

TEST REPORT

Test report no.: 1-6234/13-07-06-A



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

Area of Testing: Radio/Satellite Communications

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

Phone: +1 51 98 88 74 65

Manufacturer

Research In Motion Limited

305 Phillip Street

Waterloo, ON N2L 3W8 / CANADA

Test standard/s

47 CFR Part 15

Title 47 of the Code of Federal Regulations; Chapter I

Part 15 - Radio frequency devices

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item: Blackberry GSM Phones

Model name: RFW121LW

FCC ID: L6ARFW120LW

Frequency: DTS band 5725 MHz to 5850 MHz
(lowest channel 149 – 5745 MHz; highest channel 165 – 5825 MHz)

Technology tested: WLAN (OFDM / a & n HT20 – mode)

Antenna: Integrated antenna

Power supply: 3.8V Li-Polymer battery

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

Test report authorised:

p.o.

Stefan Bös
Senior Testing Manager

Test performed:

p.o.

Andreas Luckenbill
Expert

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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.

2.2 Application details

Date of receipt of order:	2013-07-09
Date of receipt of test item:	2013-07-08
Start of test:	2013-07-08
End of test:	2013-07-18
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	01.10.2012	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices

3.1 Measurement guidance

DTS : KDB 558074	2013-04	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247
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4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	no tests under extreme conditions
	T_{min}	no tests under extreme conditions
Relative humidity content:		48 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	3.8 V Li-Polymer battery
	V_{max}	no tests under extreme conditions
	V_{min}	no tests under extreme conditions

5 Test item

Kind of test item	:	Blackberry GSM Phones
Type identification	:	RFW121LW
S/N serial number	:	Rad. 004402242380164
HW hardware status	:	CER-54733-001 Rev2-x08-00
SW software status	:	OS Version: 10.2.0.519 Build: 546773
Frequency band [MHz]	:	DTS band 5725 MHz to 5850 MHz (lowest channel 149 – 5745 MHz; highest channel 165 – 5825 MHz)
Type of radio transmission	:	OFDM
Use of frequency spectrum	:	
Type of modulation	:	BPSK, QPSK, 16 – QAM & 64 – QAM
Number of channels	:	5
Antenna	:	Integrated antenna
Power supply	:	3.8 V Li-Polymer battery

5.1 Additional information

Test setup- and EUT-photos are included in test reports: 1-6234/13-07-01_AnnexA
1-6234/13-07-01_AnnexD

All tests are made according RIM testplan:
RIM_EMI_Matrix for Cetecom_Astro_RFW121LW-Revised (June-27-2013).xlsx

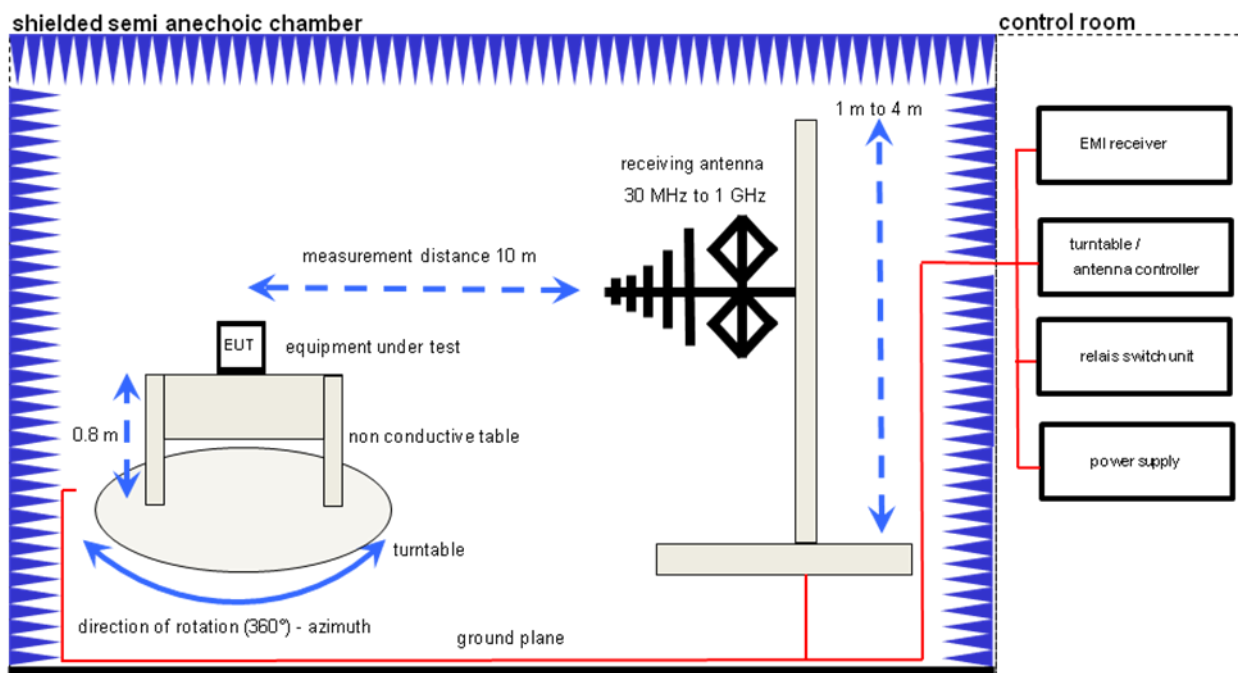
6 Test laboratories sub-contracted

None

7 Description of the test setup

7.1 Radiated measurements chamber F

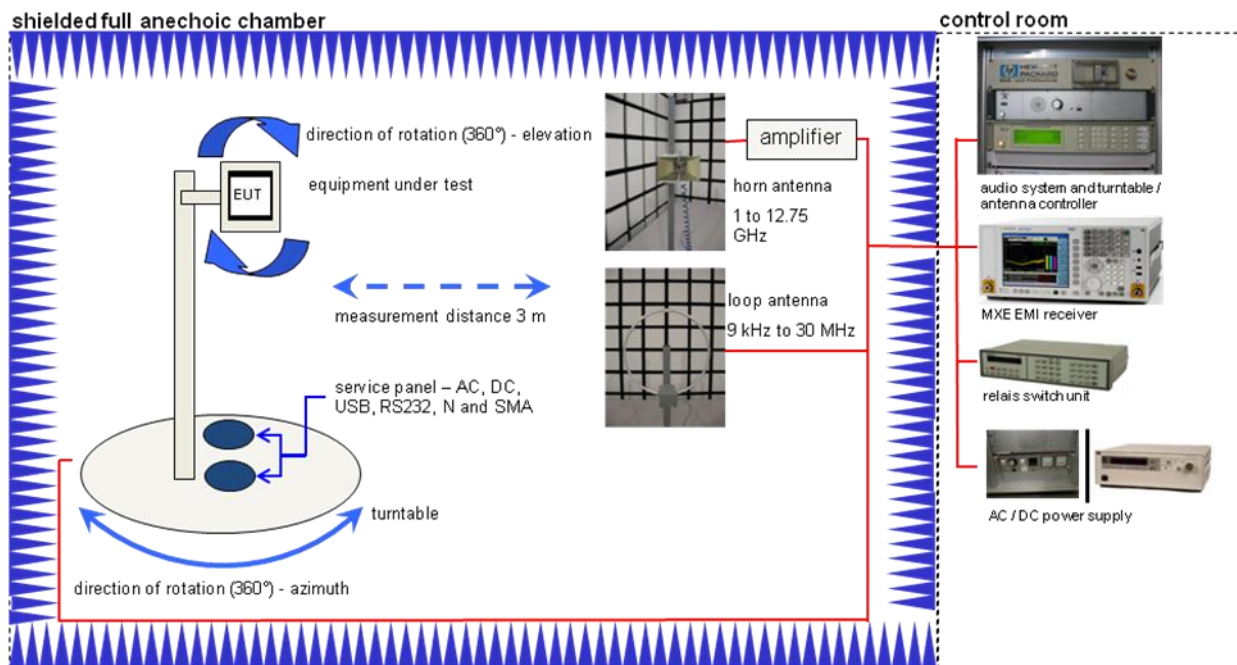
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368
DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580
EMI Test Receiver	ESCI 3	R&S	100083	300003312
Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379
Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745
Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746
Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787

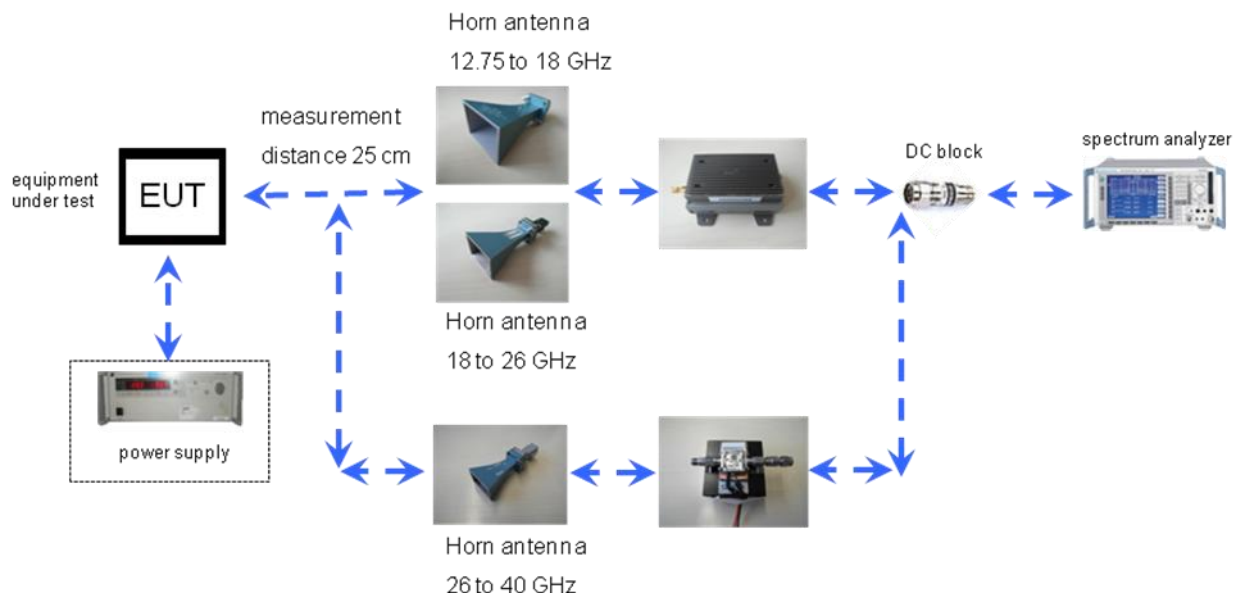
7.2 Radiated measurements chamber C



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032
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
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405

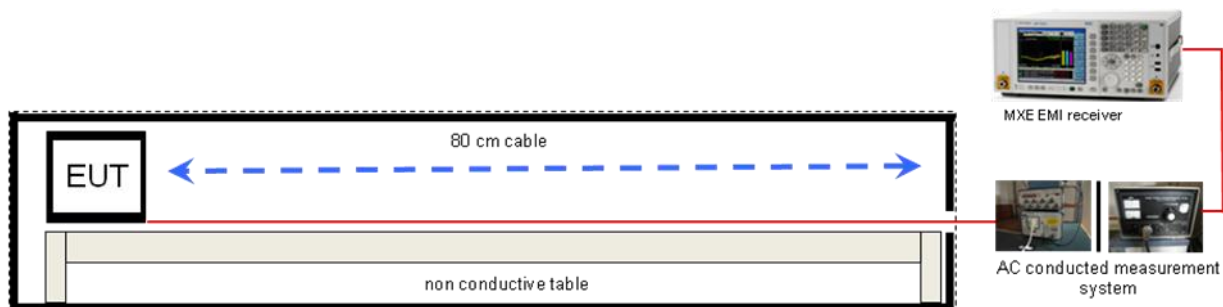
7.3 Radiated measurements 12.75 GHz to 40 GHz



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268
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
Std. Gain Horn Antenna 26.5-40.0 GHz	V637	Narda	7911	300001752
Broadband Low Noise Amplifier 18-50 GHz	CBL18503070-XX	CERNEX	19338	300004273
Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517

7.4 AC conducted



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erfi	91350	300001155
Switch / Control Unit	3488A	HP Meßtechnik	*	300000199
Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001168
Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210

8 Summary of measurement results



No deviations from the technical specifications were ascertained



There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15	Passed	2013-08-16	Tests according to manufacturer test plan.

