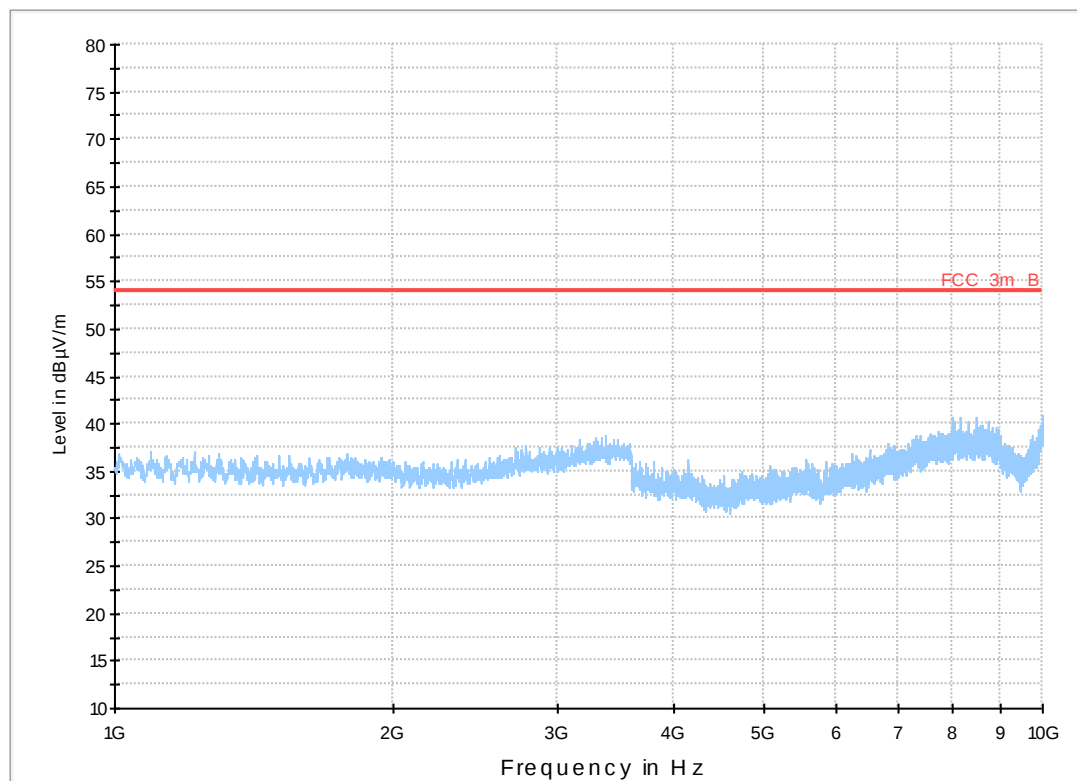
8.3.5 Test Results

set 7:

Common Information

EUT:	RFW121LW + HS1 + CH 1+ USB1
Serial Number:	IMEI: 004402242380297
Test Description:	FCC part 15 class B
Operating Conditions:	GSM 850 idle + charging
Operator Name:	Hennemann
Comment:	AC 115 V / 60 Hz

FCC_1_10_B_5m

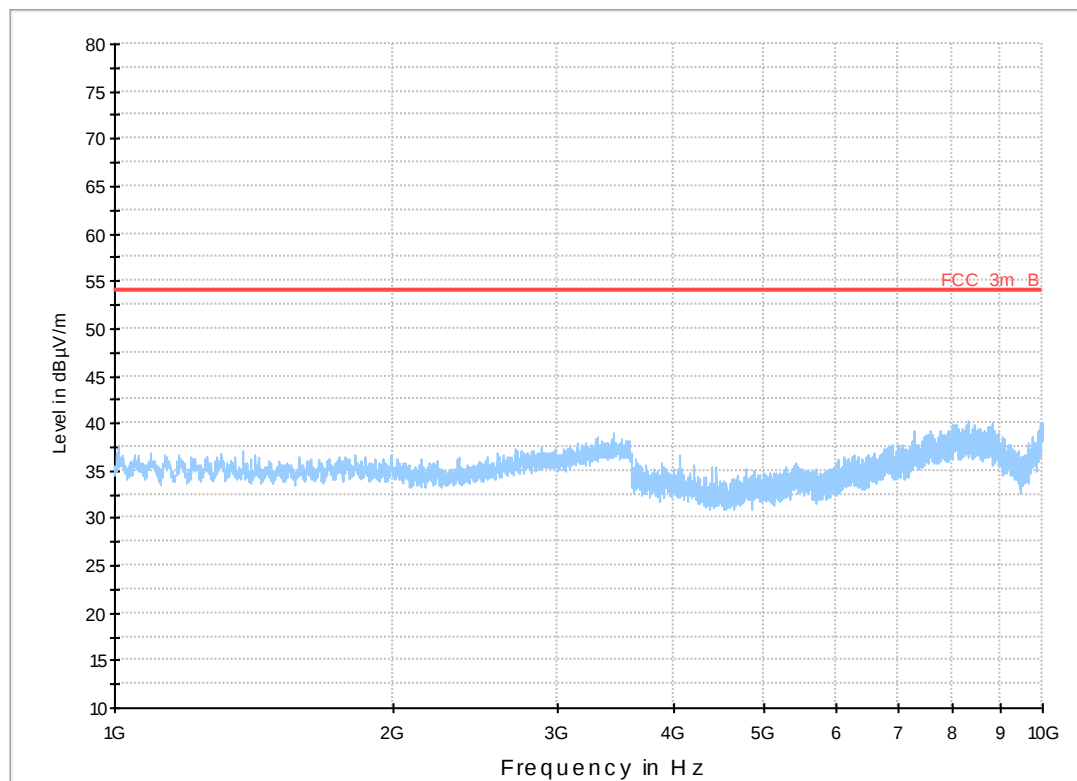


set 8:

Common Information

EUT:	RFW121LW + HS2 + CH2 + USB2
Serial Number:	IMEI: 004402242380297
Test Description:	FCC part 15 class B
Operating Conditions:	PCS 1900 idle + charging
Operator Name:	Hennemann
Comment:	AC 115 V / 60 Hz

FCC_1_10_B_5m

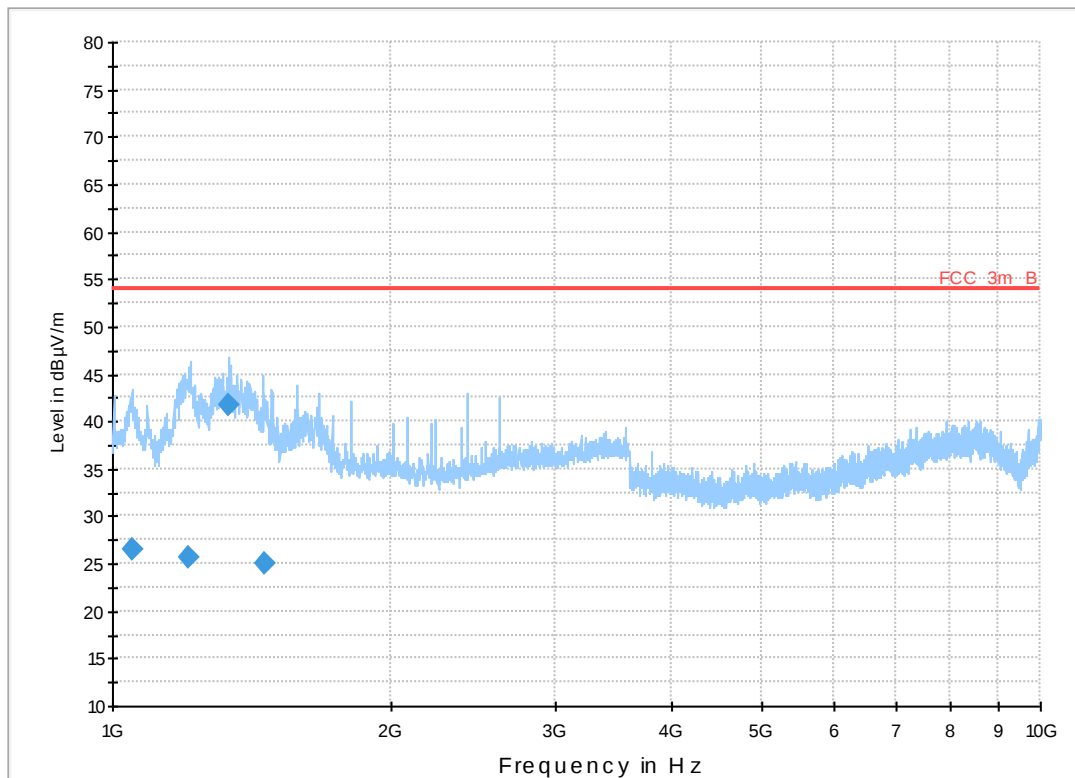


set 9:

Common Information

EUT: RFW121LW + HS3 + CH3 + HDMI cable
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: UMTS FDD 2 idle + charging + HDMI video out
 Operator Name: Hennemann
 Comment: AC 115 V / 60 Hz

FCC_1_10_B_5m



Final Result 1

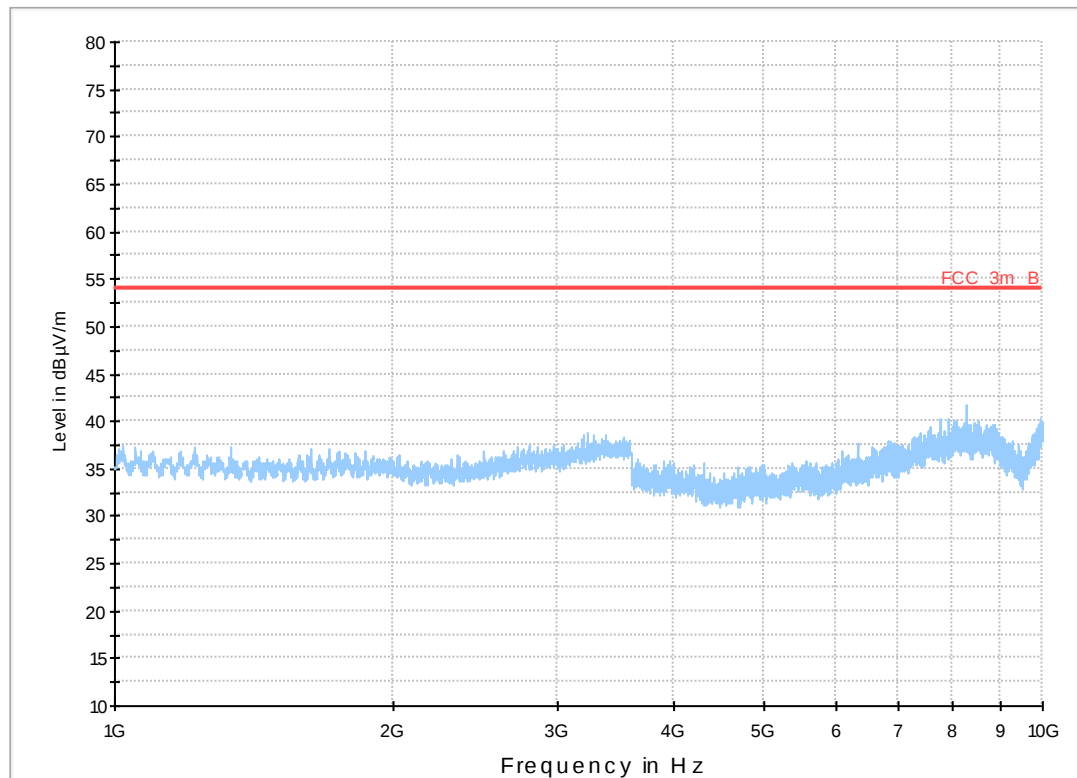
Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1049.496553	26.5	100.0	1000.000	100.0	V	188.0	-4.6	27.5	54.0	
1208.755726	25.7	100.0	1000.000	100.0	H	43.0	-4.7	28.3	54.0	
1336.616222	41.6	100.0	1000.000	100.0	H	56.0	-4.8	12.4	54.0	
1455.779872	25.0	100.0	1000.000	100.0	H	335.0	-4.8	29.0	54.0	

set 10:

Common Information

EUT:	RFW121LW + HS4 + CH 4 + EBC
Serial Number:	IMEI: 004402242380297
Test Description:	FCC part 15 class B
Operating Conditions:	UMTS FDD 5 idle + charging
Operator Name:	Hennemann
Comment:	AC 115 V / 60 Hz

FCC_1_10_B_5m

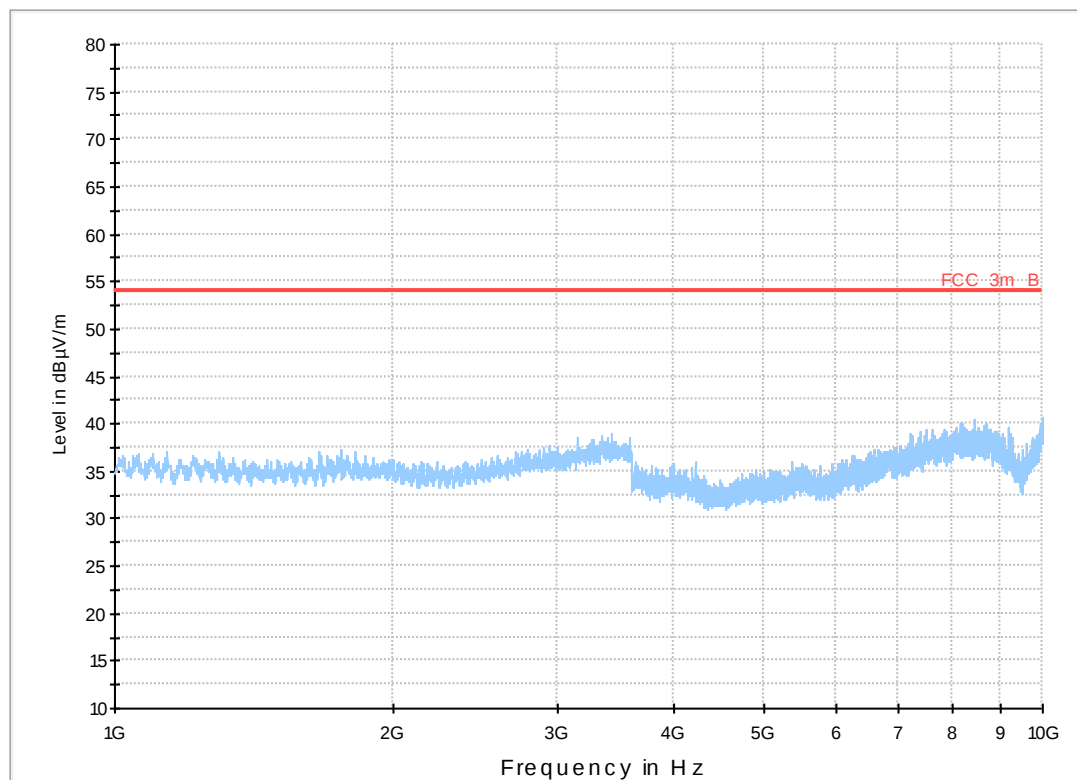


set 11:

Common Information

EUT:	RFW121LW + HS5 + CH1 + USB3
Serial Number:	IMEI: 004402242380297
Test Description:	FCC part 15 class B
Operating Conditions:	GSM 850 idle + charging
Operator Name:	Hennemann
Comment:	AC 115 V / 60 Hz

