

TEST REPORT

Test Report No.: 1-6234/13-08-13-B



Deutsche
Akkreditierungsstelle
D-PL-12076-01-01

Testing Laboratory

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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

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Manufacturer

Same as Applicant

Test Standard/s

47CFR15	2012-10	Subpart B - Unintentional Radiators
ICES-003, Issue 4	2012-08	Interference-Causing Equipment Standard Digital Apparatus

Test Item

Kind of test item:	Blackberry Smartphone
Model name:	RGF111LW
FCC ID:	L6ARGF110LW
IC:	2503A-RGF110LW
S/N serial number:	imei: 00440224247906
HW hardware status:	CER-57711-001 Rev. 1
SW software status:	10.2.0.1155
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:

Test Report authorised:

Joachim Wolsdorfer
Expert

Uli Kraus
Senior Testing Manager

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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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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.

This test report replaces the test report with the number 1-6234_13-08-13-A and dated 2013-09-18

2.2 Application details

Date of receipt of order: 2013-08-19
Date of receipt of test item: 2013-08-23
Start of test: 2013-08-26
End of test: 2013-09-02
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
ICES-003, Issue 5	2012-08	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 :	Blackberry Smartphone		
Type identification :	RGF111LW		
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 port: HDMI	In / output	< 3m
	Signal/control port: Headset	In / output	< 3m
	Signal/control port: USB	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	Blackberry Smartphone	RGF111LW	imei: 00440224247906	CER-57711- 001 Rev. 1	10.2.0.1155

*) 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 description*)	Auxiliary equipment	Type	S/N serial number	HW hardware status	SW software status
AE A	AC charger	Cobra NA Fixed Blade, part number HDW-47725-001	-/-	-/-	-/-
AE B	headset	wired headset part number HDW-49299-005	-/-	-/-	-/-
AE C	USB cable	USB Cable, Micro-USB 1.2M PVC/BFR Free (Premium) PH part number HDW-50071-001	-/-	-/-	-/-
AE D	USB cable	USB Cable, Micro-USB 1.2M PVC/BFR Free (Premium) HL part number HDW-50071-001	-/-	-/-	-/-
AE E	HDMI cable	HDMI Cable, part number HDW-29572-001	-/-	-/-	-/-
AE F	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

EUT set-up no.*)	Combination of EUT and AE	Remark
set. 1	EUT A + AE A + AE B + AE C	
set. 2	EUT A + AE A + AE B + AE D	
set. 3	EUT A + AE A + AE B + AE D + AE E + AE F	

EUT Operation modes

EUT set-up no.*)	Operation mode	Remark
op 1	GSM850 idle + charging	
op 2	PCS1900 idle + charging	
op 3	Bluetooth (DH5) TX + charging	
op 4	WLAN 802.11b + charging	
op 5	WLAN 802.11a + charging	
op 6	PCS1900 idle + HDMI out + charging	
op 7	WLAN 802.11b + HDMI out + 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 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	set 1 – set 3		
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

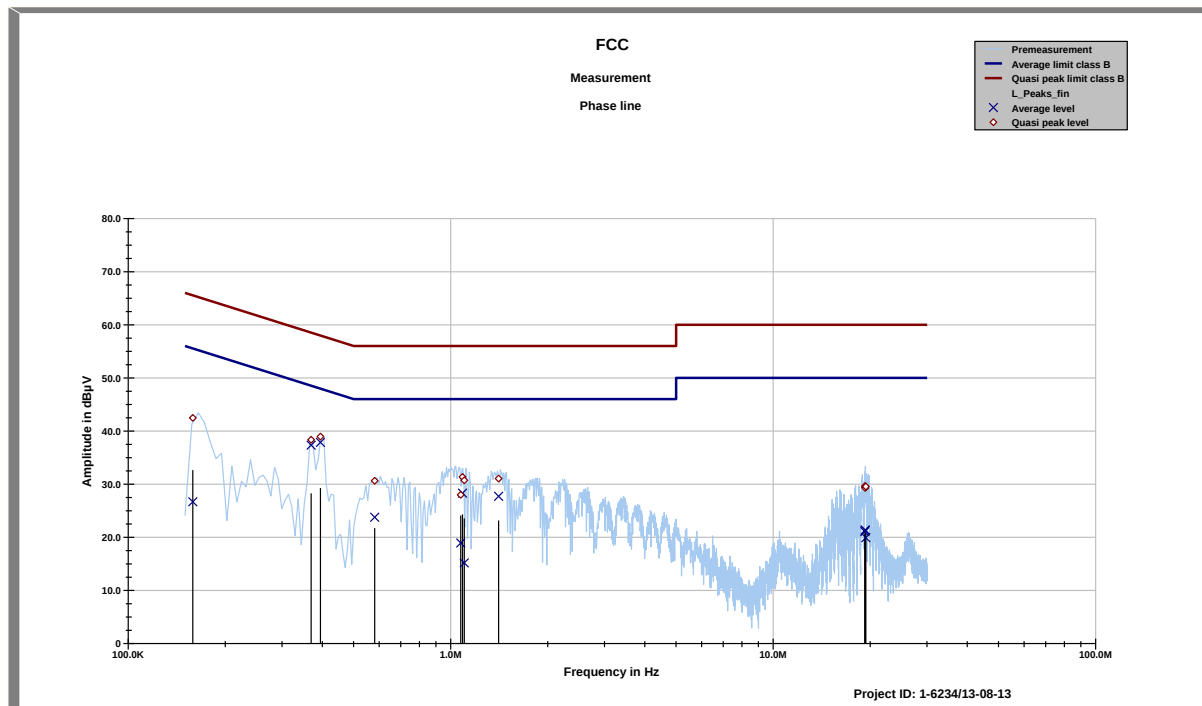
8.1.4 Calibration Information

Device	Serial number	ICT Number	Calibration valid until	Calibration interval
HP 8542 EMI Receiver with RF Filter Unit	3617A00170	300000568	01 / 2014	12 month
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 op 1:



FCC

Phase line tbl

Project ID: 1-6234/13-08-13

09:16:00 AM, Tuesday, August 27, 2013

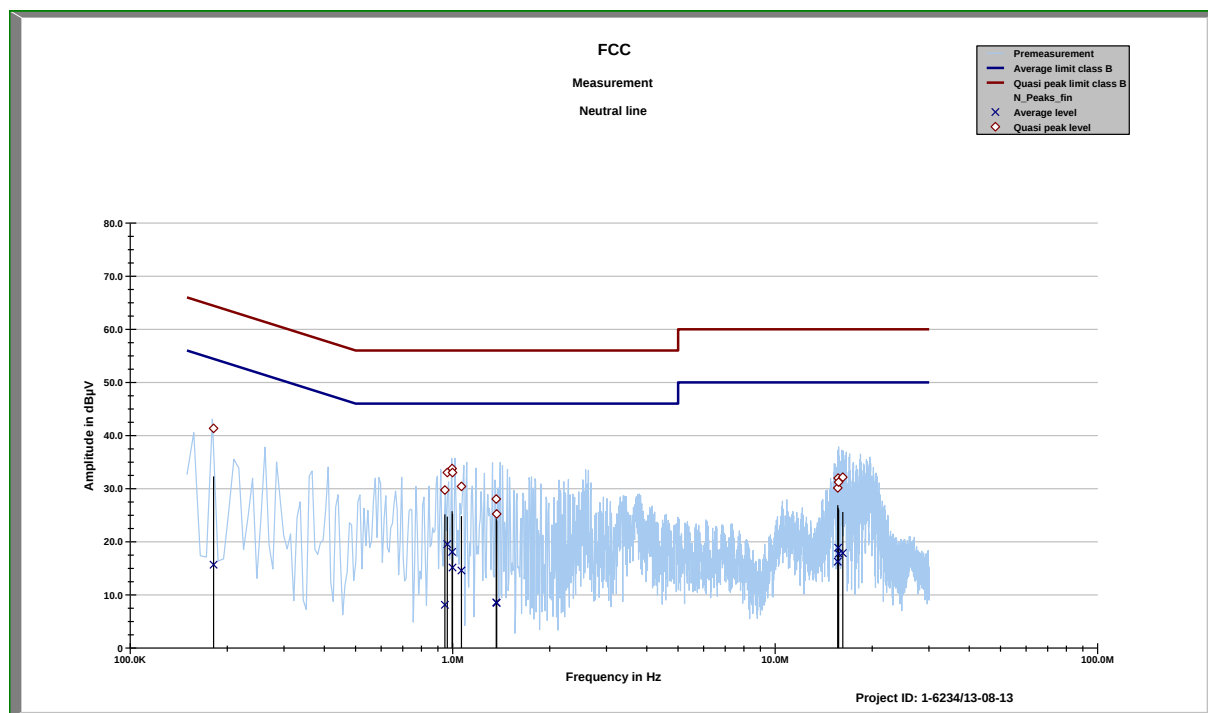
Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.15862	42.47	23.06	26.67	29.08
0.36927	38.36	20.16	37.34	12.39
0.39463	38.95	19.02	37.86	11.15
0.58108	30.63	25.37	23.77	22.23
1.07418	27.98	28.02	18.92	27.08
1.08823	31.34	24.66	28.31	17.69
1.10175	30.72	25.28	15.18	30.82
1.4081	31.04	24.96	27.71	18.29
19.231	29.50	30.50	21.06	28.94
19.278	29.64	30.36	21.34	28.66
19.284	29.29	30.71	21.32	28.68
19.369	29.54	30.46	19.92	30.08

Project ID - 1-6234/13-08-13

EUT - RGF1111LW+HS1+CH1+USB1

SN - imei: 00440224247906

Operating mode - GSM 850 idle + charging



FCC

Neutral line tbl

Project ID: 1-6234/13-08-13

09:16:00 AM, Tuesday, August 27, 2013

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBμV	dBμV	dBμV	dBμV
0.1814	41.34	23.08	15.67	39.43
0.94593	29.74	26.26	8.13	37.87
0.96181	33.03	22.97	19.54	26.46
0.99624	33.78	22.22	18.10	27.90
0.9983	33.02	22.98	15.15	30.85
1.06409	30.42	25.58	14.60	31.40
1.3647	28.05	27.95	8.59	37.41
1.3692	25.25	30.75	8.49	37.51
15.625	30.15	29.85	16.25	33.75
15.671	31.98	28.02	18.89	31.11
15.72	31.24	28.76	17.77	32.23
16.203	32.15	27.85	17.87	32.13