Test specification clause	Test case	Temperature conditions	Power source voltages	Mode	Pass	Fail	NA	NP	Remark
§15.247(b)(4)	Antenna gain	Nominal	Nominal	-/-	☐	☐	☐	☒	-/-
§15.247(e)	Power spectral density DTS clause 10.2	Nominal	Nominal	-/-	☐	☐	☐	☒	-/-
§15.247(a)(2)	Spectrum bandwidth - 6dB bandwidth DTS clause 8.2	Nominal	Nominal	-/-	☐	☐	☐	☒	-/-
§15.247(a)(2)	Spectrum bandwidth - 20dB bandwidth	Nominal	Nominal	-/-	☐	☐	☐	☒	-/-
§15.247(b)(3)	Maximum output power DTS clause 9.1.2	Nominal	Nominal	-/-	☐	☐	☐	☒	-/-
§15.247(d)	Band edge compliance conducted DTS clause 13.2.1	Nominal	Nominal	-/-	☐	☐	☐	☒	-/-
§15.205	Band edge compliance radiated	Nominal	Nominal	OFDM	☒	☐	☐	☐	complies
§15.247(d)	TX spurious emissions conducted DTS clause 11.1 & 2	Nominal	Nominal	-/-	☐	☐	☐	☒	-/-
§15.247(d)	TX spurious emissions radiated	Nominal	Nominal	OFDM	☒	☐	☐	☐	complies
§15.109	RX spurious emissions radiated	Nominal	Nominal	-/-	☐	☐	☐	☒	-/-
§15.209(a)	TX spurious emissions radiated < 30 MHz	Nominal	Nominal	-/-	☐	☐	☐	☒	-/-
§15.107(a)	Conducted emissions < 30 MHz	Nominal	Nominal	OFDM	☒	☐	☐	☐	complies

Note: NA = Not Applicable; NP = Not Performed

9 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: None

Test mode:

- ☐ No test mode available.
Iperf was used to ping another device with the largest support packet size
- ☒ Special software is used.
EUT is transmitting pseudo random data by itself

10 Measurement results

10.1 Antenna gain

Not performed! Tests according to manufacturer tests plan!

10.2 Maximum output power

Not performed! Tests according to manufacturer tests plan!

10.3 Power spectral density

Not performed! Tests according to manufacturer tests plan!

10.4 Spectrum bandwidth – 6 dB

Not performed! Tests according to manufacturer tests plan!

10.5 Spectrum bandwidth – 20 dB

Not performed! Tests according to manufacturer tests plan!

10.6 Band edge compliance conducted

Not performed! Tests according to manufacturer tests plan!

10.7 Band edge compliance radiated

Description:

Measurement of the radiated band edge compliance. The EUT is turned in the position that results in the maximum level at the band edge. Then a sweep over the corresponding restricted band is performed. The EUT is set to channel 149 for the lower restricted band and to channel 165 for the upper restricted band. The measurement is repeated for all modulations. Measurement distance is 3m.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz / 1 MHz
Video bandwidth:	1 MHz / 10 Hz
Span:	See plot!
Trace-Mode:	Max Hold

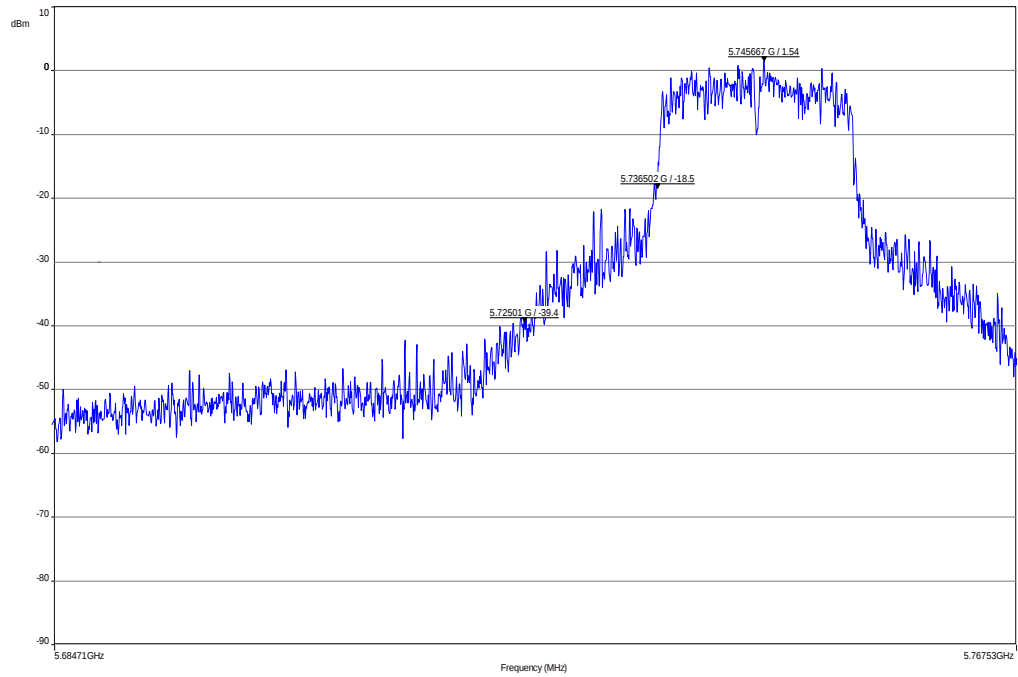
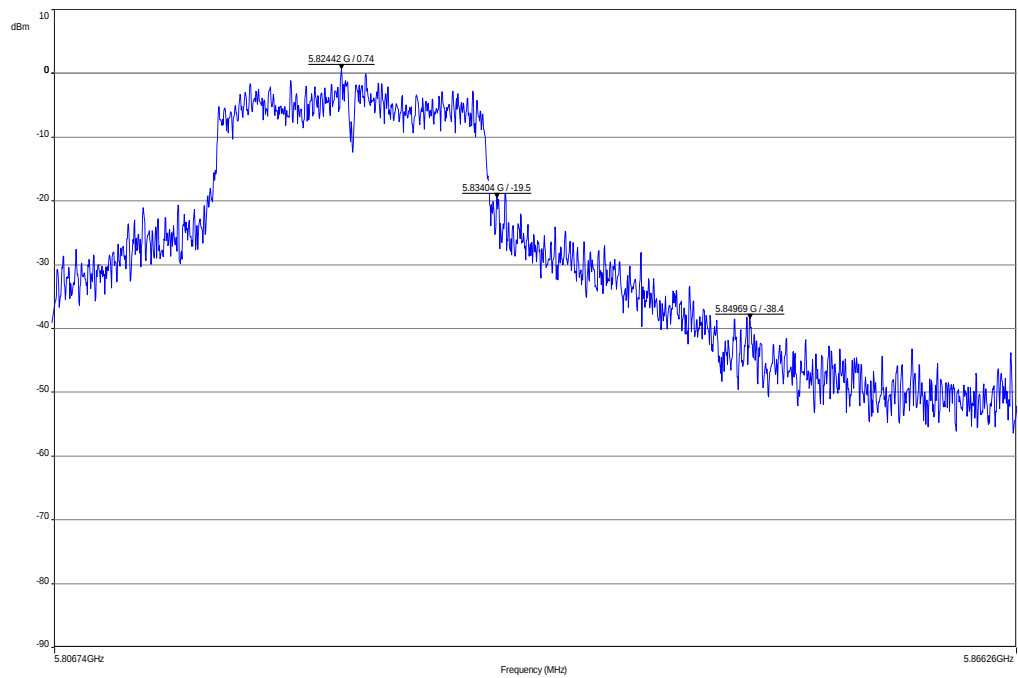
Limits:

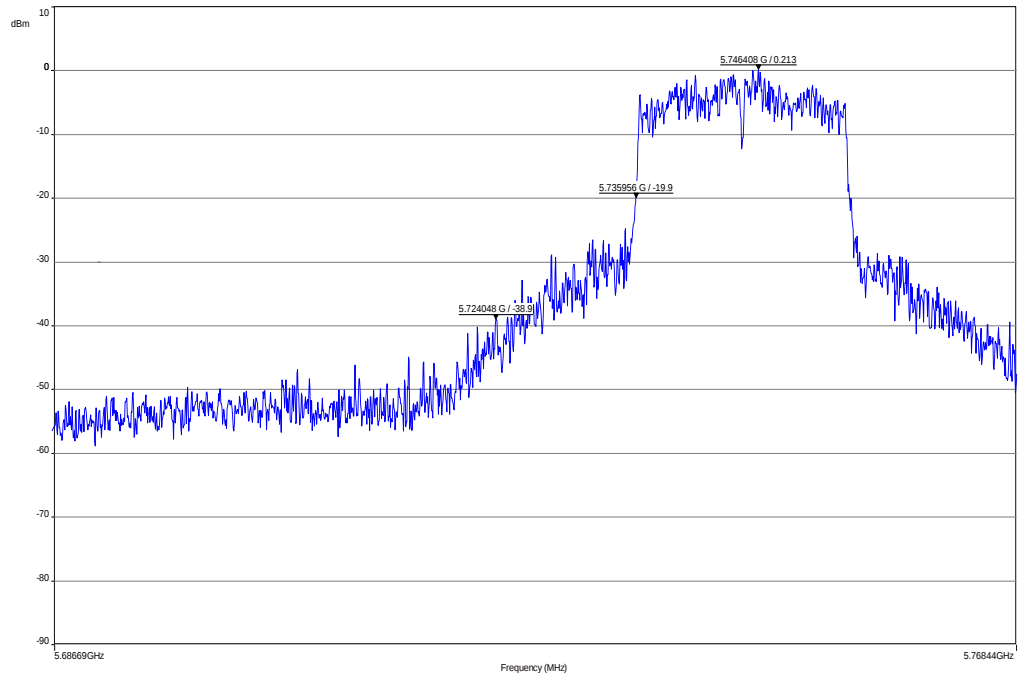
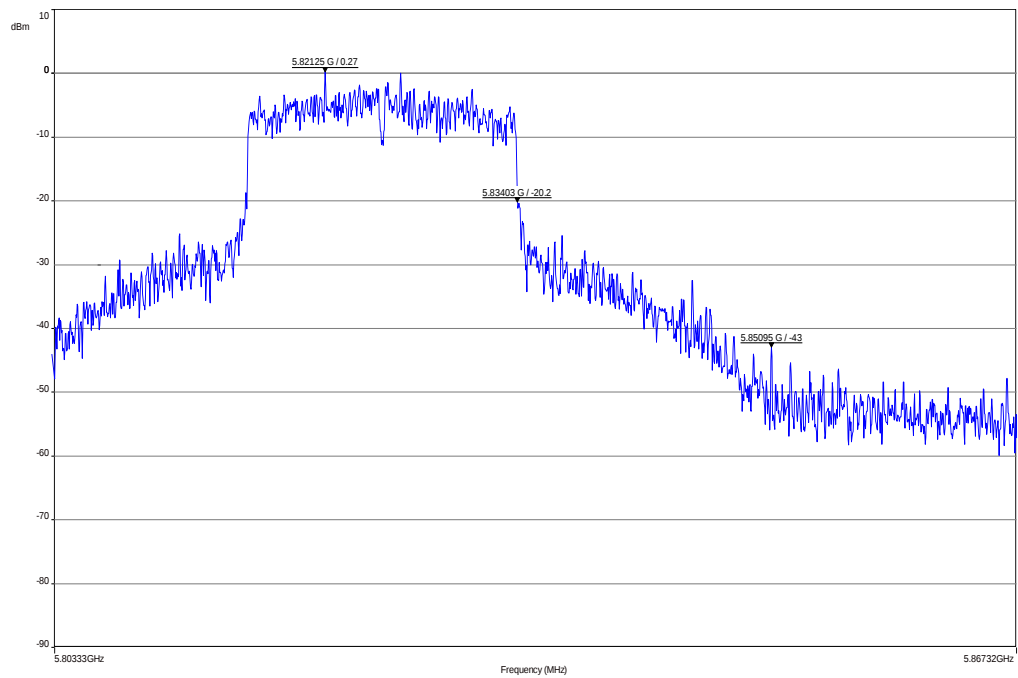
FCC
Band Edge Compliance Radiated
-/-