FCC_1_10_B_5m

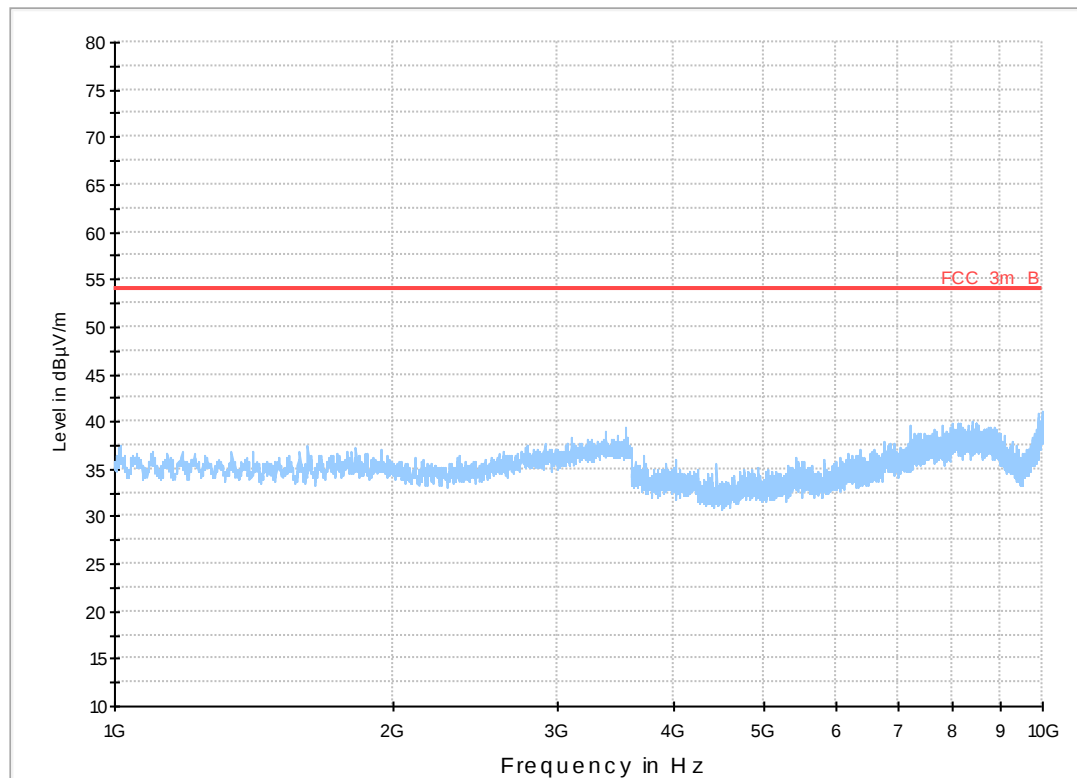


set 12:

Common Information

EUT:	RFW121LW + HS5 + CH1 + USB3
Serial Number:	IMEI: 004402242380297
Test Description:	FCC part 15 class B
Operating Conditions:	PCS 1900 idle + charging
Operator Name:	Hennemann
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:

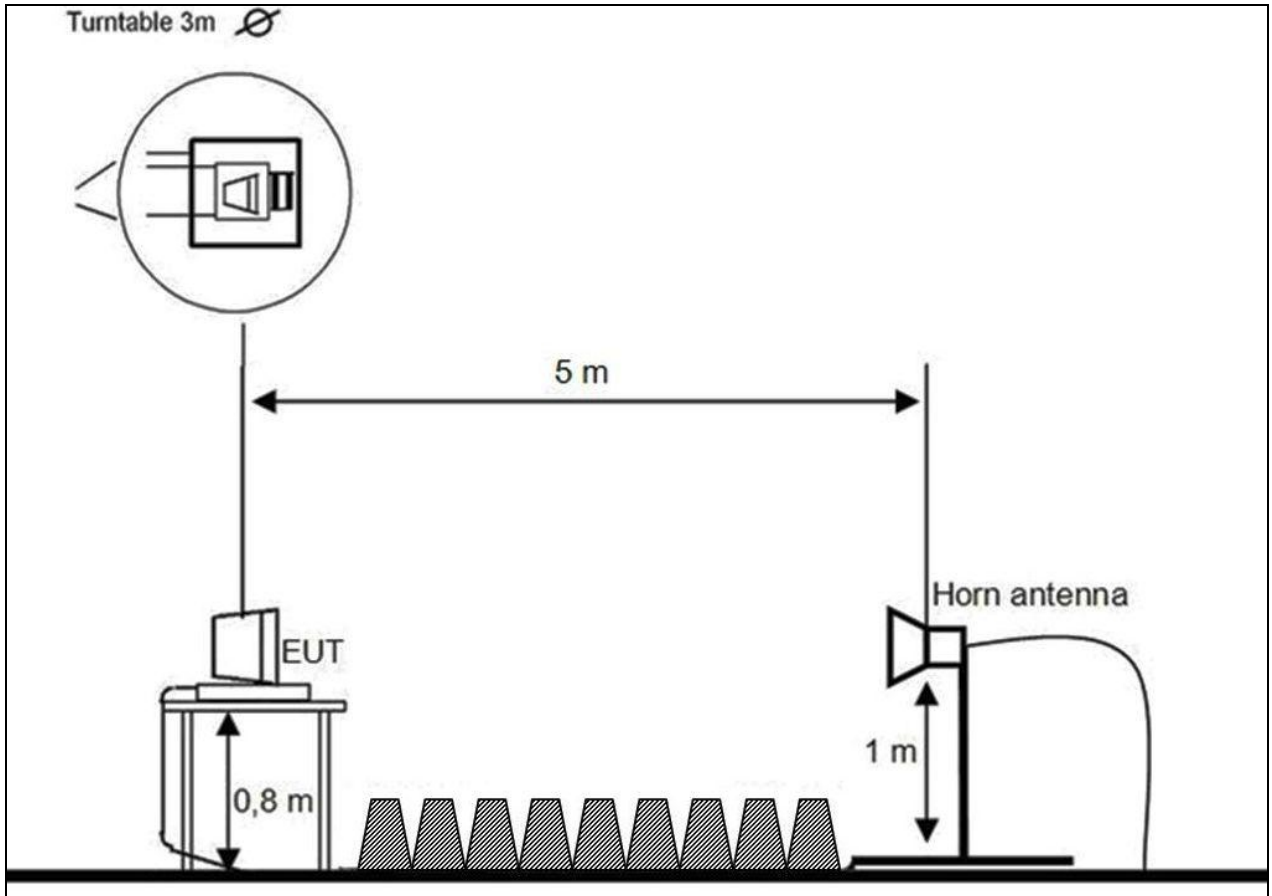
Frequency [GHz]	CL [dB]	AF [dB μ V/m]	DC [dB]
1,000	-35,50	26,20	4,40
1,500	-35,20	26,10	4,40
2,000	-35,10	26,70	4,40
2,500	-35,00	26,50	4,40
3,000	-34,70	27,60	4,40
3,500	-34,80	28,40	4,40
4,000	-35,00	28,60	4,40
4,500	-34,90	28,90	4,40
5,000	-34,80	29,30	4,40
5,500	-34,35	29,80	4,40
6,000	-34,00	30,30	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 dB μ V/m, the loss of the cable (CL) is -35,00 dB, the antenna factor (AF) is 28,60 dB μ V/m and the distance correction (DC) is 4,40 dB the final result will be calculated:

$$SS \text{ [dB}\mu\text{V]} = 46,13 \text{ [dB}\mu\text{V/m]} + (-35,00) \text{ [dB]} + 28,60 \text{ [dB}\mu\text{V/m]} + 4,4 \text{ [dB]} = \underline{44,13 \text{ [dB}\mu\text{V/m]} (160,88 \mu\text{V/m})}$$