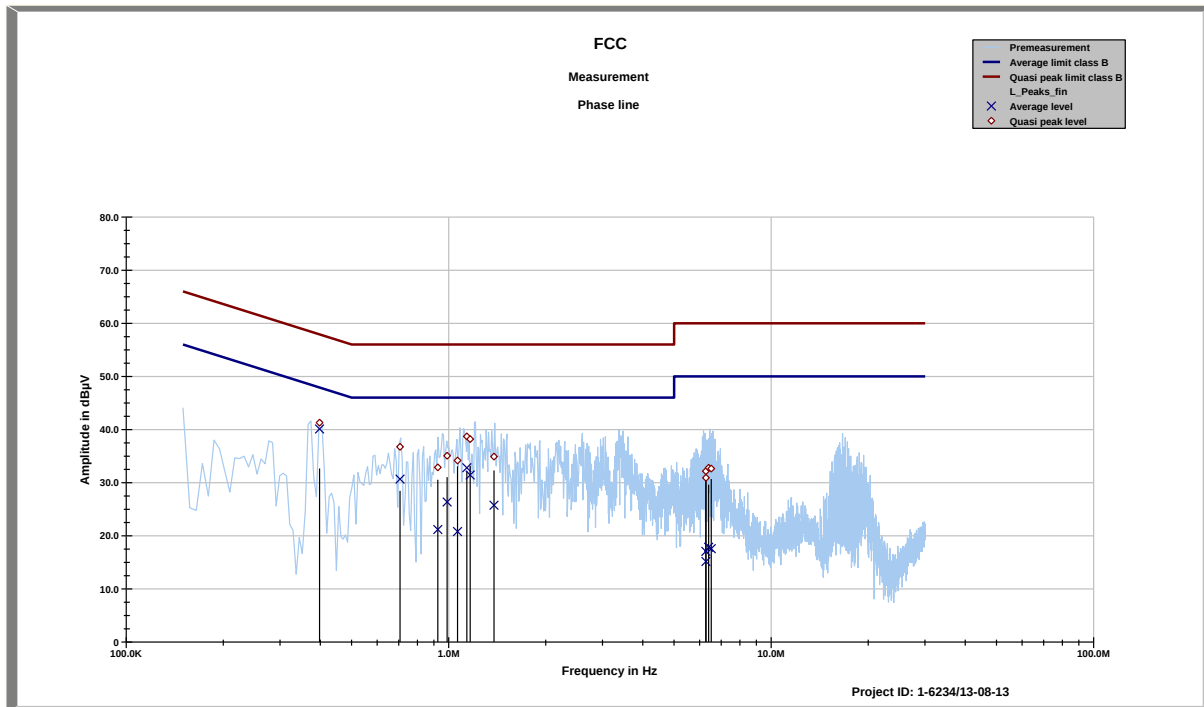
Project ID - 1-6234/13-08-13

EUT - RGF111LW+HS1+CH1+USB1

SN - imei: 00440224247906

Operating mode - GSM 850 idle + charging

set 2 op 6:



FCC

Phase line tbl

Project ID: 1-6234/13-08-13

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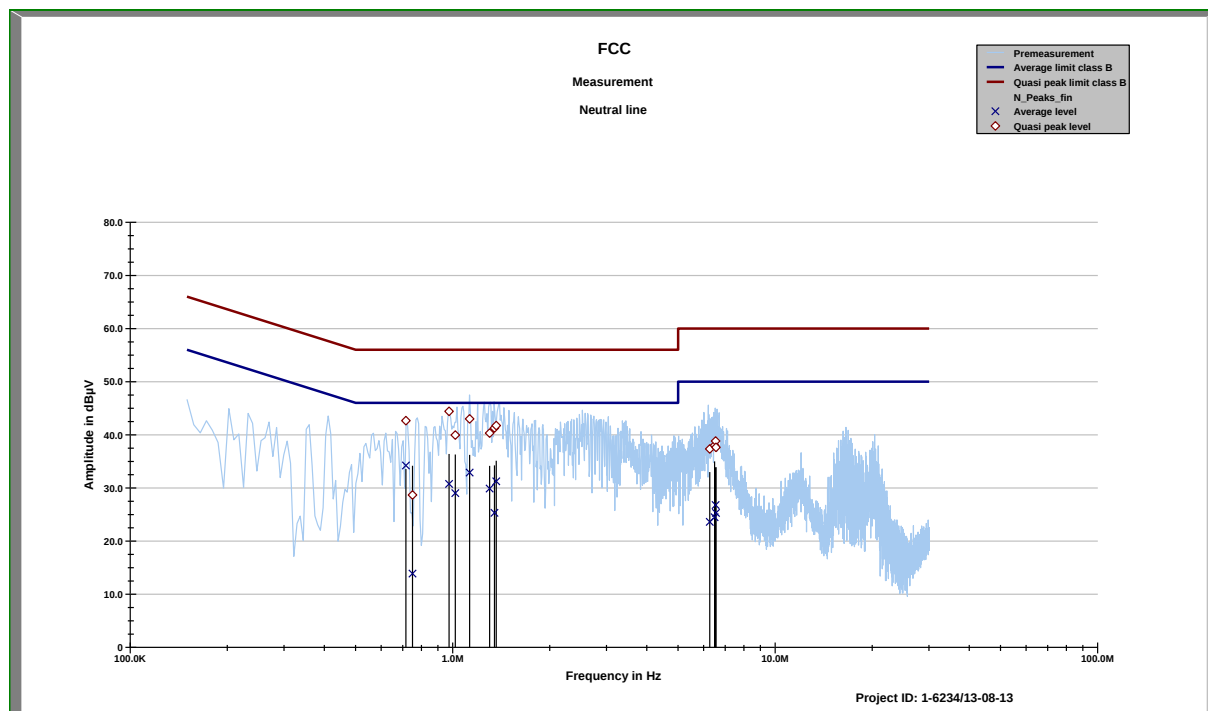
Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.39769	41.29	16.61	40.11	8.82
0.70641	36.75	19.25	30.67	15.33
0.92515	32.87	23.13	21.18	24.82
0.98864	35.07	20.93	26.37	19.63
1.06513	34.16	21.84	20.79	25.21
1.13811	38.70	17.30	32.80	13.20
1.16579	38.19	17.81	31.43	14.57
1.3819	34.91	21.09	25.75	20.25
6.269	32.16	27.84	17.06	32.94
6.2757	30.92	29.08	15.15	34.85
6.3963	32.80	27.20	17.84	32.16
6.5141	32.64	27.36	17.57	32.43

Project ID - 1-6234/13-08-13

EUT - RGF1111LW+HS1+CH1+USB2+HDMI+HDMI monitor

SN - imei: 00440224247906

Operating mode - PCS1900 idle + HDMI out + charging



FCC

Neutral line tbl

Project ID: 1-6234/13-08-13

10:35:22 AM, Tuesday, August 27, 2013

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.71571	42.67	13.33	34.22	11.78
0.75049	28.67	27.33	13.88	32.12
0.9743	44.41	11.59	30.76	15.24
1.01863	39.95	16.05	29.01	16.99
1.12803	43.00	13.00	32.89	13.11
1.3013	40.31	15.69	29.87	16.13
1.3474	41.29	14.71	25.31	20.69
1.3647	41.73	14.27	31.25	14.75
6.2652	37.35	22.65	23.61	26.39
6.4866	38.00	22.00	24.48	25.52
6.5342	38.83	21.17	26.79	23.21
6.553	37.63	22.37	25.30	24.70

Project ID - 1-6234/13-08-13

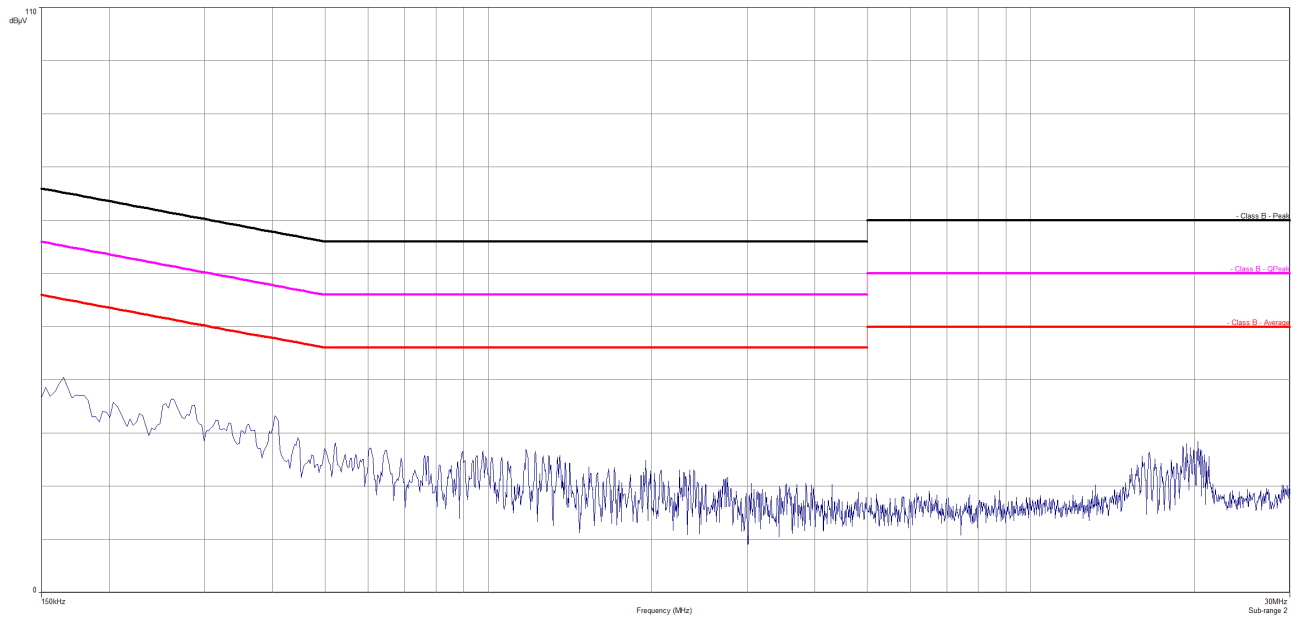
EUT - RGF1111LW+HS1+CH1+USB2+HDMI+HDMI monitor

SN - imei: 00440224247906

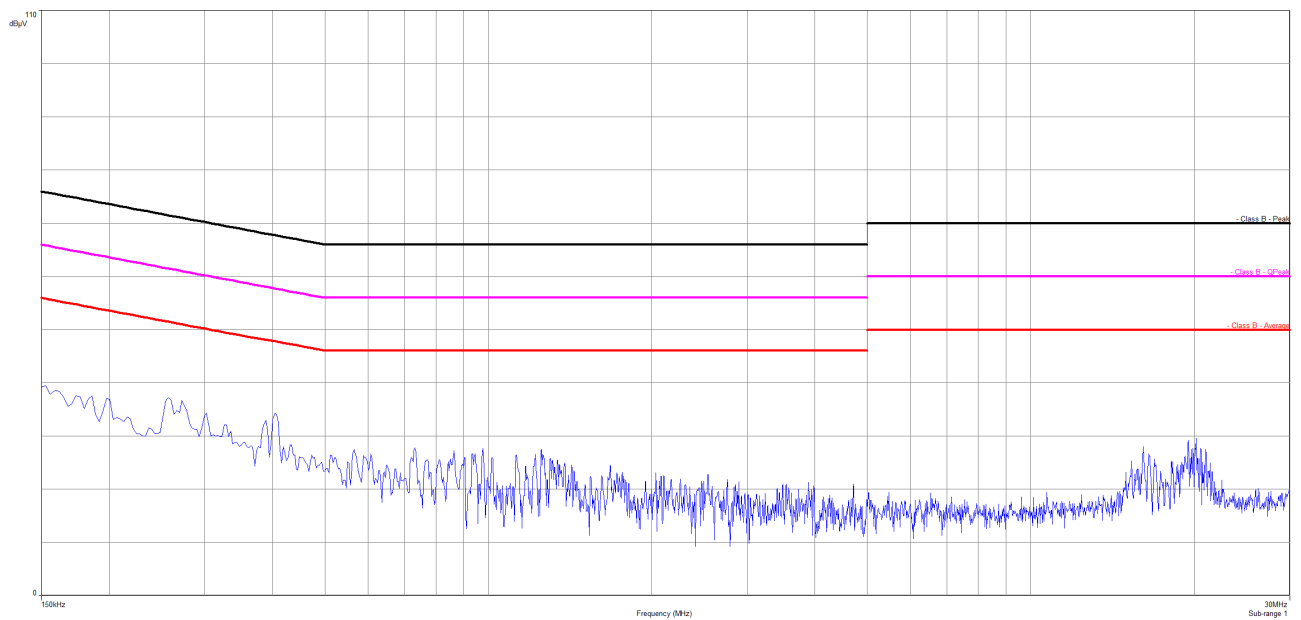
Operating mode - PCS1900 idle + HDMI out + charging

set 1 op 3:

phase line:



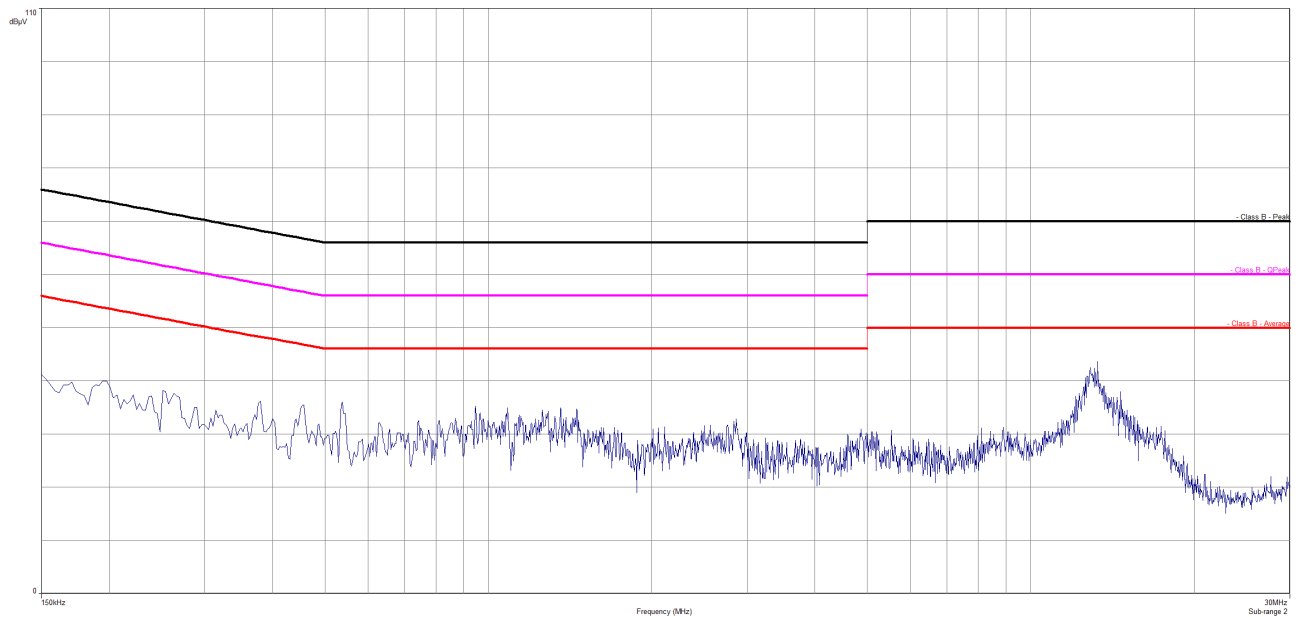
neutral line:



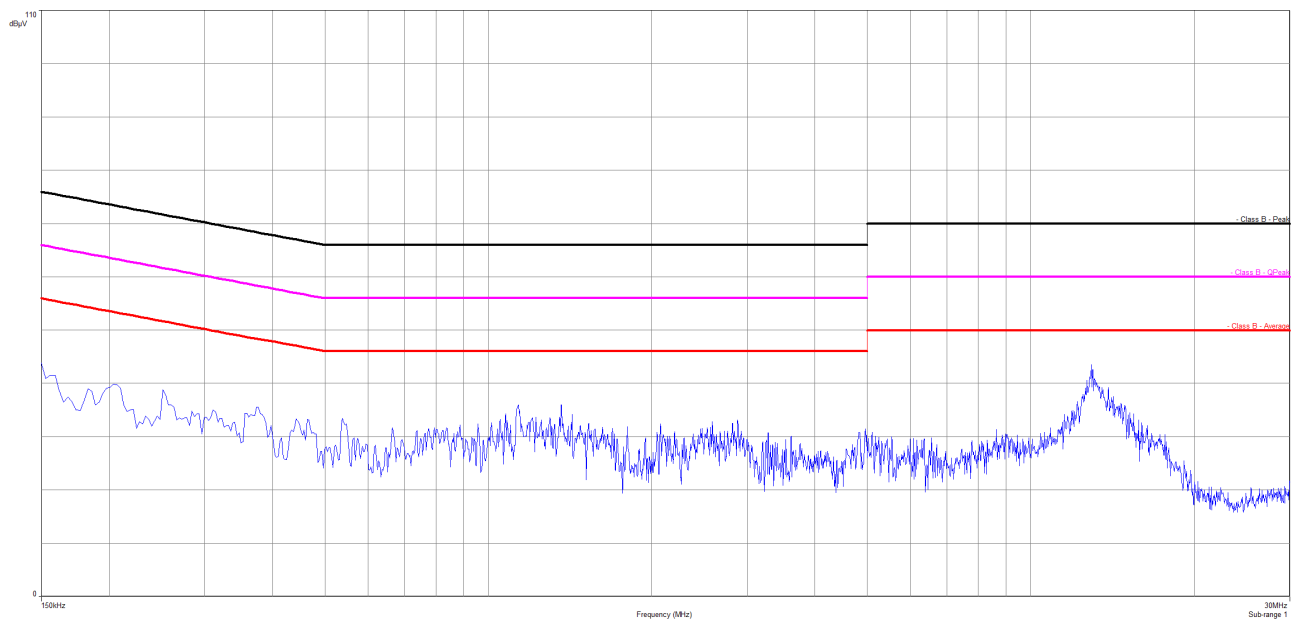
Project ID - 1-6234/13-08-13
 EUT - RGF111LW+HS1+CH1+USB1
 SN - imei: 00440224247906
 Operating mode - BT DH5 testmode + charging

set 3 op 7:

phase line:



neutral line:



Project ID - 1-6234/13-08-13

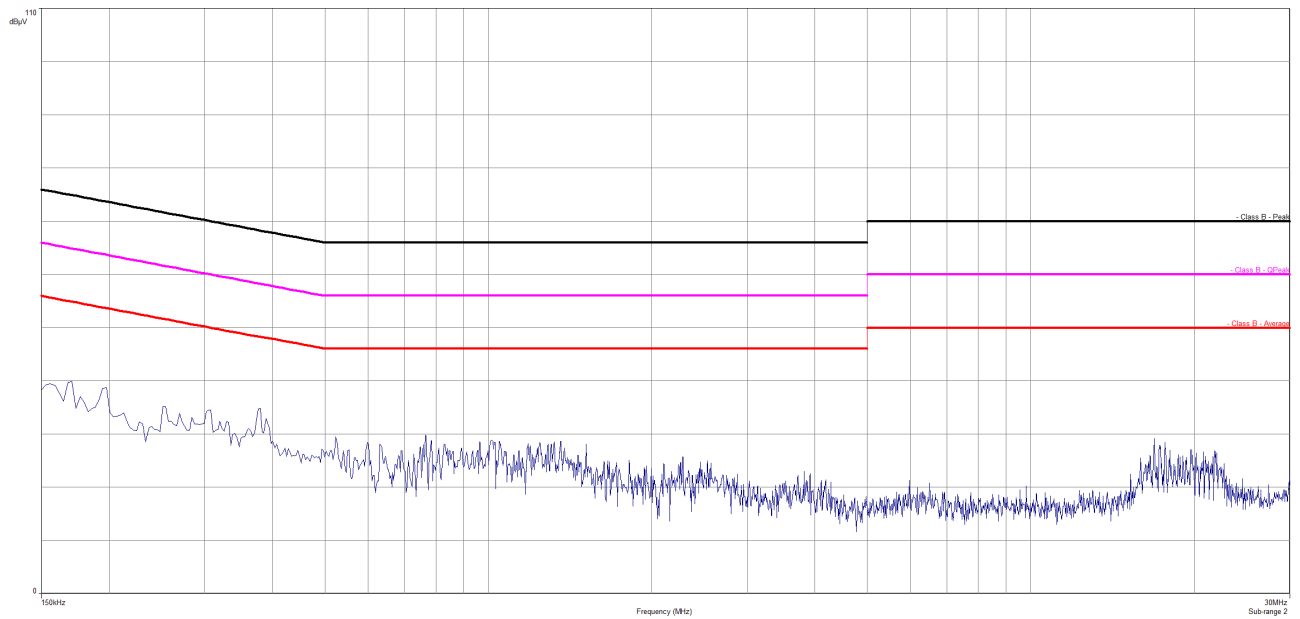
EUT - RGF1111LW+HS1+CH1+USB2+HDMI+HDMI monitor

SN - imei: 00440224247906

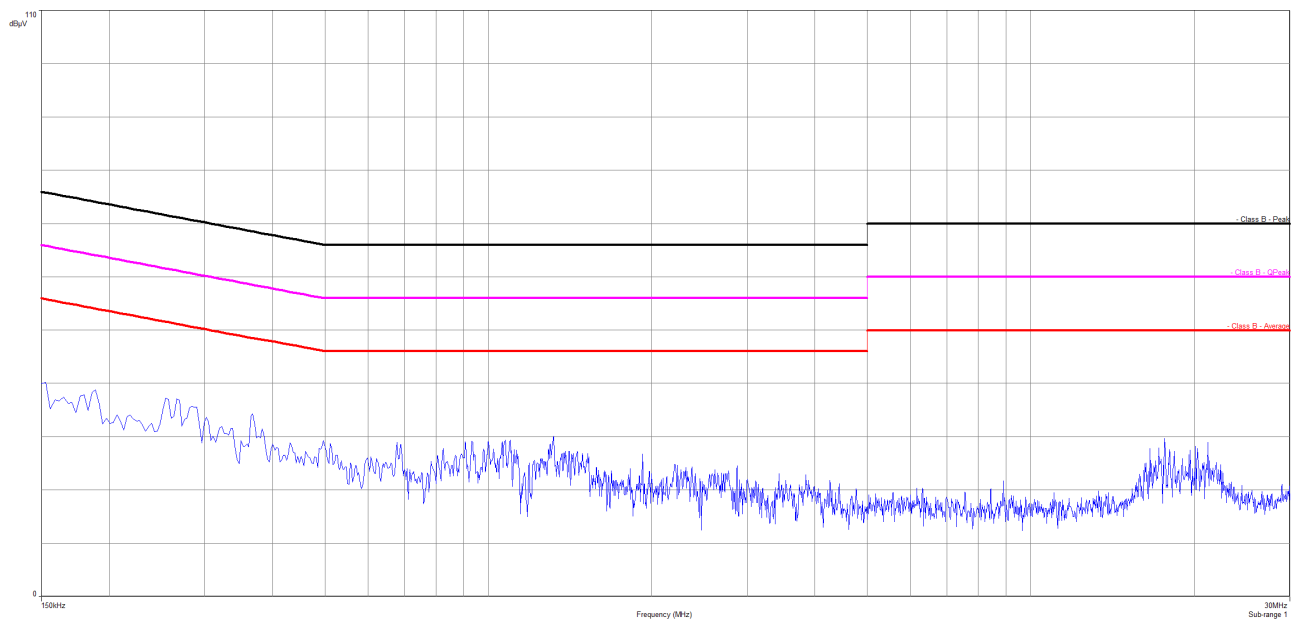
Operating mode - WLAN 802.11 B-modeTX+ HDMI out + charging

set 1 op 5:

phase line:



neutral line:



Project ID - 1-6234/13-08-13

EUT - RGF111LW+HS1+CH1+USB1

SN - imei: 00440224247906

Operating mode - WLAN 802.11 A-mode TX + 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

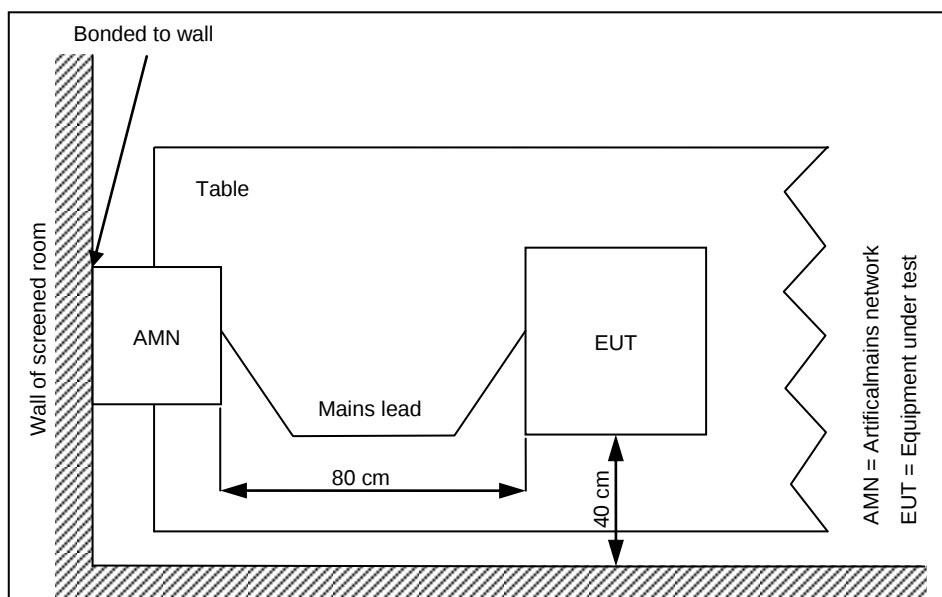
Example calculation:

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	set 1 – set 3		
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 1 op 1:

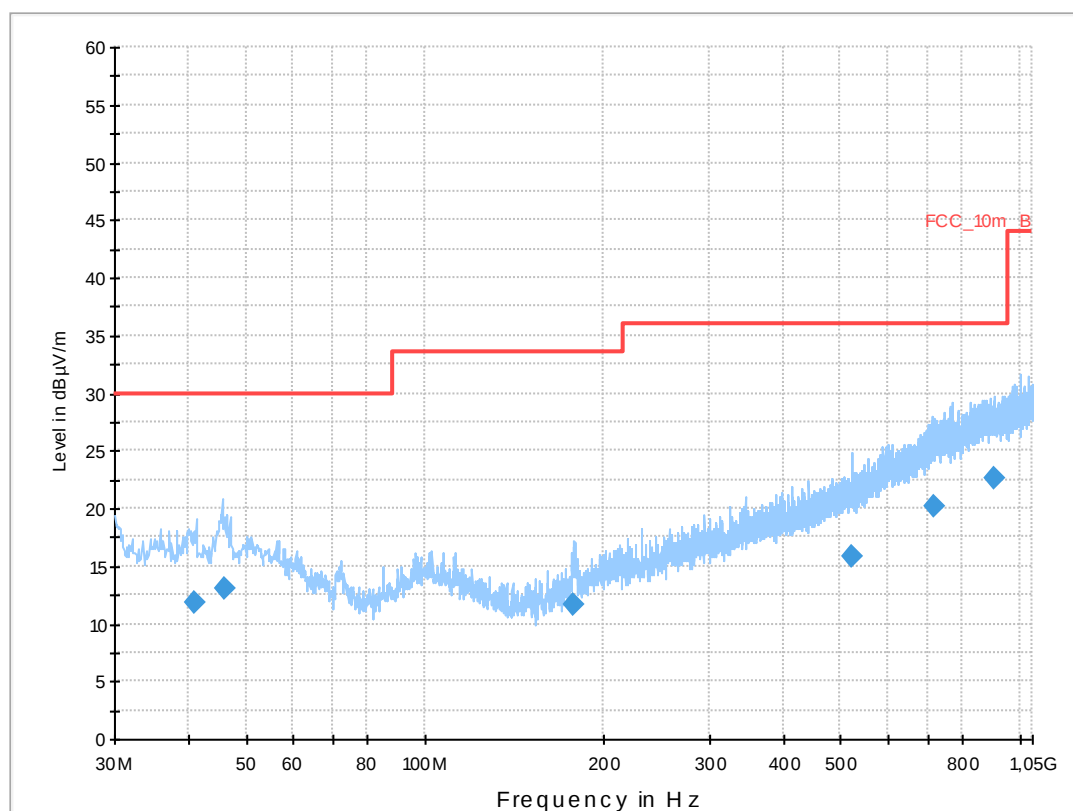
Common Information

EUT: RGF111LW + HS1 + CH1 + USB1
 Serial Number: imei: 00440224247906
 Test Description: FCC part 15 class B
 Operating Conditions: GSM 850 idle + charging
 Operator Name: Wolsdorfer
 Comment: AC: 230 V / 50 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
40.927050	11.8	1000.0	120.000	200.0	V	288.0	13.4	18.2	30.0	
45.968250	13.0	1000.0	120.000	234.0	V	233.0	13.3	17.0	30.0	
178.133550	11.7	1000.0	120.000	200.0	V	289.0	10.3	21.8	33.5	
522.251850	15.8	1000.0	120.000	100.0	H	234.0	19.0	20.2	36.0	
715.071150	20.2	1000.0	120.000	145.0	H	27.0	22.9	15.8	36.0	
907.381950	22.6	1000.0	120.000	313.0	V	50.0	25.2	13.4	36.0	

set 2 op 2:

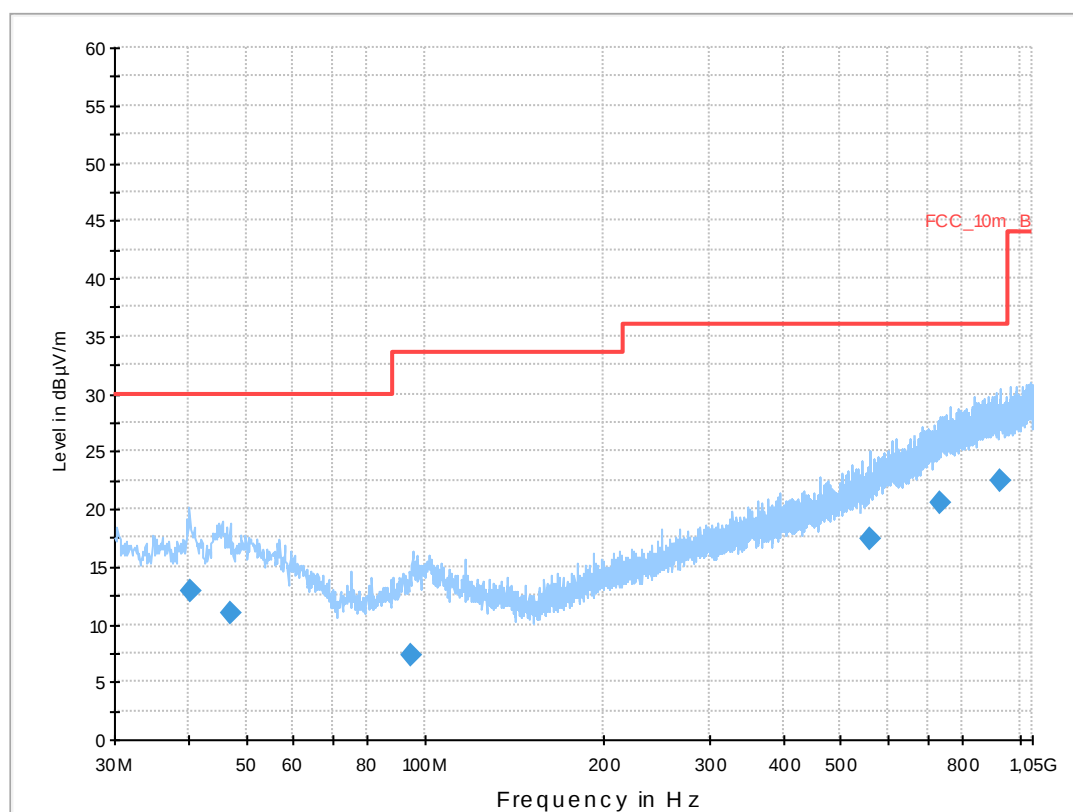
Common Information

EUT: RGF111LW + HS1 + CH1 + USB2
 Serial Number: imei: 00440224247906
 Test Description: FCC part 15 class B
 Operating Conditions: PCS1900 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
40.441950	12.9	1000.0	120.000	153.0	V	210.0	13.4	17.1	30.0	
47.234550	11.0	1000.0	120.000	200.0	V	185.0	13.3	19.0	30.0	
94.625700	7.3	1000.0	120.000	186.0	H	275.0	11.2	26.2	33.5	
560.058300	17.3	1000.0	120.000	200.0	V	31.0	19.7	18.7	36.0	
732.074100	20.6	1000.0	120.000	364.0	H	8.0	23.2	15.4	36.0	
927.866100	22.4	1000.0	120.000	200.0	H	131.0	25.3	13.6	36.0	

set 1 op 3:

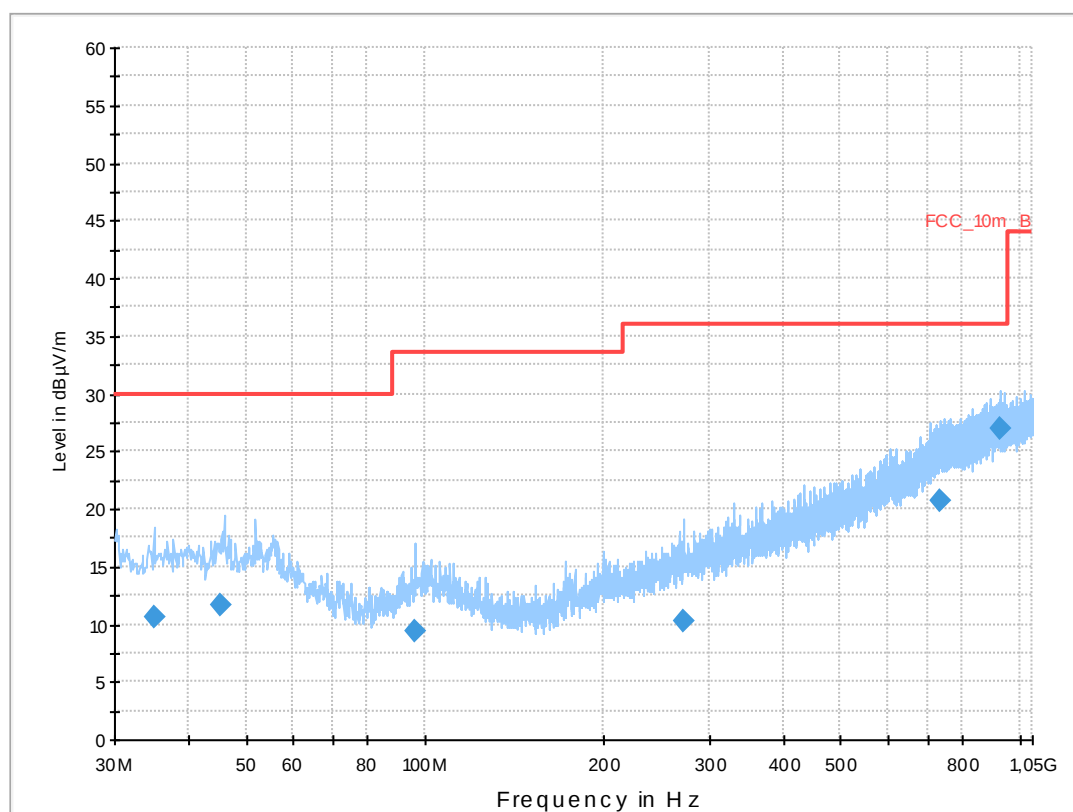
Common Information

EUT: RGF111LW + HS1 + CH1 + USB1
 Serial Number: imei: 00440224247906
 Test Description: FCC part 15 class B
 Operating Conditions: BT DH5 testmode + 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: 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
34.935900	10.6	1000.0	120.000	111.0	V	280.0	13.0	19.4	30.0	
45.330150	11.6	1000.0	120.000	170.0	V	171.0	13.3	18.4	30.0	
95.937900	9.4	1000.0	120.000	170.0	V	265.0	11.4	24.1	33.5	
272.525100	10.3	1000.0	120.000	115.0	V	81.0	13.9	25.7	36.0	
733.826700	20.6	1000.0	120.000	170.0	V	85.0	23.3	15.4	36.0	
927.435600	26.9	1000.0	120.000	170.0	V	280.0	25.3	9.1	36.0	

set 2 op 4:

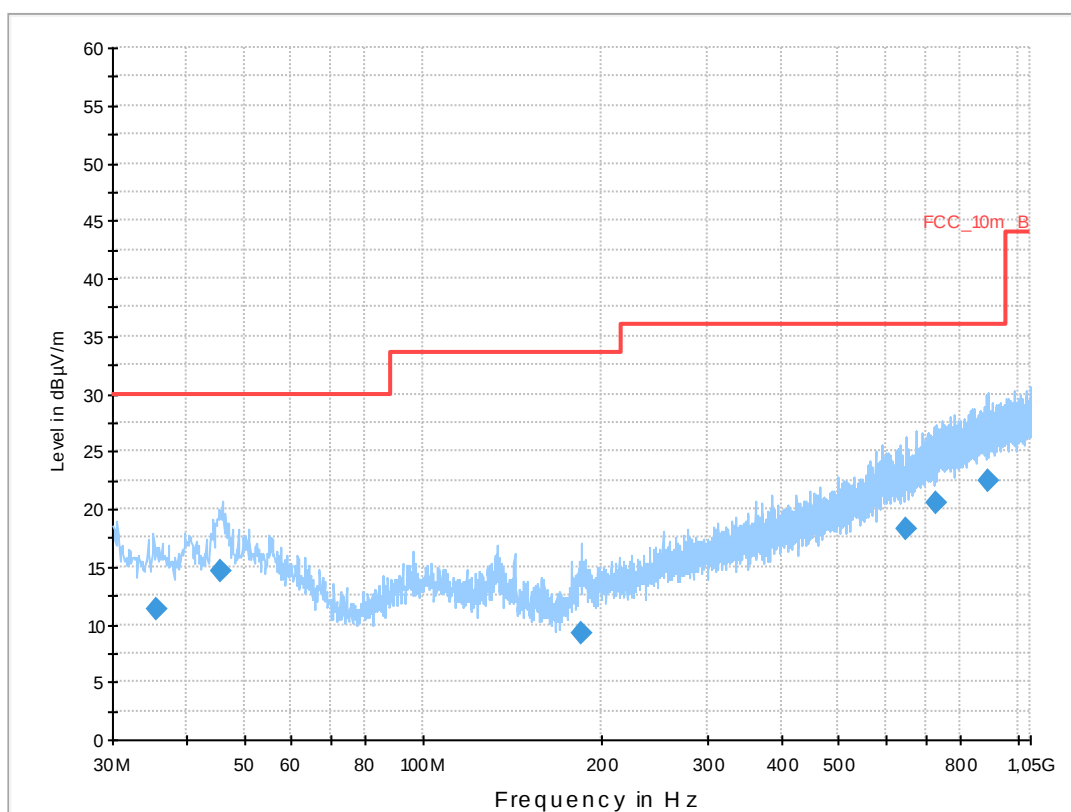
Common Information

EUT: RGF111LW + HS1 + CH1 + USB2
 Serial Number: imei: 00440224247906
 Test Description: FCC part 15 class B
 Operating Conditions: WLAN 802.11b CH6 TX + charging
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Receiver: [ESCI 3]
 Level Unit: dB μ V/m

ubrange	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
35.683200	11.2	1000.0	120.000	98.0	V	178.0	13.1	18.8	30.0	
45.561000	14.6	1000.0	120.000	98.0	V	190.0	13.3	15.4	30.0	
184.463400	9.2	1000.0	120.000	170.0	V	190.0	10.7	24.3	33.5	
648.030750	18.3	1000.0	120.000	170.0	V	10.0	21.1	17.7	36.0	
728.244000	20.4	1000.0	120.000	170.0	V	2.0	23.2	15.6	36.0	
895.381350	22.5	1000.0	120.000	170.0	H	-3.0	25.1	13.5	36.0	

set 2 op 5:

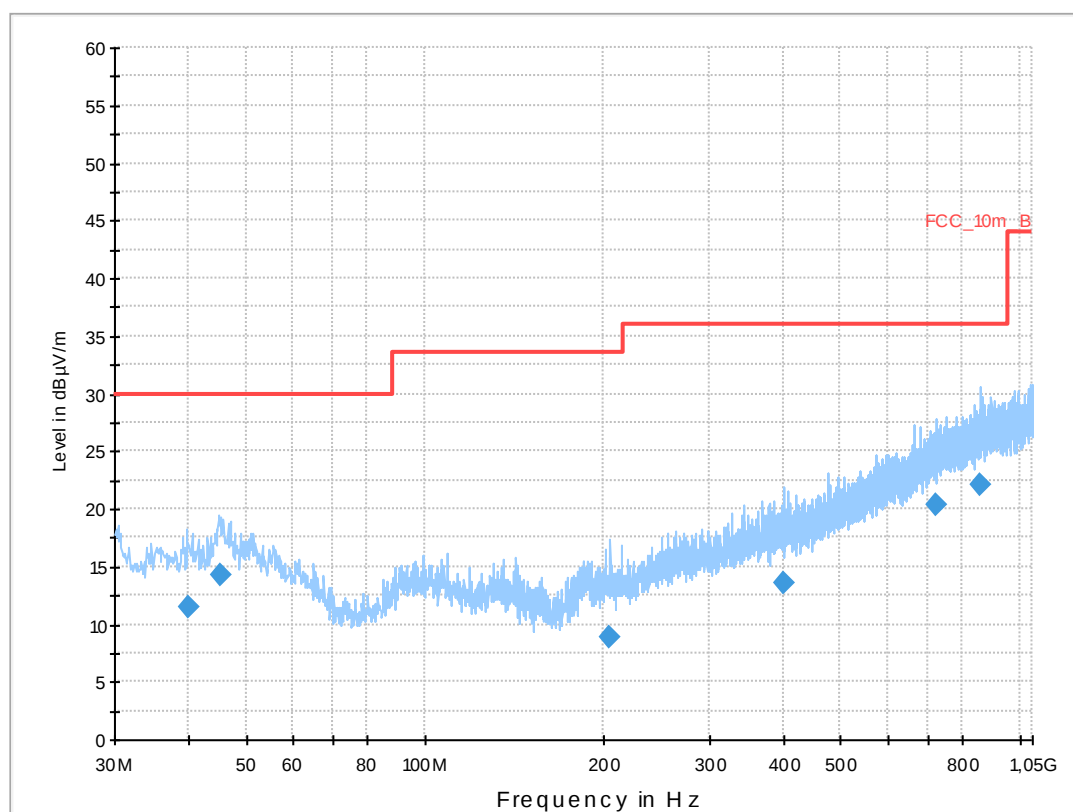
Common Information

EUT: RGF111LW + HS1 + CH1 + USB2
 Serial Number: imei: 00440224247906
 Test Description: FCC part 15 class B
 Operating Conditions: WLAN 802.11a CH36 TX + 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	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
39.958950	11.5	1000.0	120.000	98.0	V	100.0	13.4	18.5	30.0	
45.361650	14.3	1000.0	120.000	98.0	V	80.0	13.3	15.7	30.0	
204.746550	8.8	1000.0	120.000	98.0	V	-10.0	11.9	24.7	33.5	
402.384000	13.6	1000.0	120.000	163.0	V	265.0	16.9	22.4	36.0	
725.444700	20.3	1000.0	120.000	154.0	V	170.0	23.1	15.7	36.0	
857.815800	22.0	1000.0	120.000	170.0	H	270.0	24.7	14.0	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:

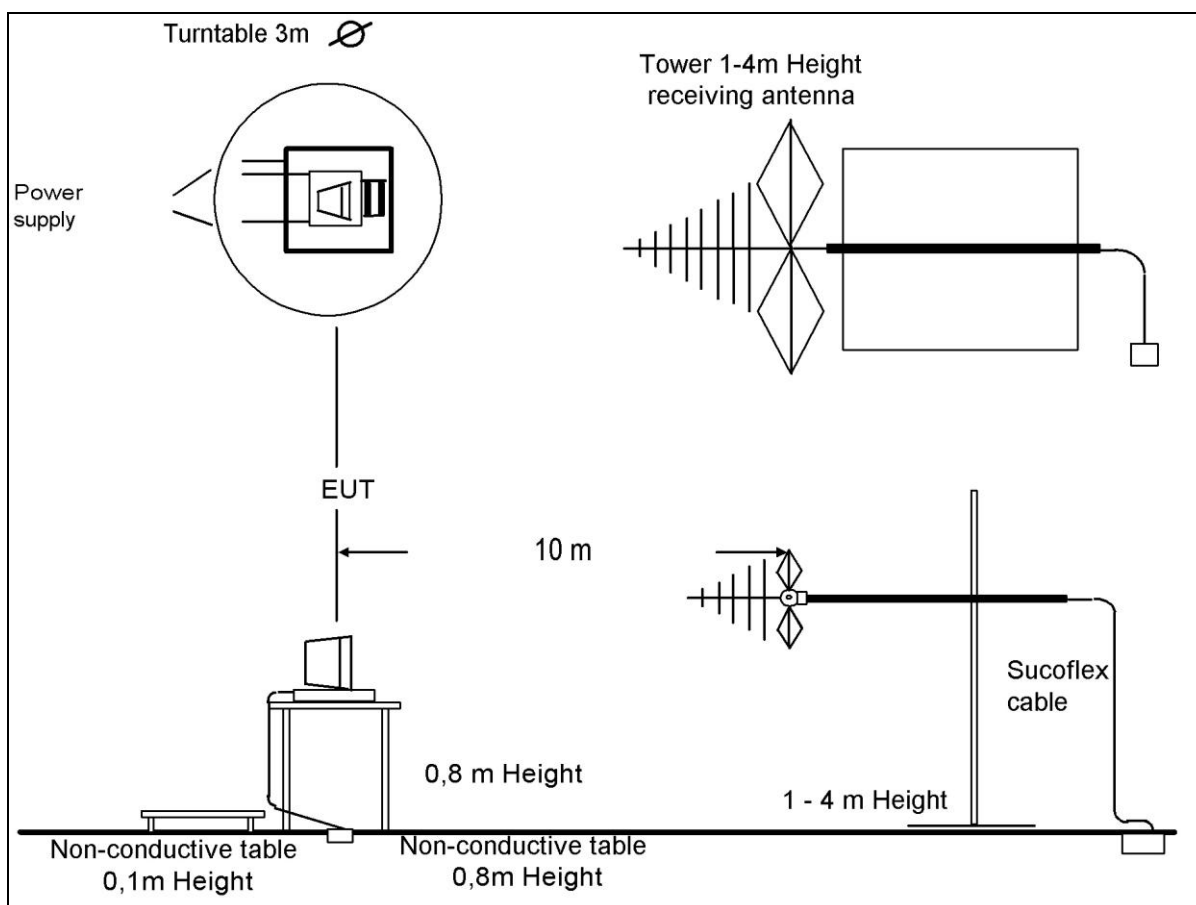
Frequency [MHz]	CL [dB]	AF [dB μ V/m]
30,000	0,20	12,30
100,000	0,60	11,30
200,000	1,10	10,60
300,000	1,30	13,20
400,000	1,60	15,30
500,000	1,90	16,80
600,000	2,00	18,80
700,000	2,20	20,30
800,000	2,30	21,50
900,000	2,40	22,80
1000,000	2,50	23,30