Results:

Scenario Modulation	Band Edge Compliance Conducted [dB]	
	OFDM / a – mode	OFDM / n – mode HT20
Lower Band Edge – Channel 149	See plot!	See plot!
Upper Band Edge – Channel 165	See plot!	See plot!
Measurement uncertainty	± 3 dB	

Result: **Passed**

Plots: OFDM / a – mode peak / average**Plot 1:** TX mode, lower band edge, vertical & horizontal polarization**Plot 2:** TX mode, upper band edge, vertical & horizontal polarization

Plots: OFDM / n – mode peak / average**Plot 1:** TX mode, lower band edge, vertical & horizontal polarization**Plot 2:** TX mode, upper band edge, vertical & horizontal polarization

10.8 TX spurious emissions conducted

Not performed! Tests according to manufacturer tests plan!

10.9 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at the lowest, middle and highest channel. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak / RMS
Sweep time:	Auto
Resolution bandwidth:	F > 1 GHz: 1 MHz F < 1 GHz: 100 kHz
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold
Measured Modulation	☒ OFDM a – mode ☒ OFDM n – mode HT20

The modulation with the highest output power was used to perform the transmitter spurious emissions. If spurious were detected a re-measurement was performed on the detected frequency with each modulation.

Limits:

FCC		
TX Spurious Emissions Radiated		
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).		
Frequency (MHz)	Field Strength (dBμV/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Results: OFDM / a – mode

TX Spurious Emissions Radiated [dBμV/m]								
OFDM / a – mode								
5745 MHz			5785 MHz			5825 MHz		
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.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
Above 1 GHz – no emissions detected closer than 20 dB below the limit!			Above 1 GHz – no emissions detected closer than 20 dB below the limit!			Above 1 GHz – no emissions detected closer than 20 dB below the limit!		
Measurement uncertainty			± 3 dB					

Result: Passed**Results: OFDM / n – mode HT20**

TX Spurious Emissions Radiated [dBμV/m]								
OFDM / n – mode HT20								
5745 MHz			5785 MHz			5825 MHz		
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.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
Above 1 GHz – no emissions detected closer than 20 dB below the limit!			Above 1 GHz – no emissions detected closer than 20 dB below the limit!			Above 1 GHz – no emissions detected closer than 20 dB below the limit!		
Measurement uncertainty			± 3 dB					

Result: Passed

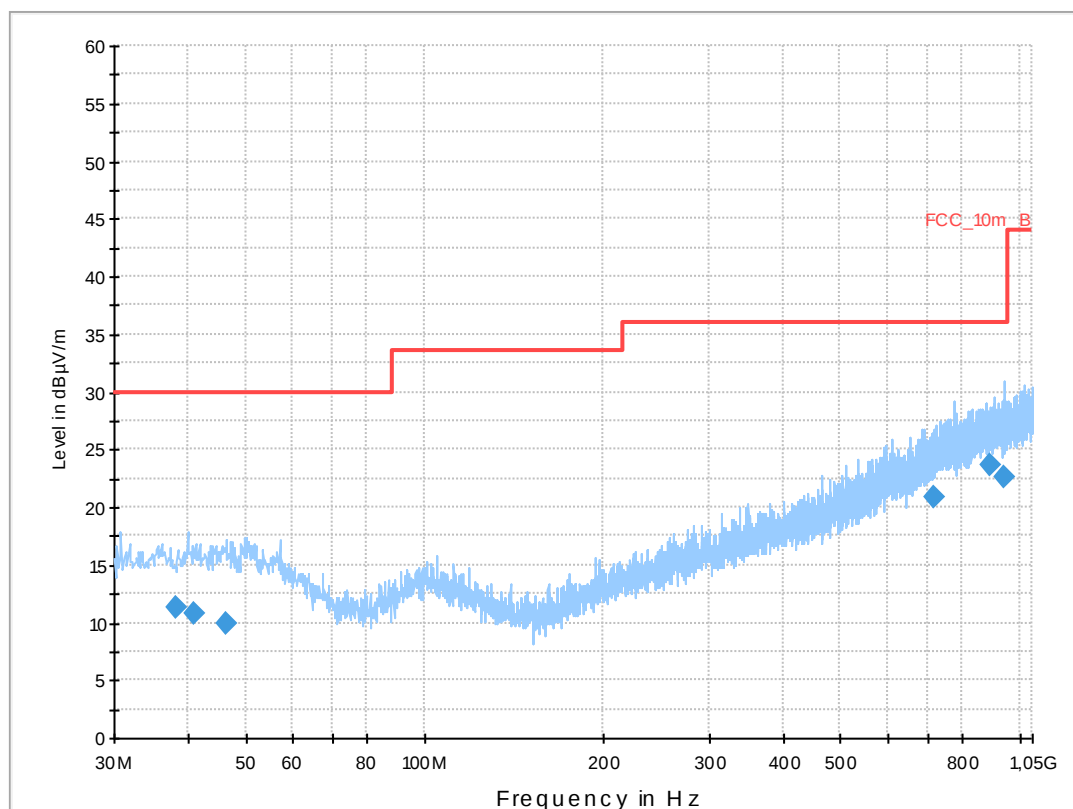
Plots: OFDM / a – mode**Plot 1:** Lowest channel, 30 MHz to 1 GHz, vertical & horizontal polarization**Common Information**

EUT: RFW121LW
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: TX WLAN a-mode, 6 Mbit/s, Ch. 149
 Operator Name: Hennemann
 Comment: battery powered

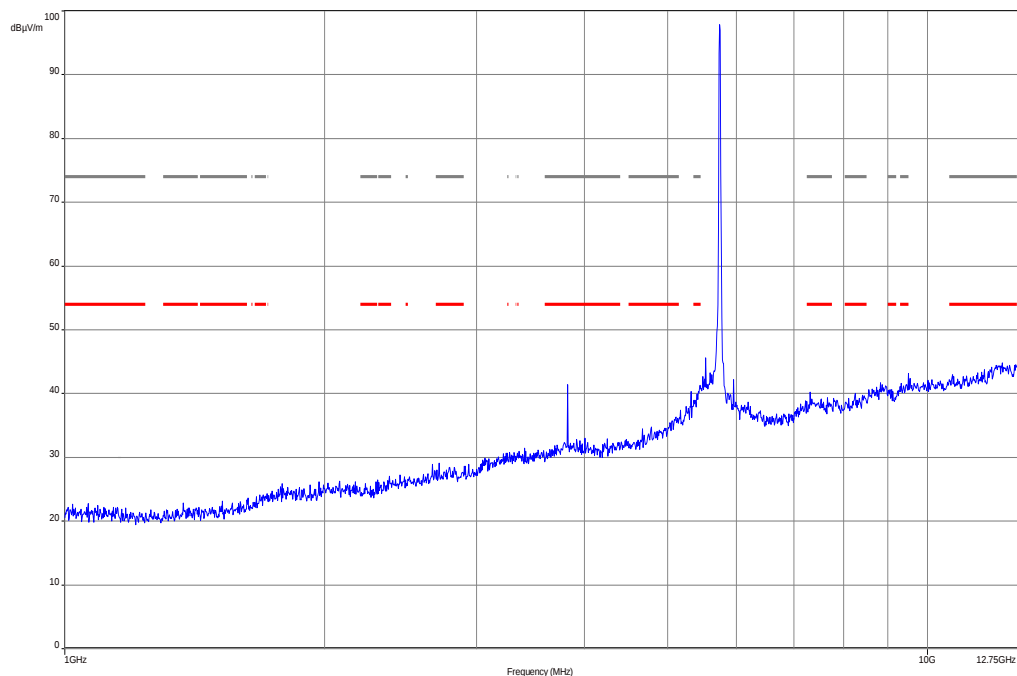
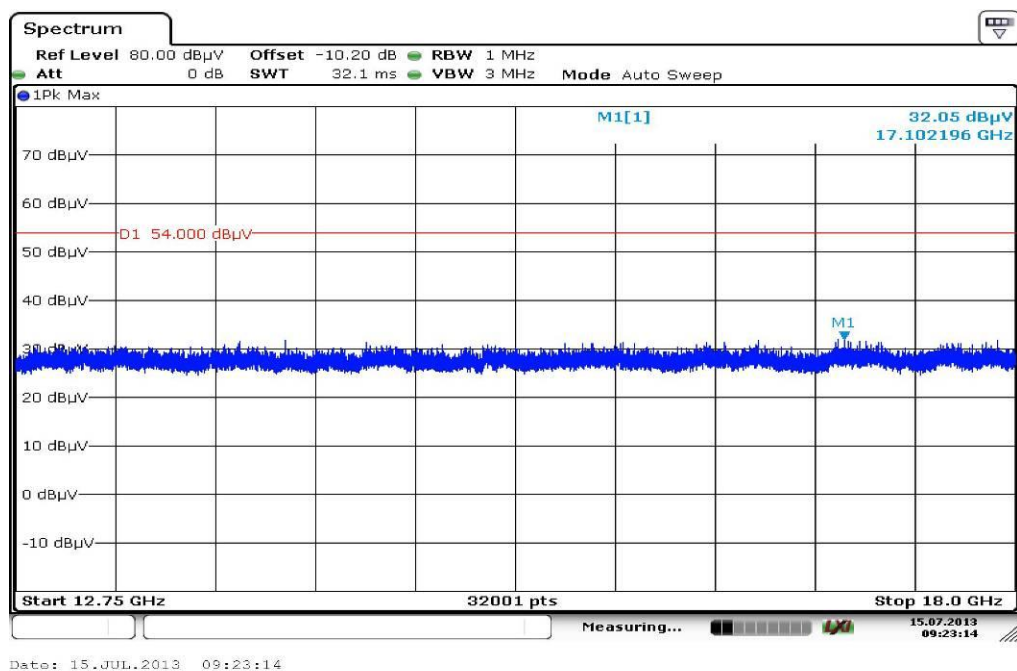
Scan Setup: STAN_Fin [EMI radiated]