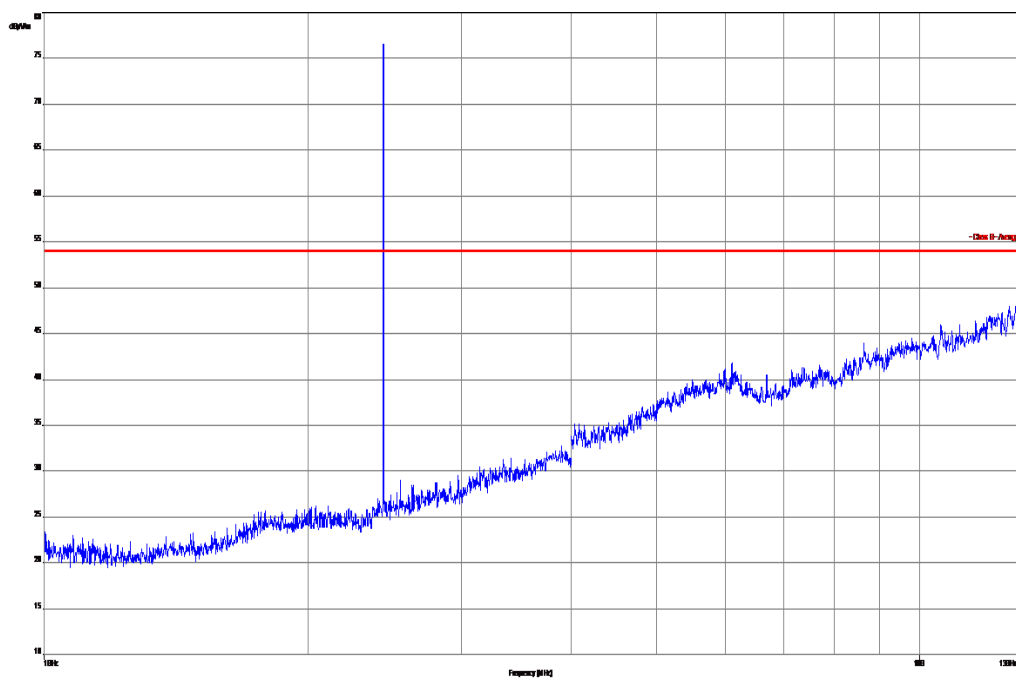
8.3.8 Test Set-up



set 13:

Common Information

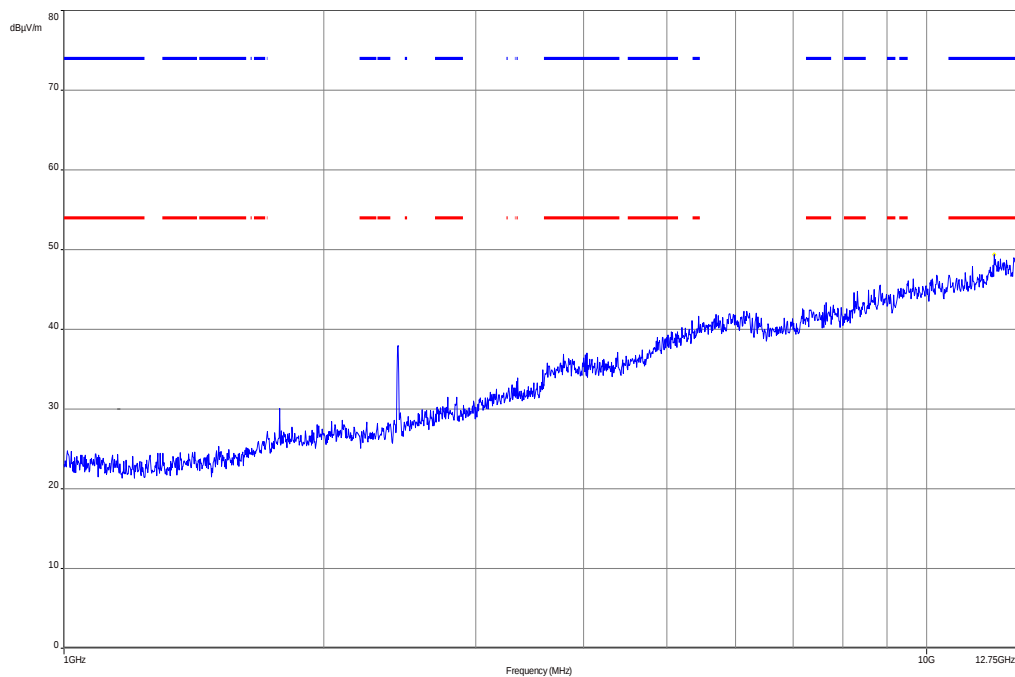
EUT:	RFW121LW + HS1 + CH1 + USB1
Serial Number:	IMEI: 004402242380297
Test Description:	FCC part 15 class B
Operating Conditions:	TX BT (DH5) + charging
Operator Name:	Luckenbill
Comment:	AC 115 V / 60 Hz