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 (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	see test details		
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 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)

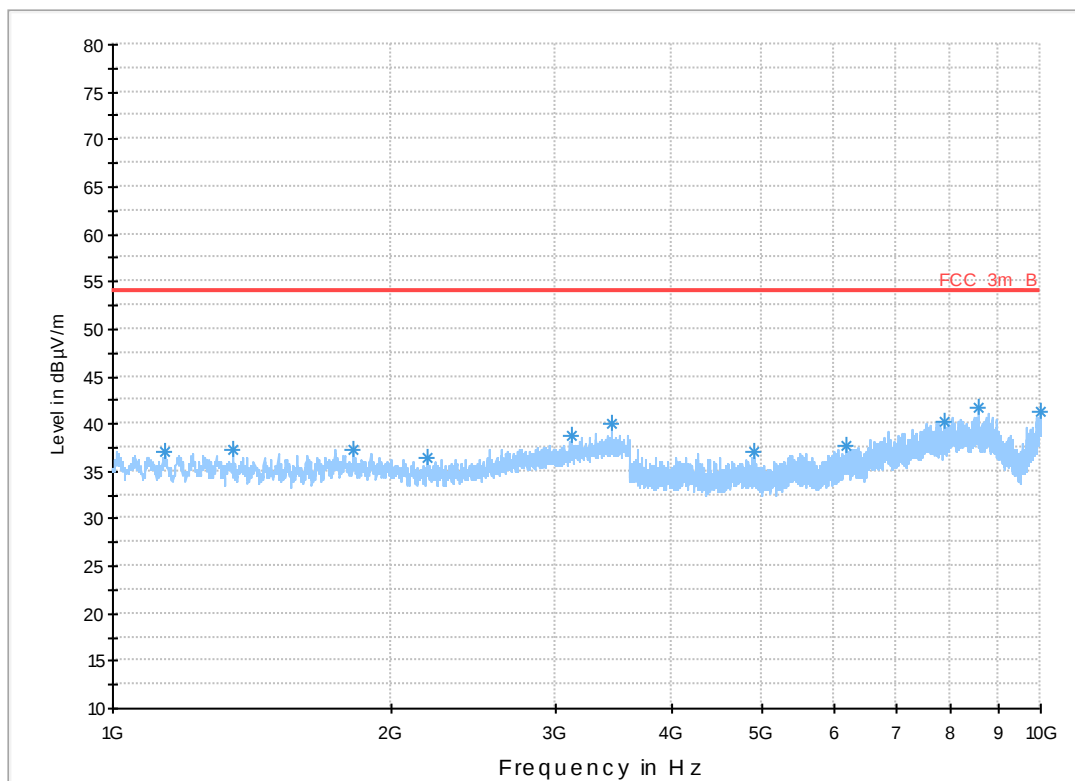
8.3.5 Test Results

set 1 op 1:

Common Information

EUT:	RGF111LW + HS1 + CH1 + USB1
Serial Number:	00440224247906
Test Description:	FCC part 15 class B
Operating Conditions:	GSM 850 idle + charging
Operator Name:	Wolsdorfer
Comment:	AC: 115 V / 60 Hz

FCC_1_10_B_5m

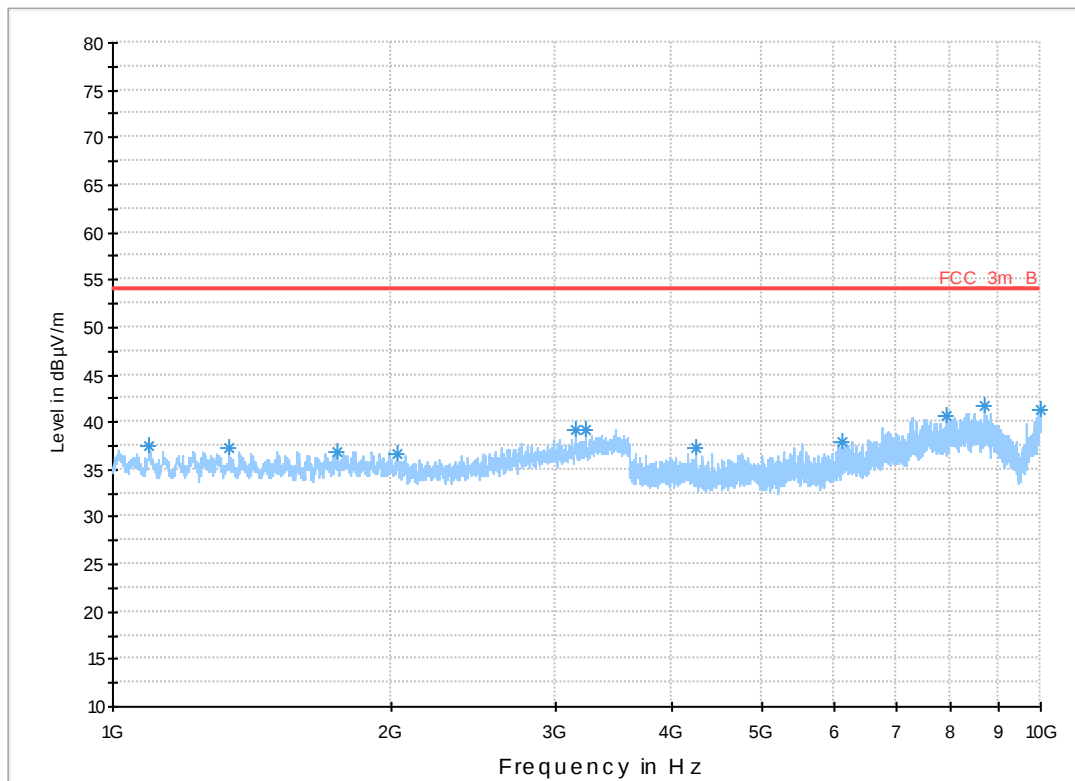


set 2 op 2:

Common Information

EUT:	RGF111LW + HS1 + CH1 + USB2
Serial Number:	00440224247906
Test Description:	FCC part 15 class B
Operating Conditions:	PCS1900 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:

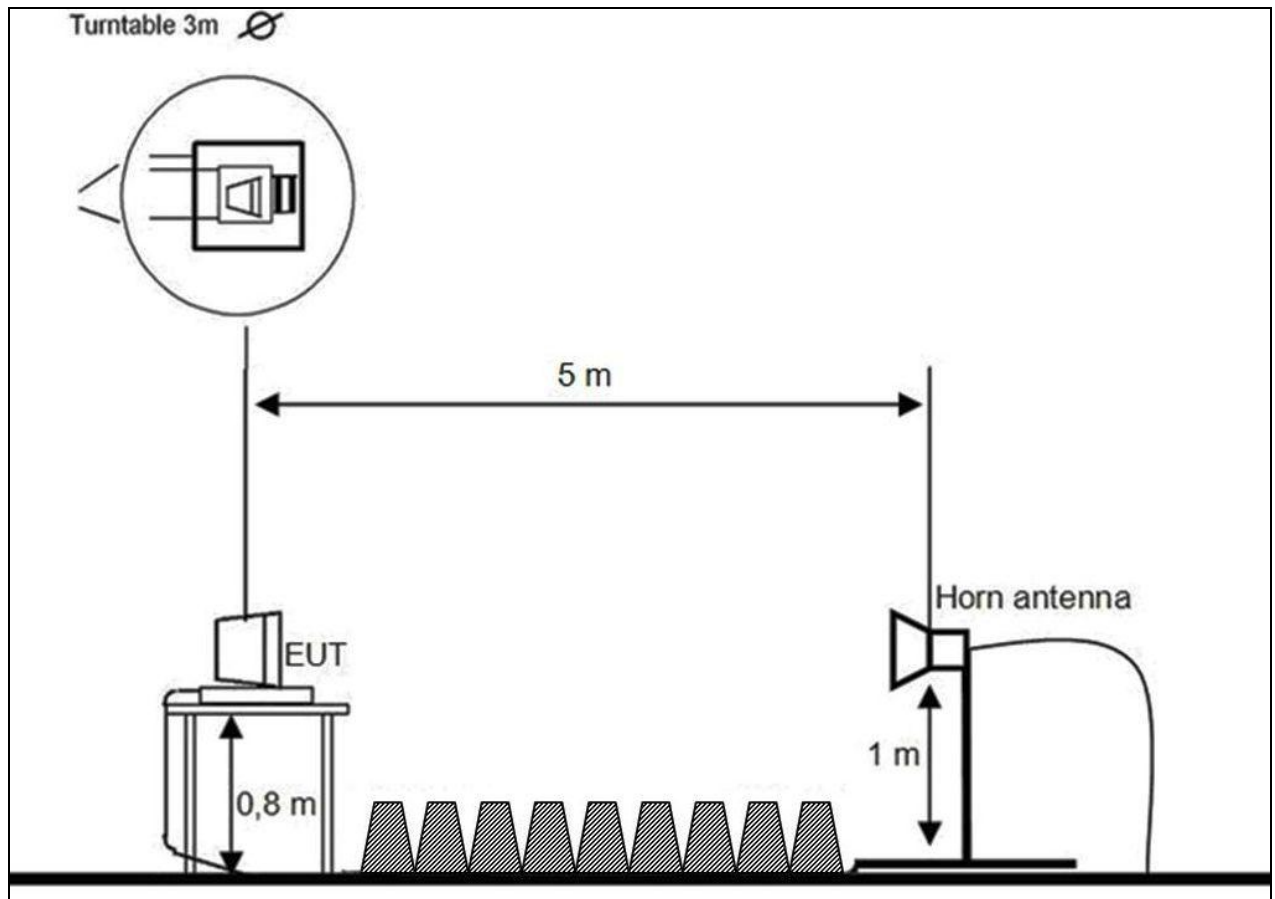
Frequency [GHz]	CL [dB]	AF [dB μ V/m]	DC [dB]
1,000	-35,50	26,20	4,40
1,500	-35,20	26,10	4,40
2,000	-35,10	26,70	4,40
2,500	-35,00	26,50	4,40
3,000	-34,70	27,60	4,40
3,500	-34,80	28,40	4,40
4,000	-35,00	28,60	4,40
4,500	-34,90	28,90	4,40
5,000	-34,80	29,30	4,40
5,500	-34,35	29,80	4,40
6,000	-34,00	30,30	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:

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

8.3.8 Test Set-up

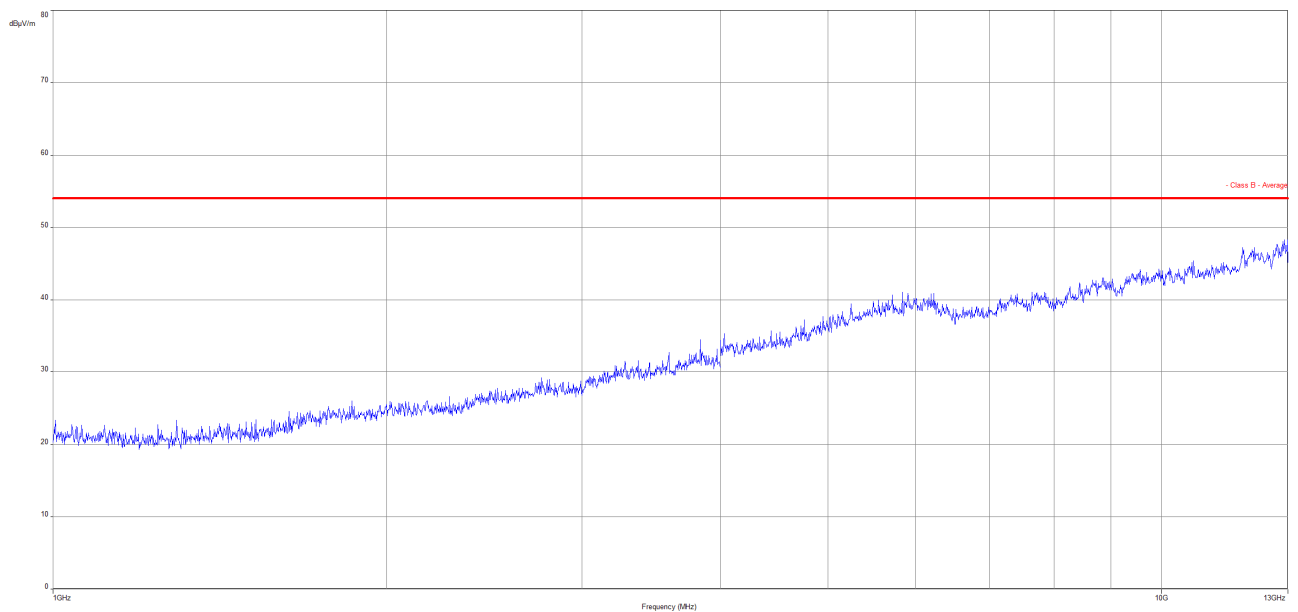


set 1 op 3:

Common Information

EUT:	RGF111LW + HS1 + CH1 + USB1
Serial Number:	00440224247906
Test Description:	FCC part 15 class B
Operating Conditions:	BT DH5 testmode + charging
Operator Name:	Sander
Comment:	AC: 115 V / 60 Hz

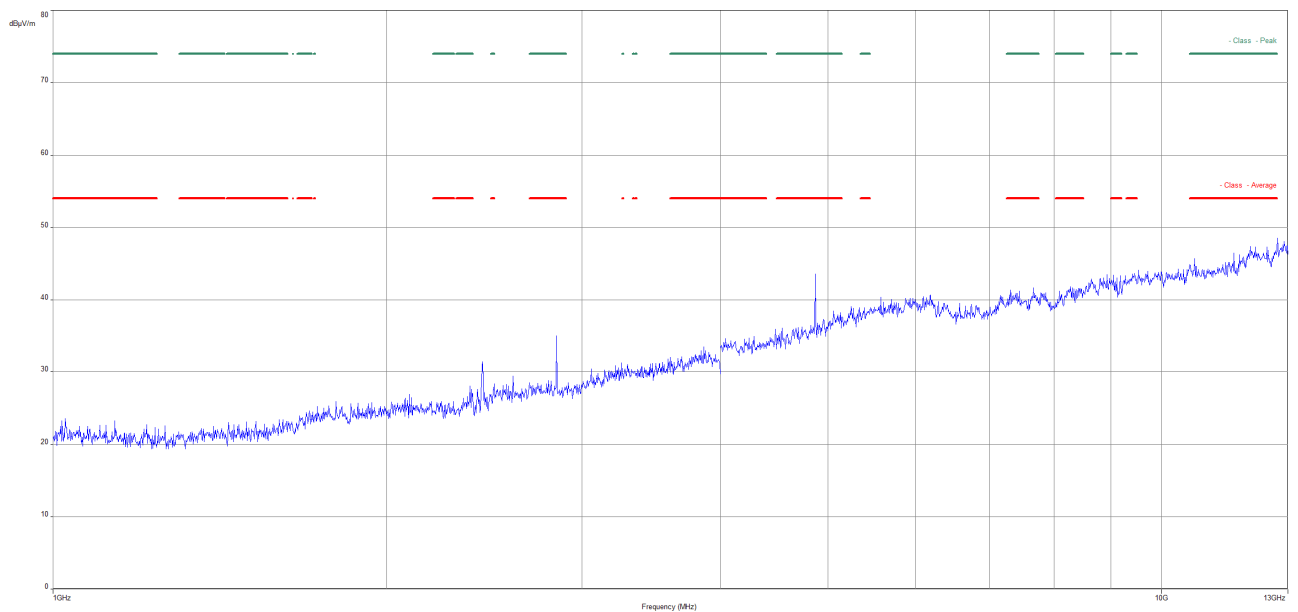
(2.4GHz notch inserted)



set 2 op 4:

Common Information

EUT:	RGF111LW + HS1 + CH1 + USB2
Serial Number:	00440224247906
Test Description:	FCC part 15 class B
Operating Conditions:	WLAN 802.11b + charging
Operator Name:	Sander
Comment:	AC: 115 V / 60 Hz

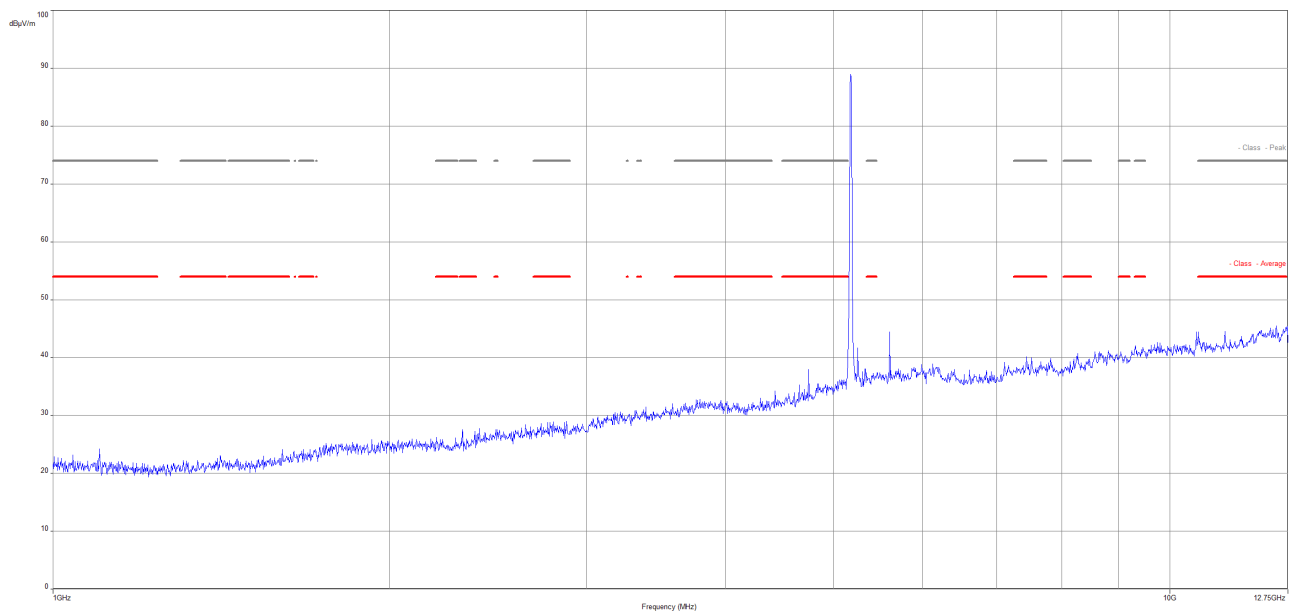


set 2 op 5:

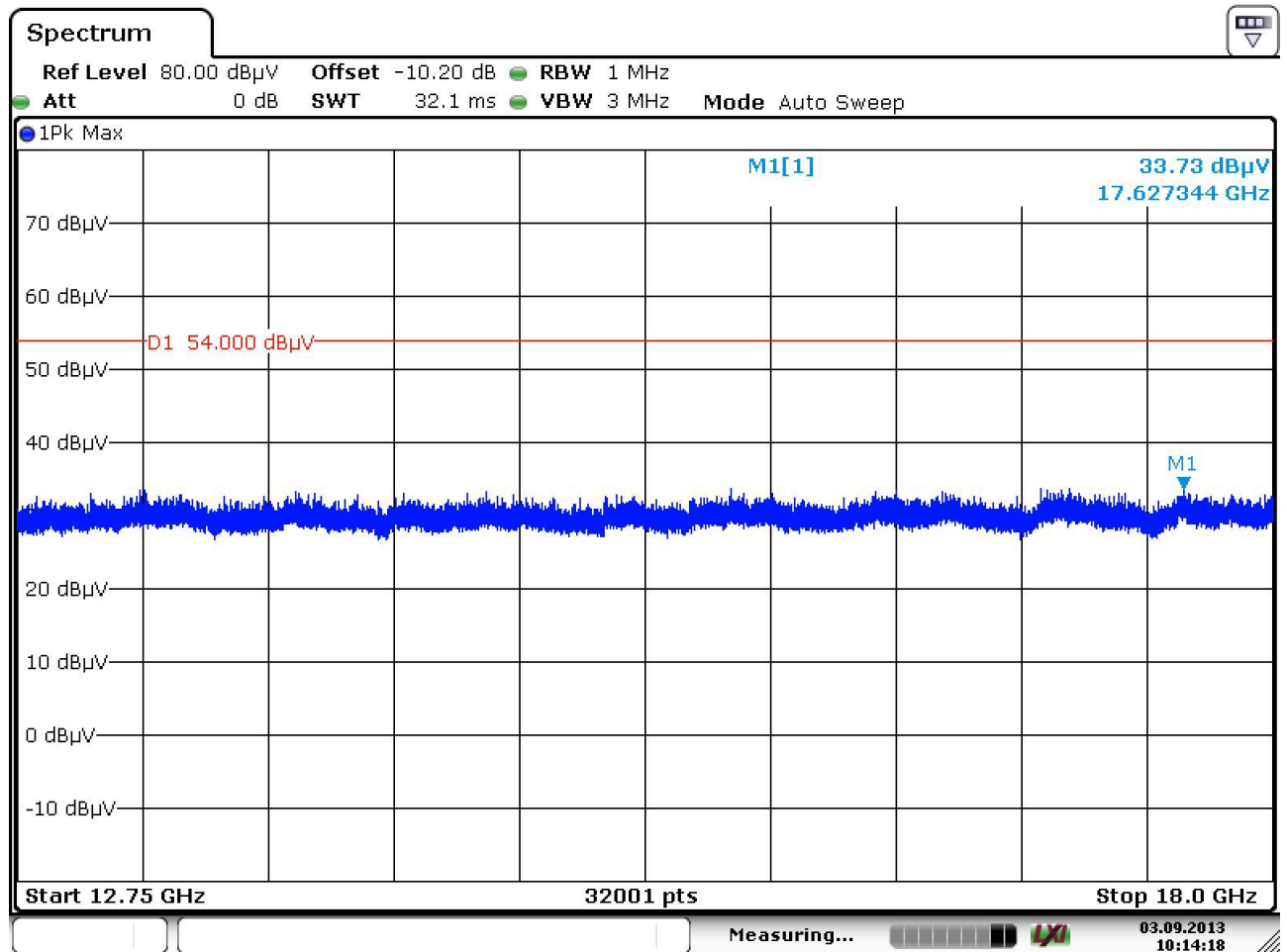
Common Information

EUT:	RGF111LW + HS1 + CH1 + USB2
Serial Number:	00440224247906
Test Description:	FCC part 15 class B
Operating Conditions:	WLAN 802.11a + charging
Operator Name:	Sander
Comment:	AC: 115 V / 60 Hz