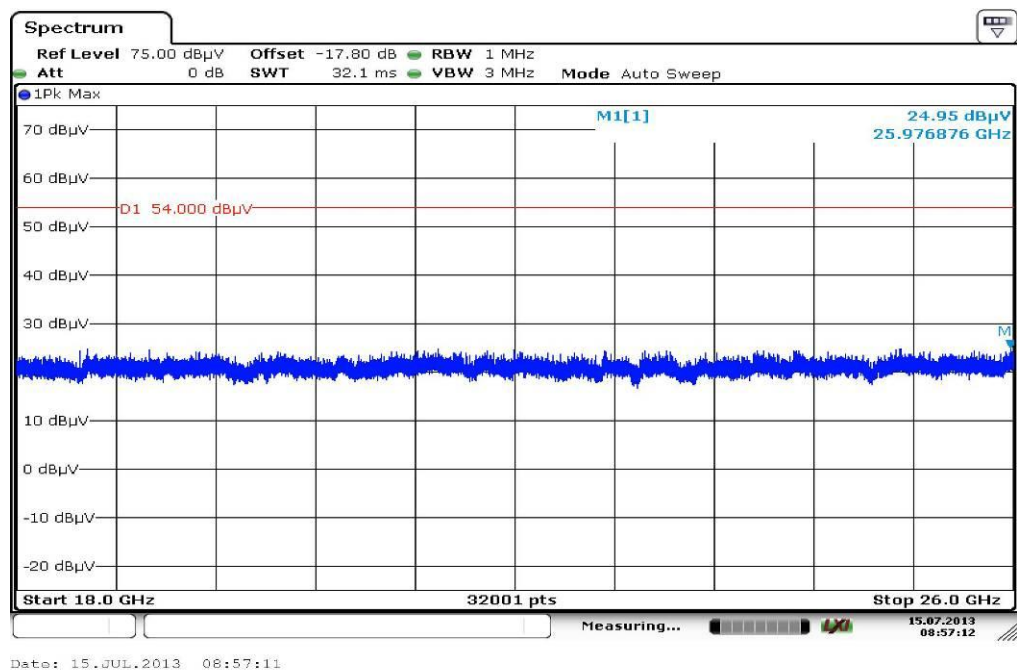
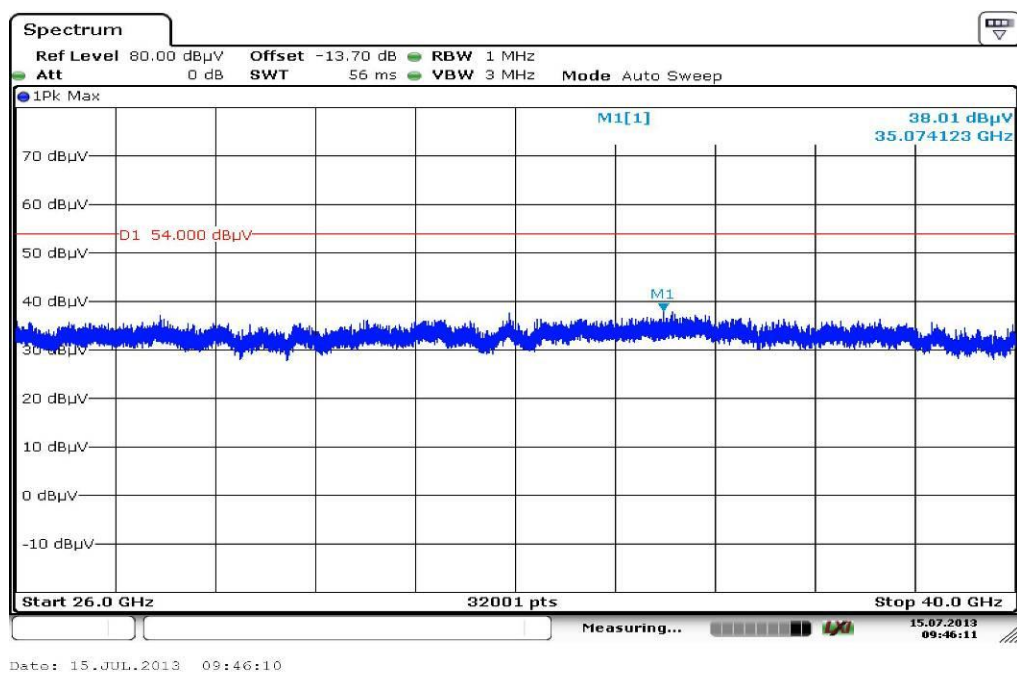
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dBμV/m

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
41.003550	10.8	1000.0	120.000	100.0	H	235.0	13.4	19.2	30.0	
38.168500	11.4	1000.0	120.000	123.0	V	157.0	13.2	18.6	30.0	
46.350000	9.9	1000.0	120.000	261.0	V	16.0	13.3	20.1	30.0	
719.348800	20.8	1000.0	120.000	203.0	H	257.0	23.0	15.2	36.0	
895.465800	23.7	1000.0	120.000	147.0	V	153.0	25.2	12.3	36.0	
944.497350	22.5	1000.0	120.000	170.0	V	170.0	25.3	13.5	36.0	

Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization**Plot 3:** Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization**Plot 5:** Lowest channel, 26 GHz to 40 GHz, vertical & horizontal polarization

Plot 6: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

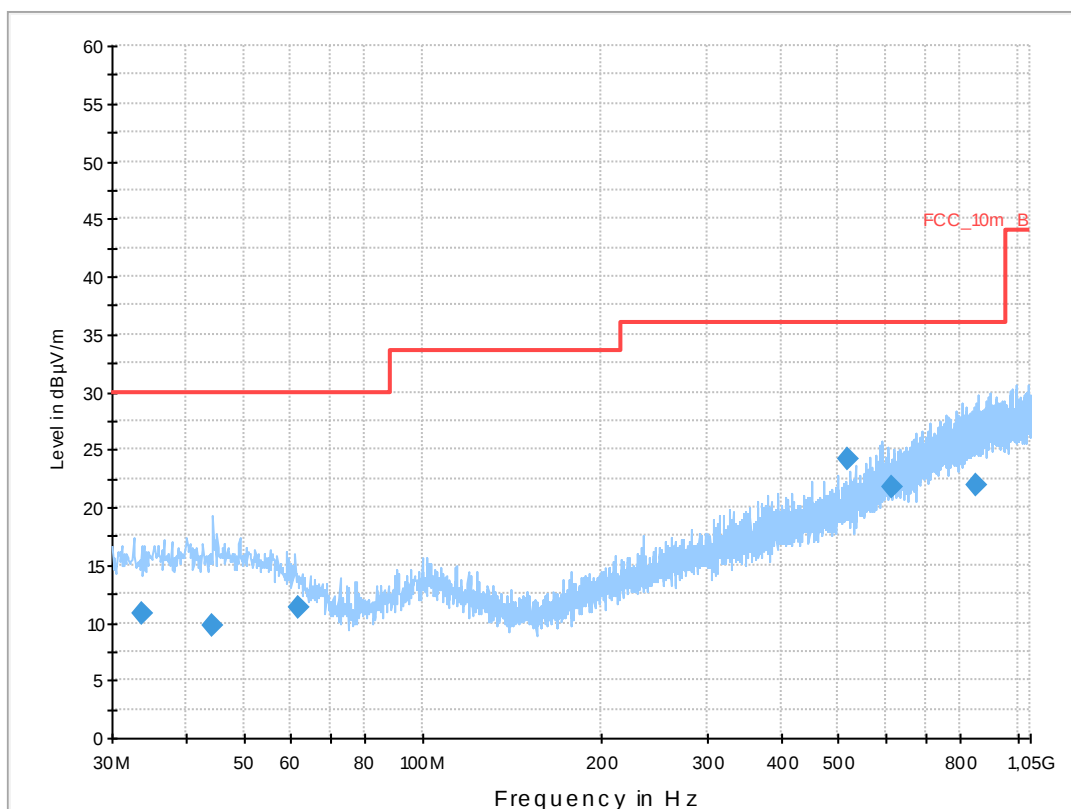
Common Information

EUT: RFW121LW
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: TX WLAN a-mode, 6 Mbit/s, Ch. 157
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