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

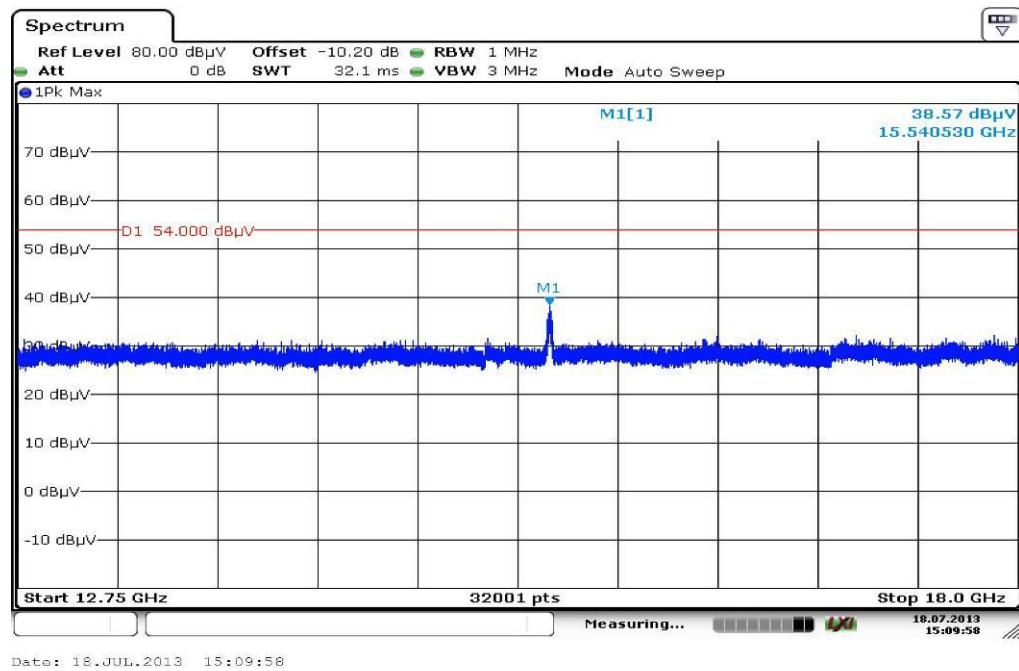
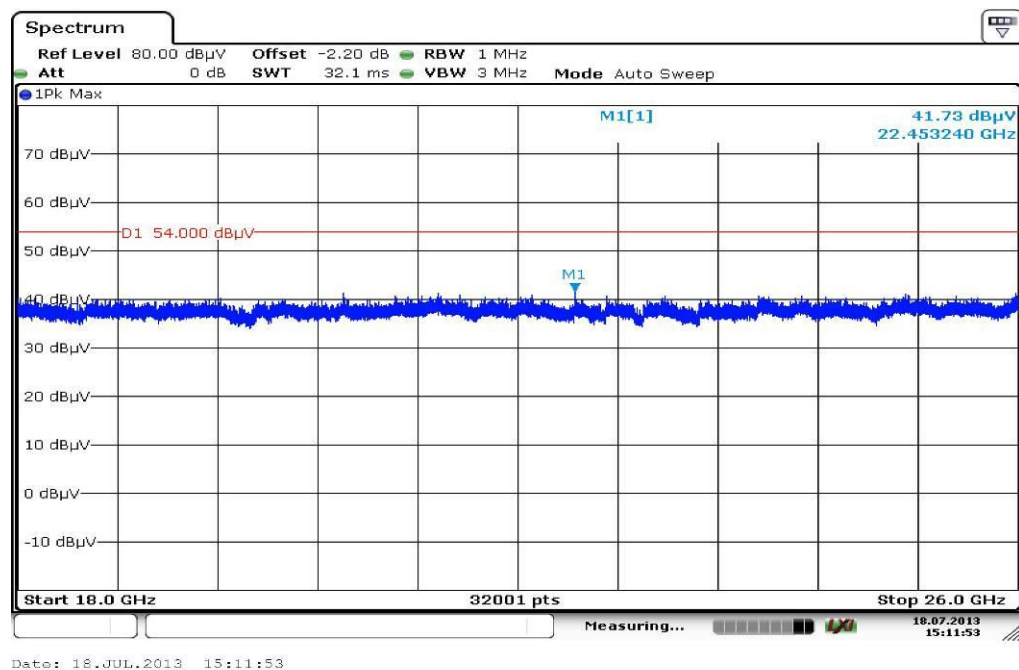
set 14:

Common Information

EUT:	RFW121LW + HS2 + CH2 + USB2
Serial Number:	IMEI: 004402242380297
Test Description:	FCC part 15 class B
Operating Conditions:	TX WLAN b-mode, 1 Mbit/s, Ch. 6 + charging
Operator Name:	Luckenbill
Comment:	AC 115 V / 60 Hz

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

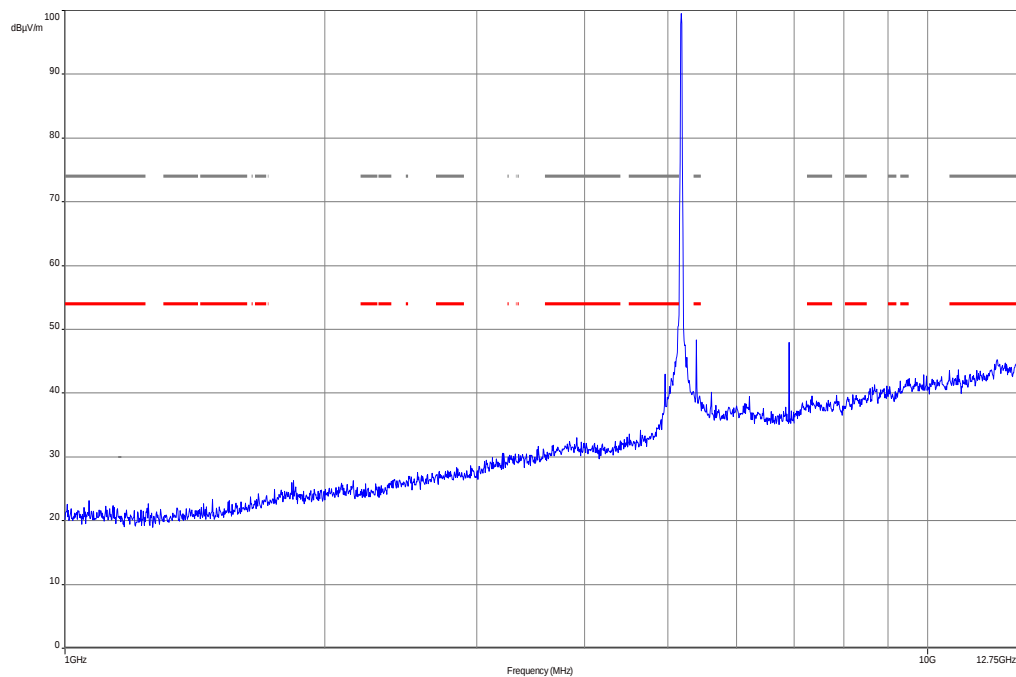
The carrier signal is notched with a 2.4 GHz band rejection filter.