1 GHz - 12.75GHz

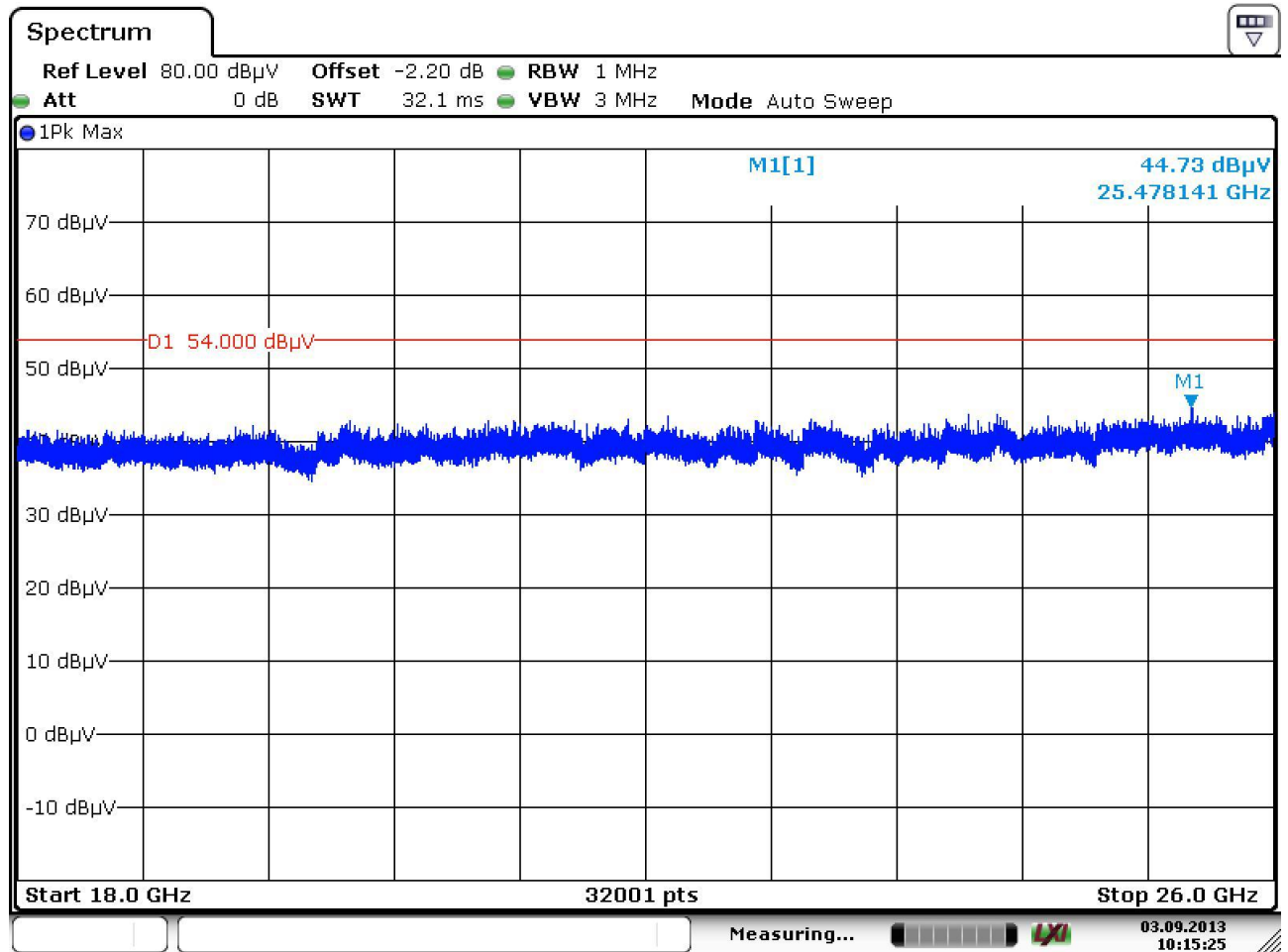


12,75 GHz – 18GHz



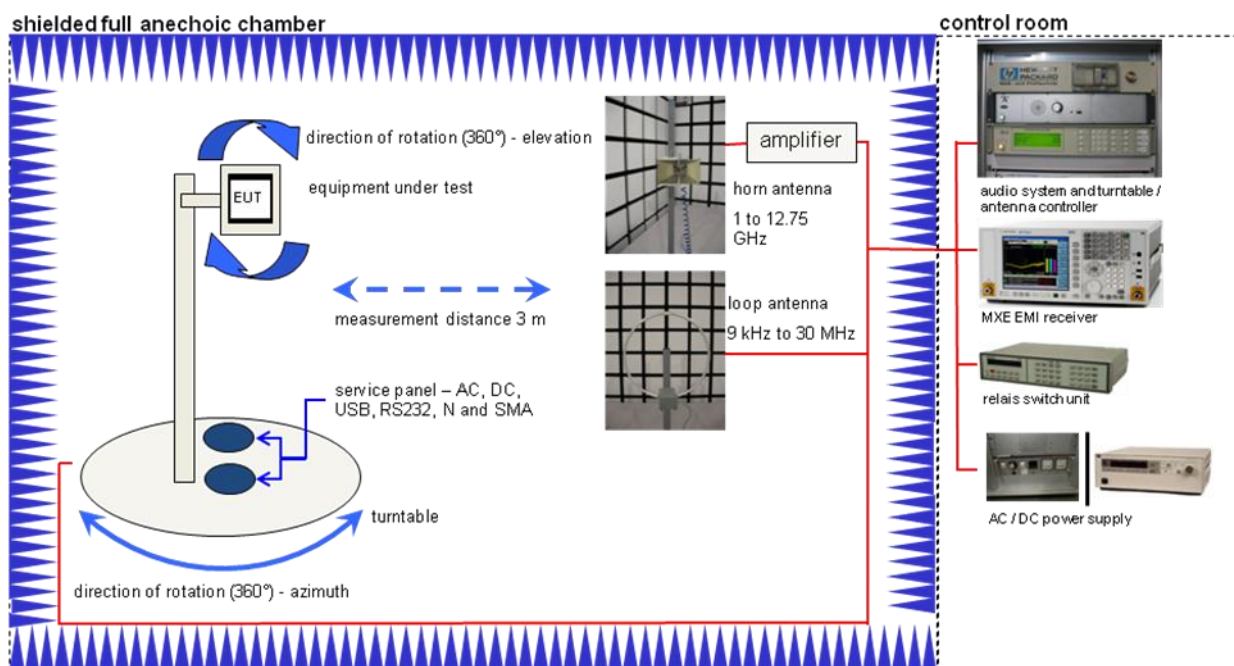
Date: 3.SEP.2013 10:14:17

18 GHz – 26 GHz



Date: 3.SEP.2013 10:15:25

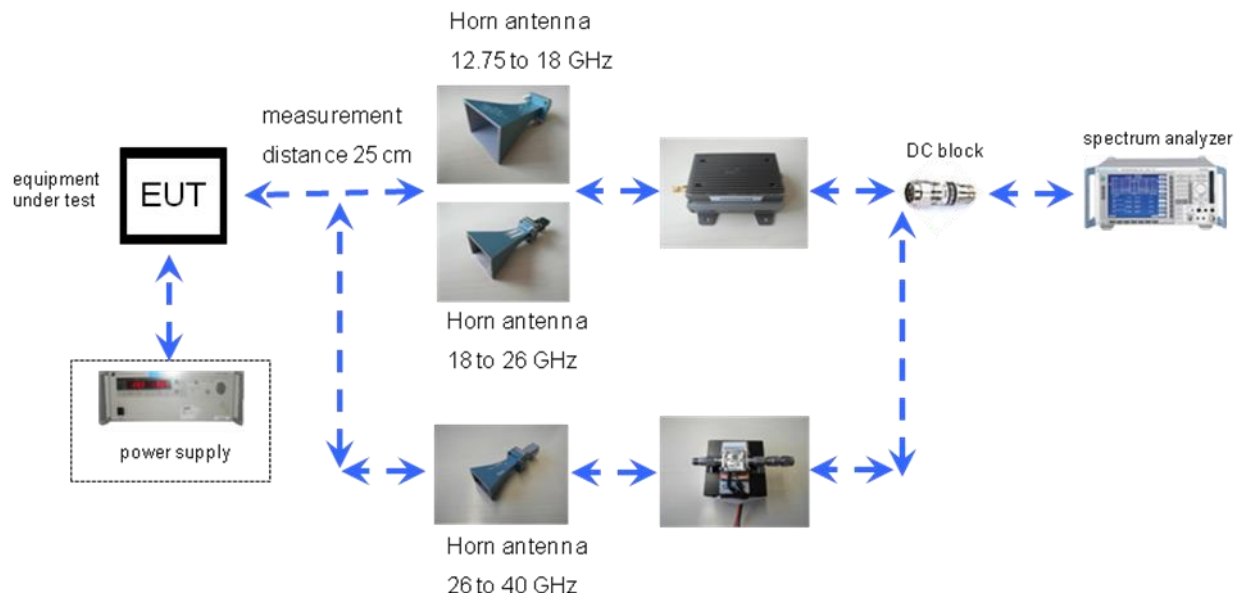
8.4 Hardware setup Radiated measurements chamber C



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
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	8905-2342	300000256
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

8.5 Radiated measurements 12.75 GHz to 40 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
Std. Gain Horn Antenna 26.5-40.0 GHz	V637	Narda	7911	300001751
Broadband Low Noise Amplifier 18-50 GHz	CBL18503070-XX	CERNEX	19338	300004273
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

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_13-01-01_AnnexD.pdf

Annex B: Photographs of the EUT

see external document 1-6234_13-01-01_AnnexA.pdf

Annex C: Document history

Version	Applied changes	Date of release
-/-	Initial release	2013-09-06
-A	editorial changes	2013-09-18-
-B	editorial changes	2013-09-25

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