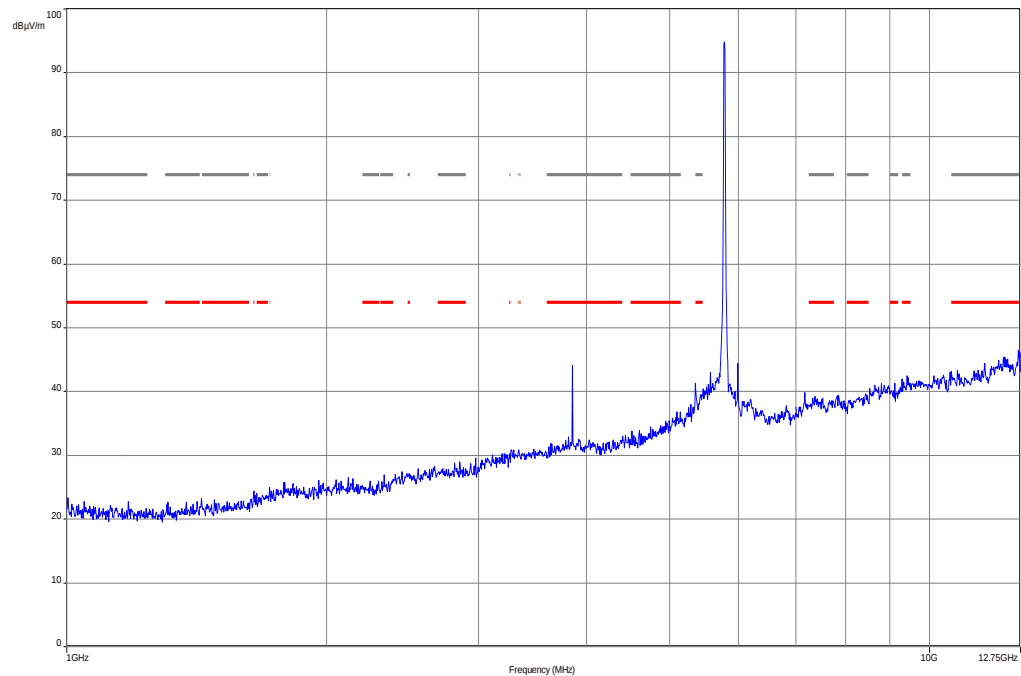
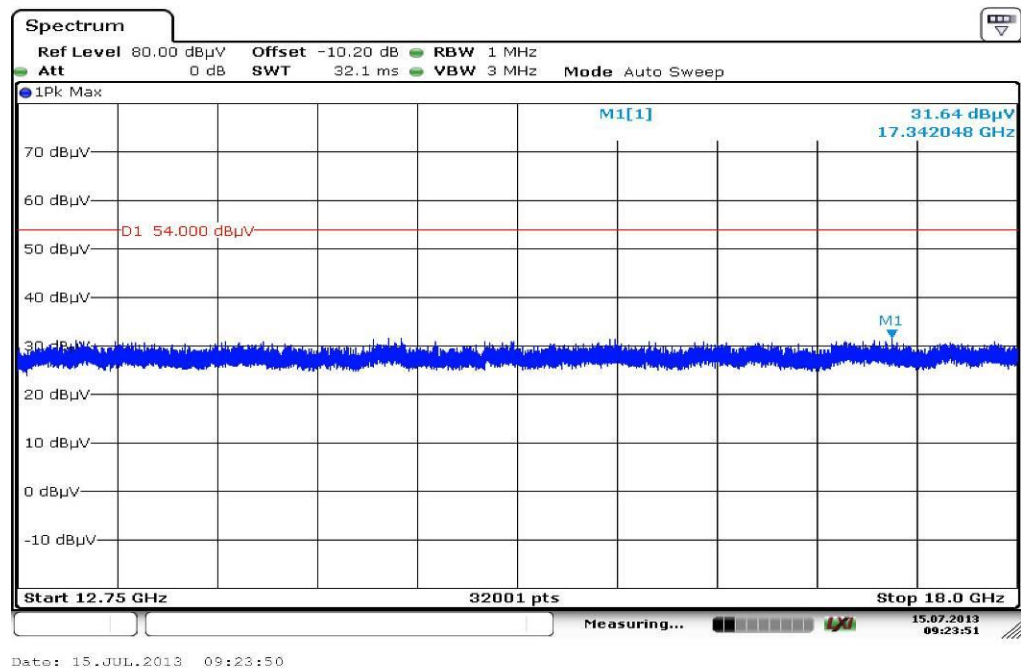
Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dB μ V/m

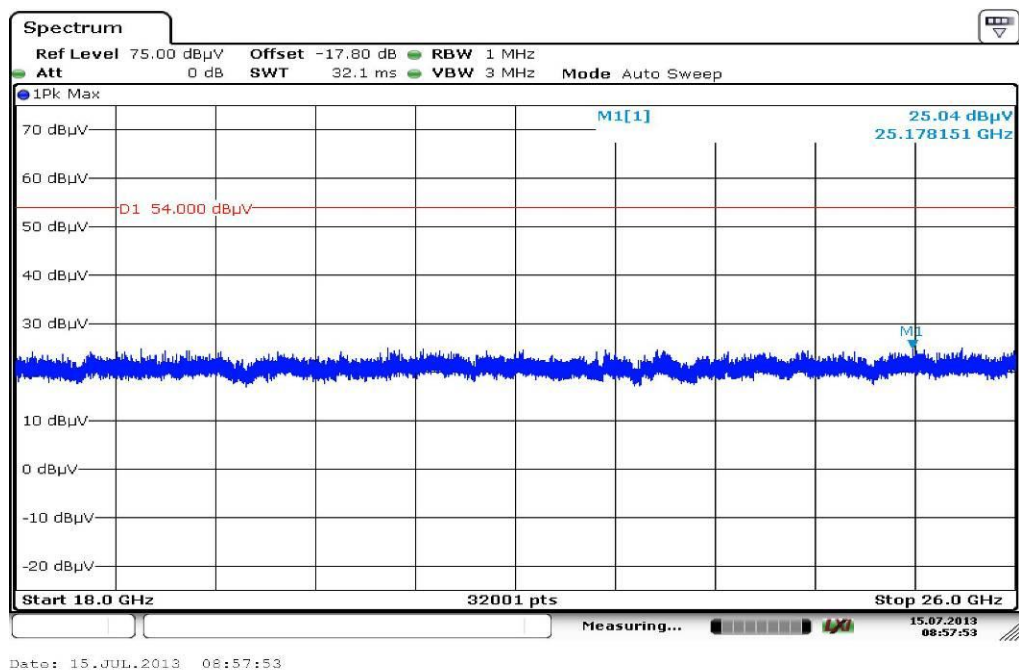
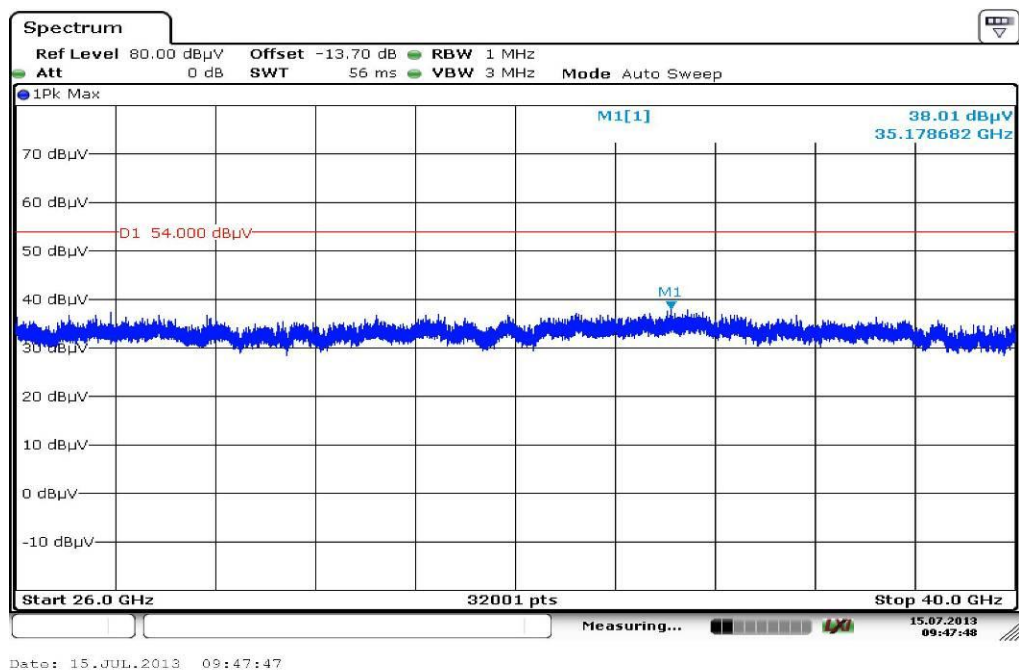
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



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
33.741200	10.9	1000.0	120.000	135.0	V	23.0	12.9	19.1	30.0	
44.322600	9.7	1000.0	120.000	154.0	H	2.0	13.3	20.3	30.0	
61.579900	11.3	1000.0	120.000	195.0	V	162.0	11.2	18.7	30.0	
517.325000	24.1	1000.0	120.000	114.0	H	195.0	18.9	11.9	36.0	
612.788000	21.8	1000.0	120.000	152.0	H	53.0	20.9	14.2	36.0	
853.520000	22.0	1000.0	120.000	209.0	V	273.0	24.6	14.0	36.0	

Plot 7: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization**Plot 8:** Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

Plot 9: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization**Plot 10:** Middle channel, 26 GHz to 40 GHz, vertical & horizontal polarization

Plot 11: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

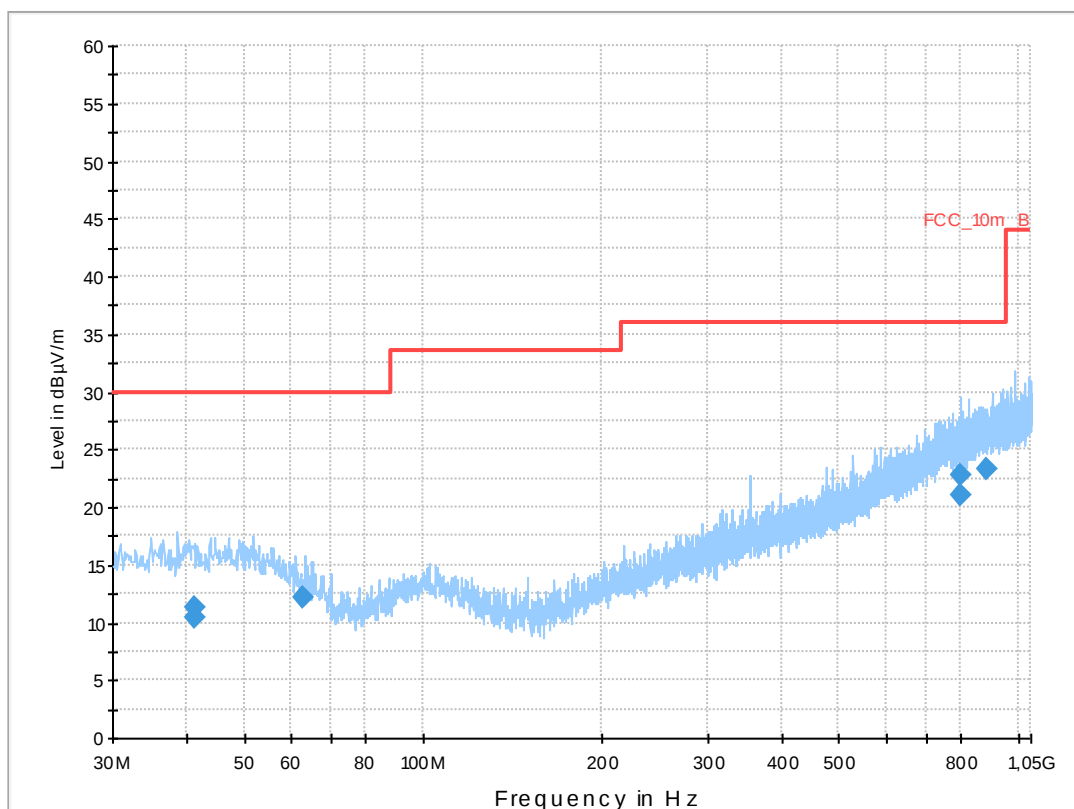
Common Information

EUT: RFW121LW
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: TX WLAN a-mode, 6 Mbit/s, Ch. 165
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