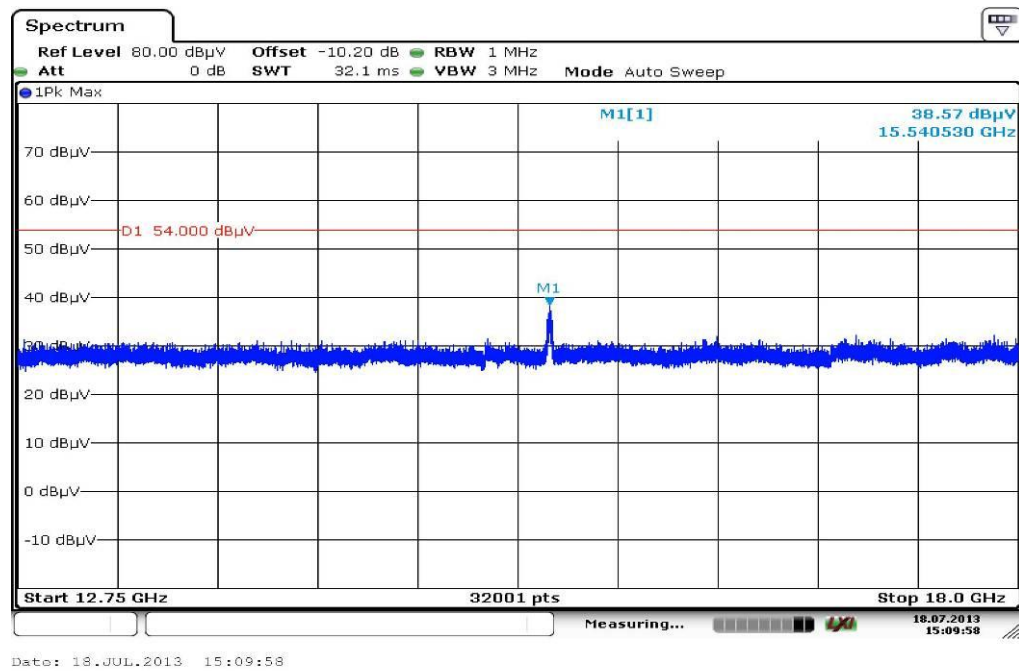
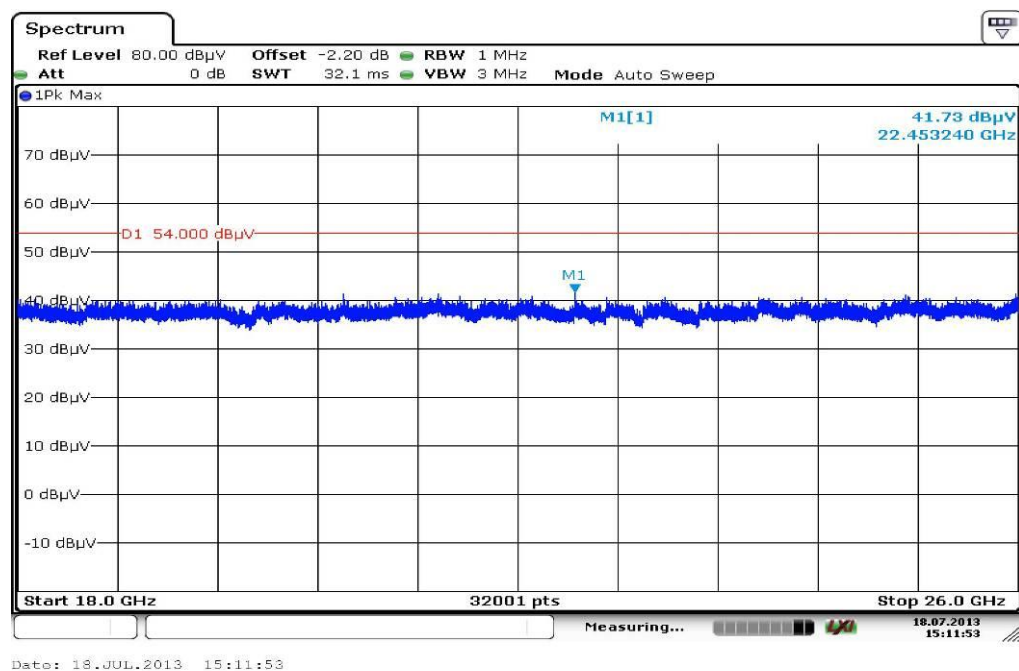
Plot 3: 12.75 GHz to 18 GHz, vertical & horizontal polarization**Plot 4:** 18 GHz to 26 GHz, vertical & horizontal polarization

set 15:

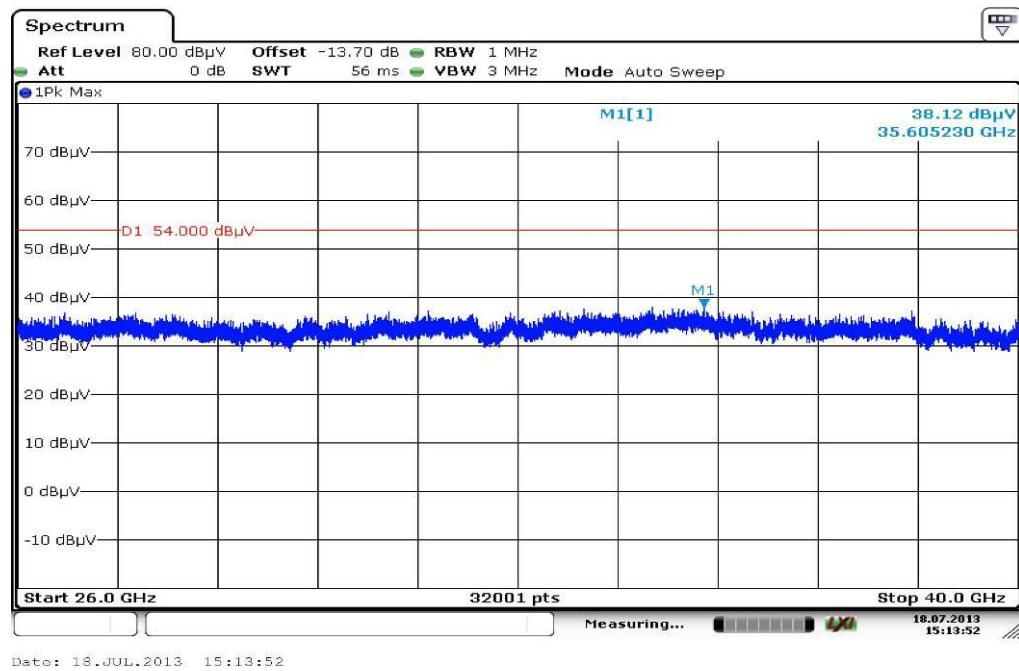
Common Information

EUT:	RFW121LW + HS3 + CH3 + USB5 + EBC
Serial Number:	IMEI: 004402242380297
Test Description:	FCC part 15 class B
Operating Conditions:	TX WLAN a-mode, 1 Mbit/s, Ch. 36 + charging
Operator Name:	Luckenbill
Comment:	AC 115 V / 60 Hz

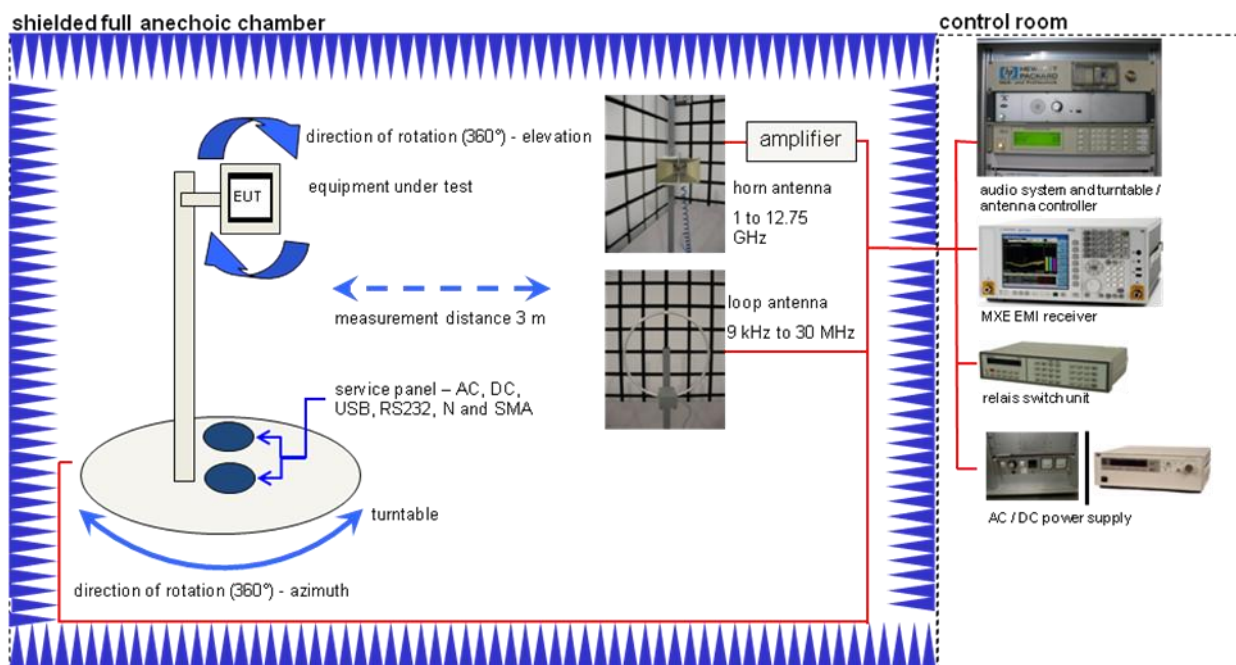
Plot 1: 1 GHz to 12.75 GHz, vertical & horizontal polarization

Plot 2: 12 GHz to 18 GHz, vertical & horizontal polarization**Plot 3:** 18 GHz to 26 GHz, vertical & horizontal polarization

Plot 4: 26 GHz to 40 GHz, vertical & horizontal polarization



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.	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	Transformer 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

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;B597 9	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	vKII	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	WRCG240 0/2483- 2375/2505- 50/10SS	Wainwright	11	300003351	ev		
17	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologi es	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		

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:
1-6234-13-01-07_AnnexD.pdf

Annex B: Photographs of the EUT

see external document:
1-6234-13-01-07_AnnexA.pdf

Annex C: Document history

Version	Applied changes	Date of release
-/-	Initial release	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