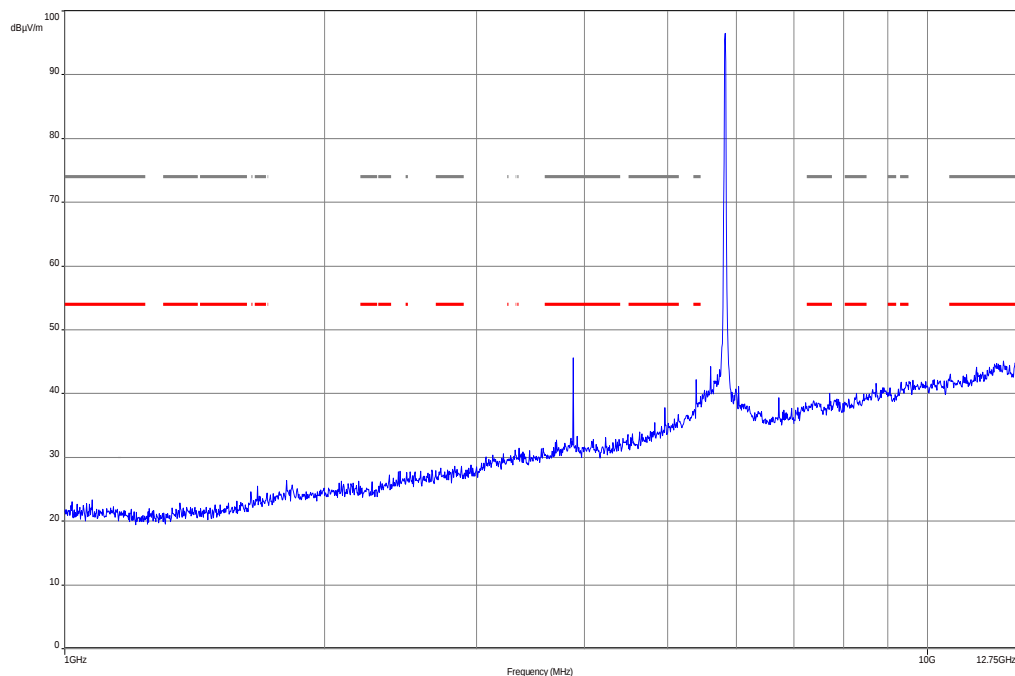
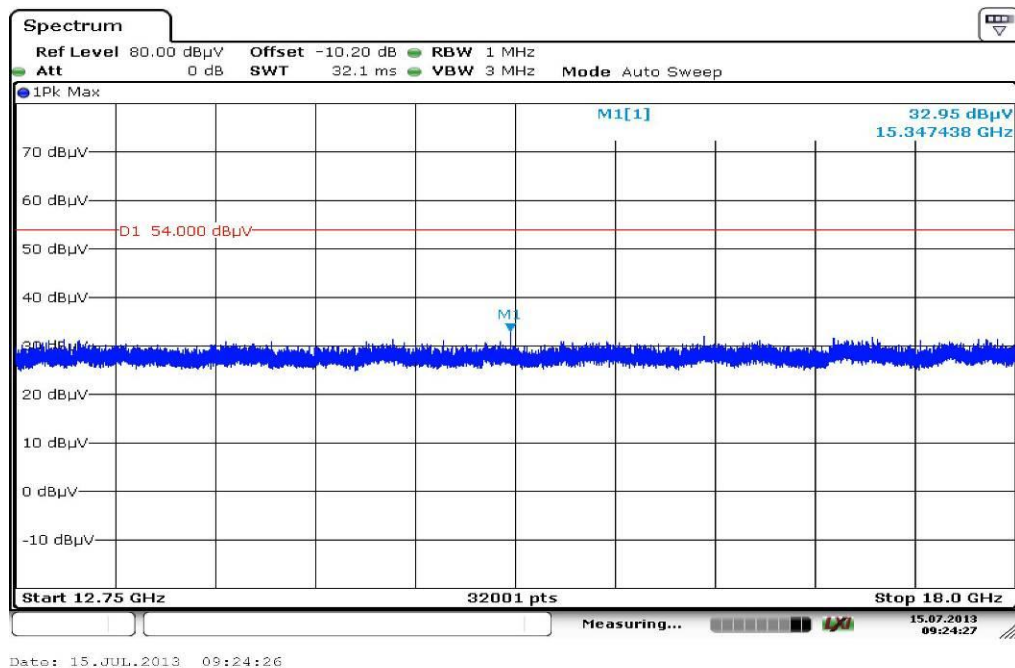
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

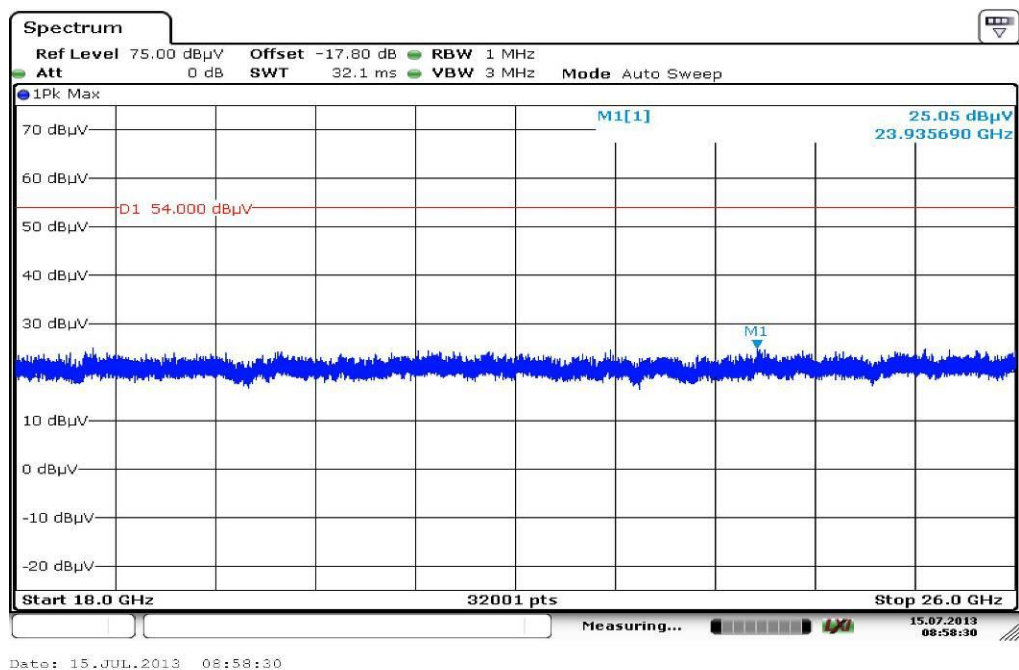
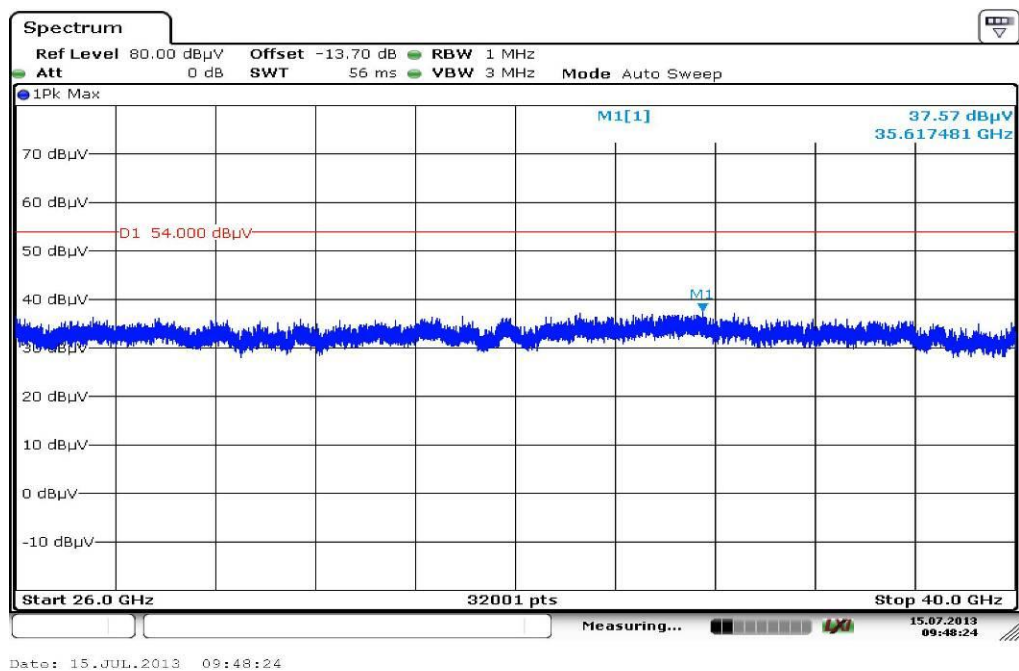
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



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
41.234120	10.4	1000.0	120.000	142.0	H	267.0	13.4	18.7	30.0	
41.234120	11.3	1000.0	120.000	142.0	V	76.0	13.4	18.7	30.0	
62.600000	12.1	1000.0	120.000	136.0	H	320.0	11.0	17.9	30.0	
797.794050	21.1	1000.0	120.000	170.0	H	183.0	23.8	14.9	36.0	
800.248810	22.7	1000.0	120.000	122.0	H	136.0	23.8	13.3	36.0	
883.195110	23.3	1000.0	120.000	154.0	V	32.0	25.0	11.0	36.0	

Plot 12: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization**Plot 13:** Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

Plot 14: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization**Plot 15:** Highest channel, 26 GHz to 40 GHz, vertical & horizontal polarization

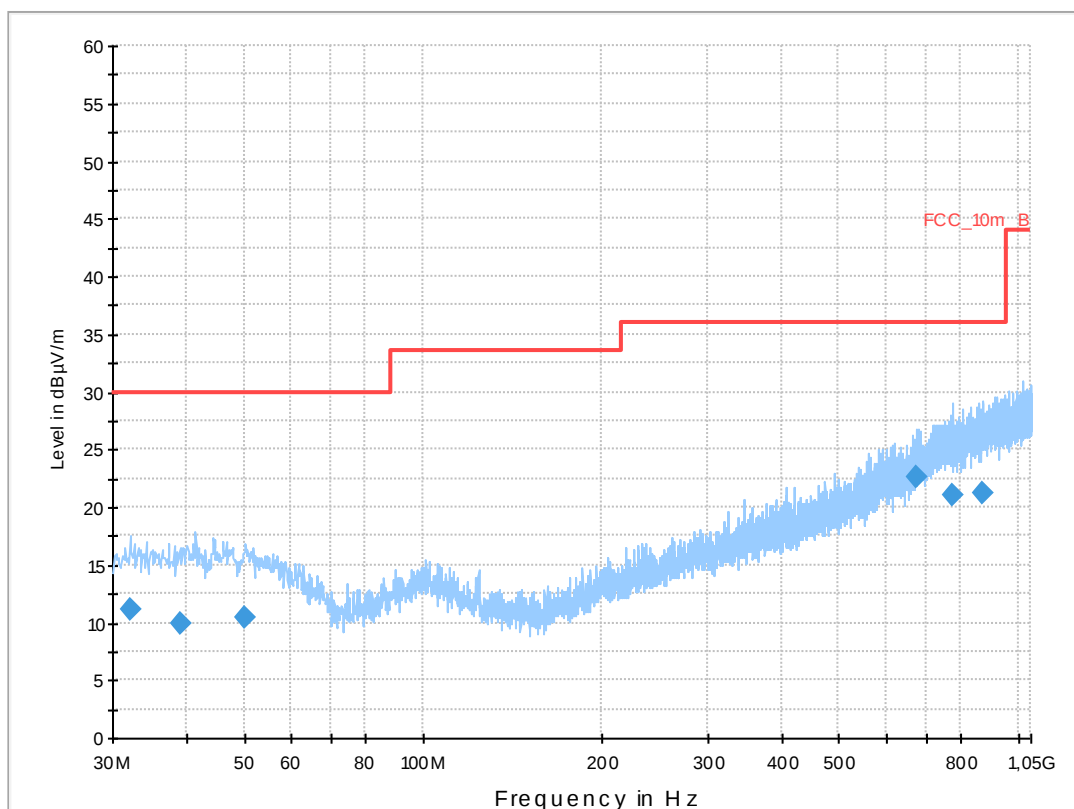
Plots: OFDM / n – mode HT20**Plot 1:** Lowest channel, 30 MHz to 1 GHz, vertical & horizontal polarization**Common Information**

EUT: RFW121LW
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: TX WLAN n-mode, 6 Mbit/s, Ch. 149
 Operator Name: Hennemann
 Comment: battery powered

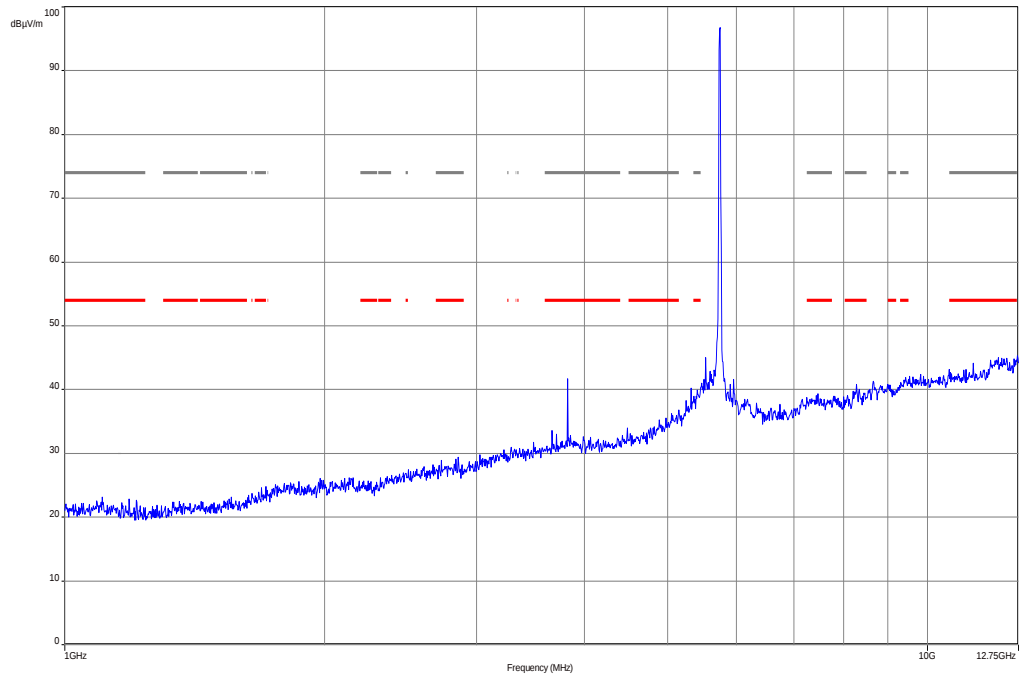
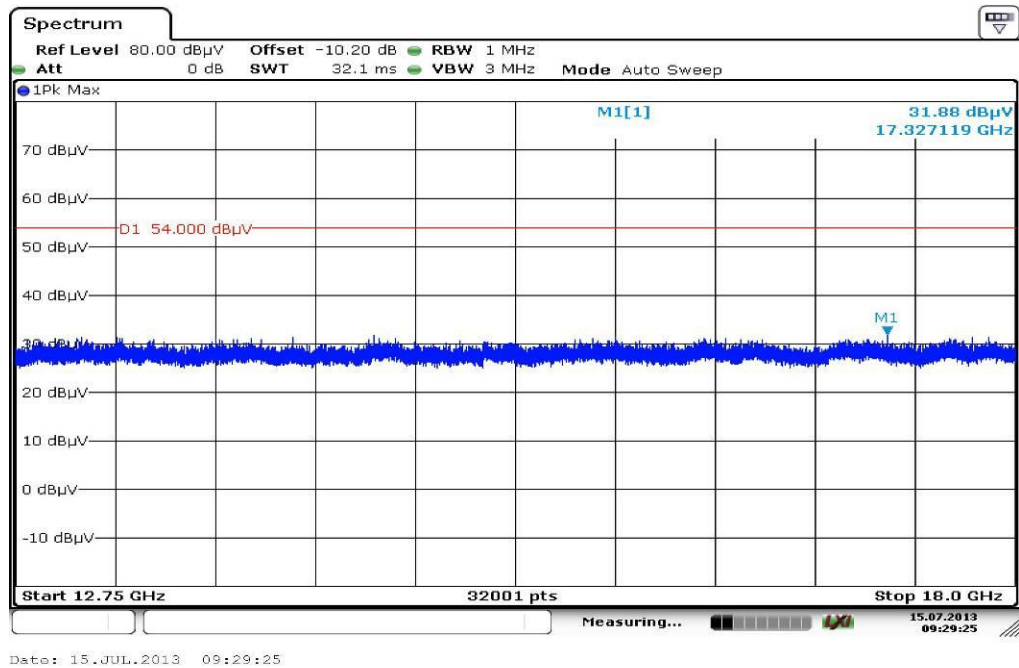
Scan Setup: STAN_Fin [EMI radiated]

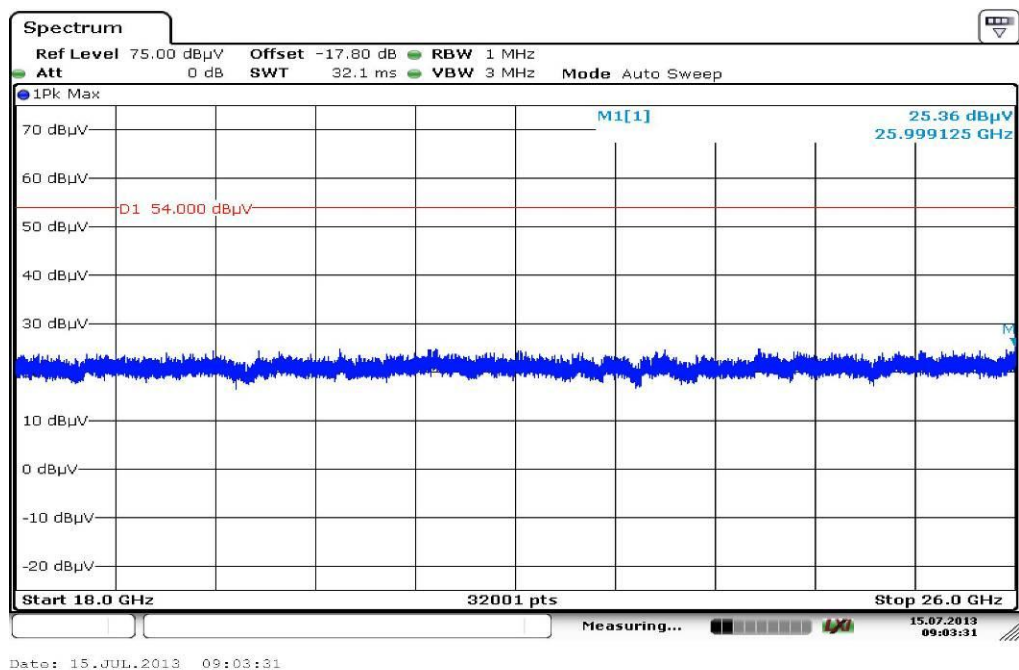
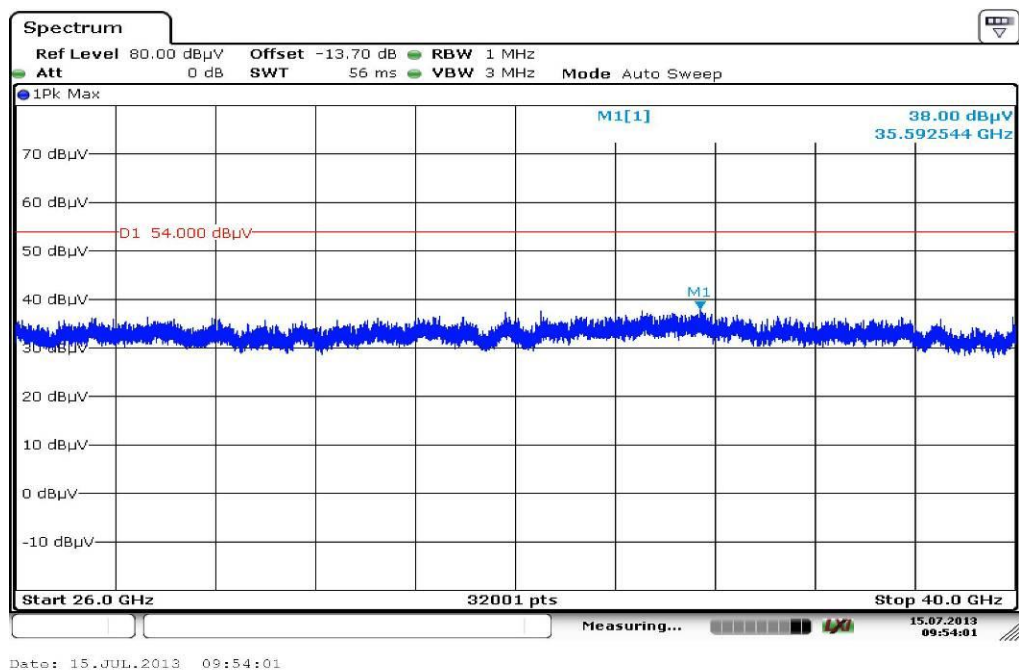
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

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
32.167500	11.1	1000.0	120.000	153.0	V	183.0	12.7	18.9	30.0	
38.925000	9.9	1000.0	120.000	115.0	H	3.0	13.4	20.1	30.0	
50.145000	10.4	1000.0	120.000	134.0	V	83.0	13.4	19.6	30.0	
676.935000	22.6	1000.0	120.000	172.0	H	96.0	21.9	13.4	36.0	
773.635950	21.1	1000.0	120.000	98.0	V	190.0	23.7	14.9	36.0	
873.922500	21.2	1000.0	120.000	149.0	V	231.0	24.0	14.8	36.0	

Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization**Plot 3:** Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

Plot 4: Lowest channel, 18 GHz to 26 GHz, vertical & horizontal polarization**Plot 5:** Lowest channel, 26 GHz to 40 GHz, vertical & horizontal polarization

Plot 6: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

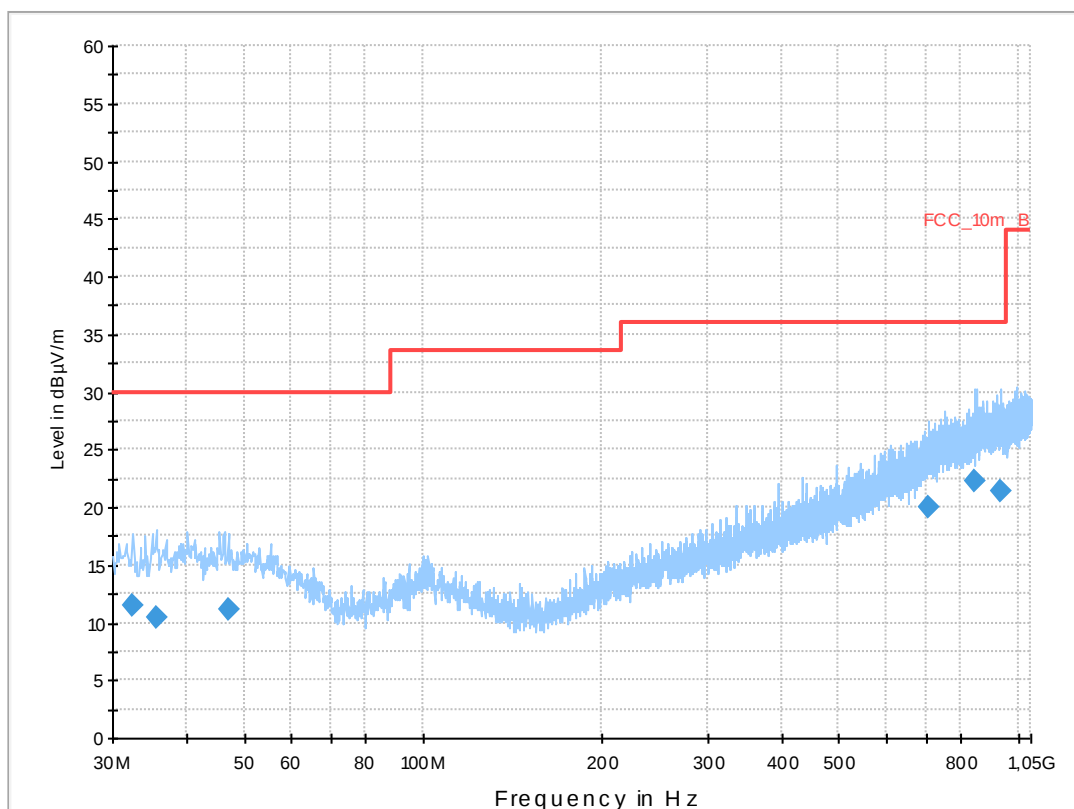
Common Information

EUT: RFW121LW
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: TX WLAN n-mode, 6 Mbit/s, Ch. 157
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

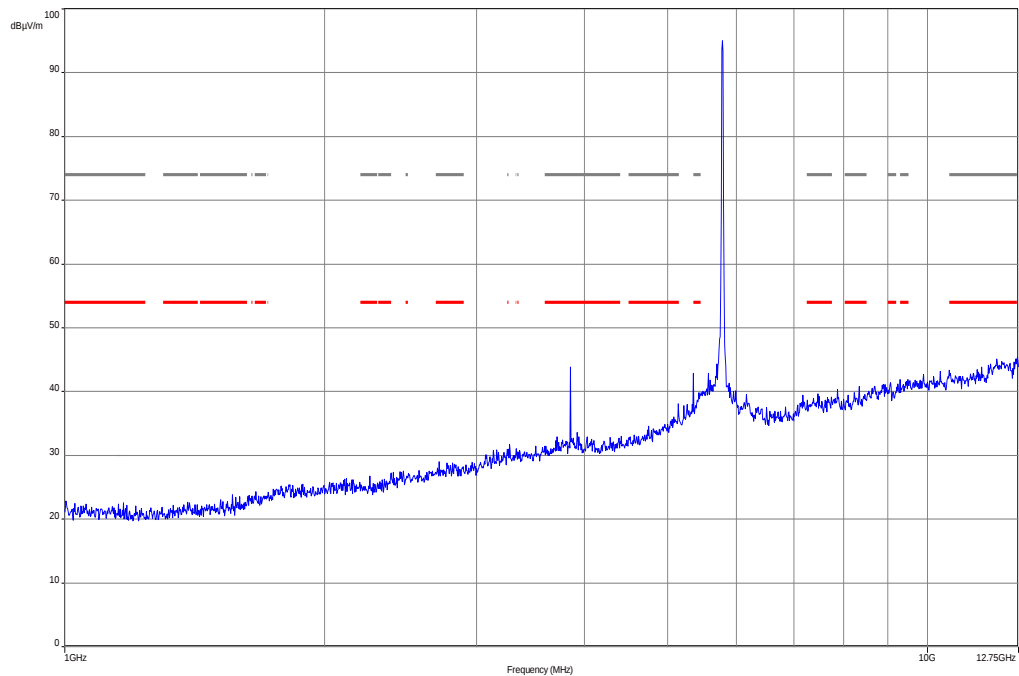
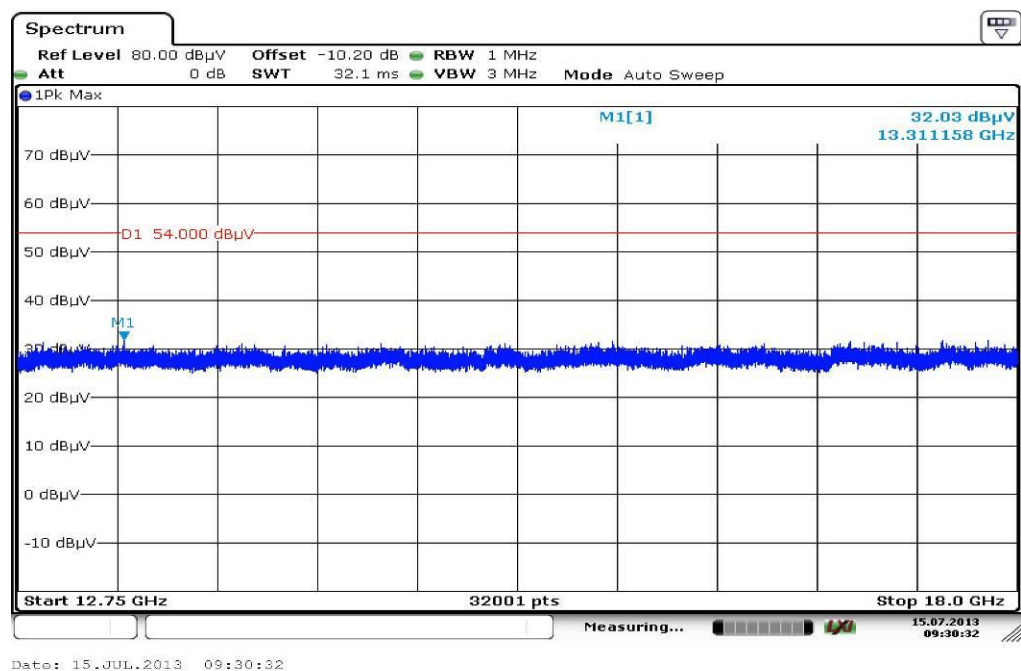
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

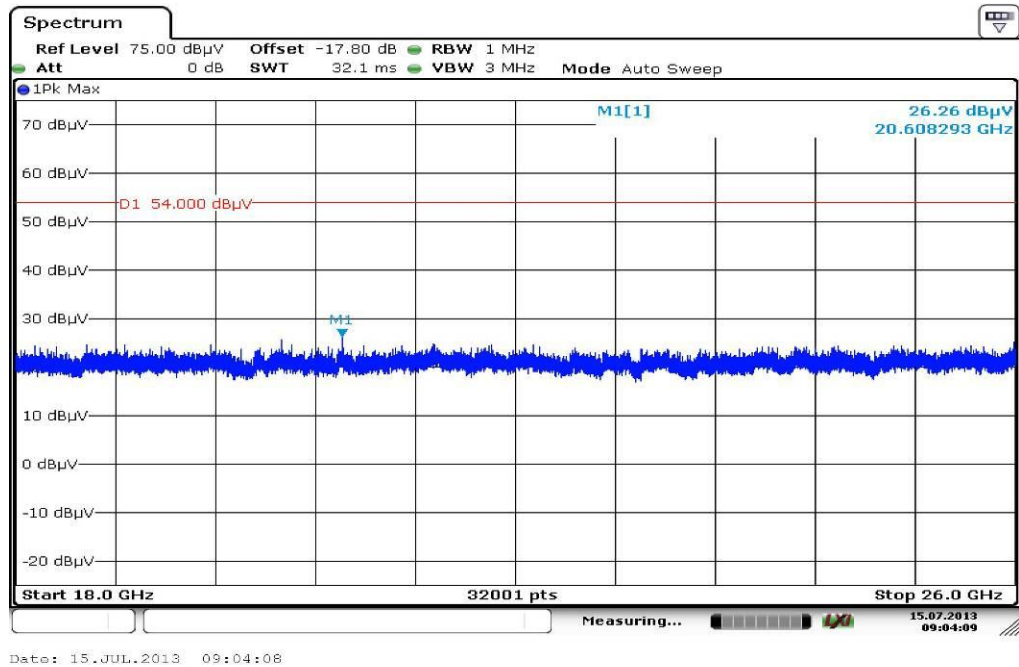
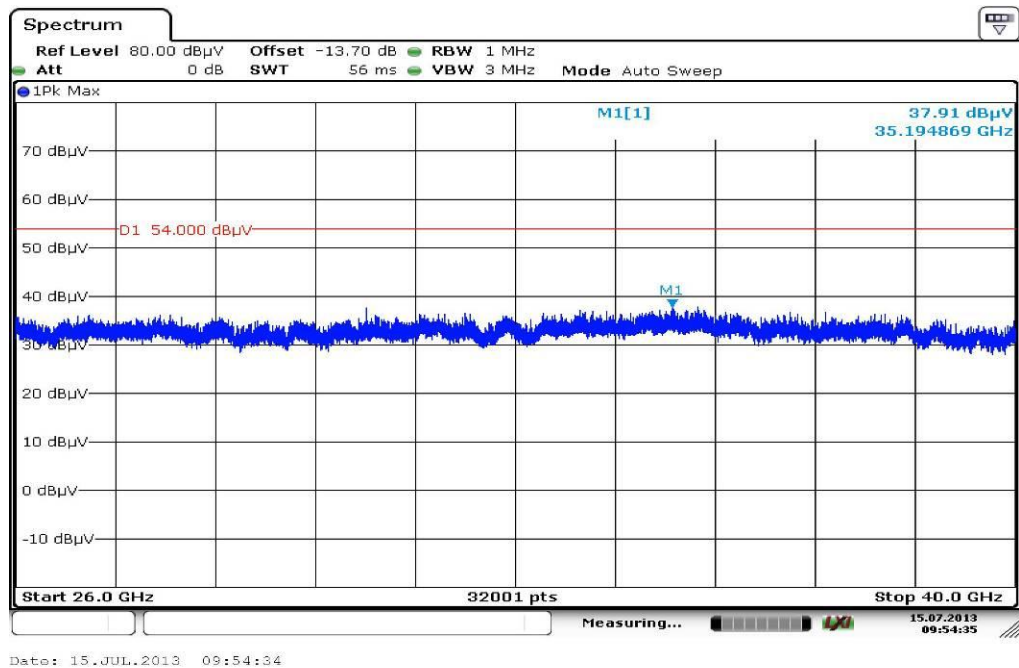
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



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
32.422500	11.5	1000.0	120.000	262.0	H	34.0	12.8	18.5	30.0	
35.482500	10.4	1000.0	120.000	105.0	V	93.0	13.1	19.6	30.0	
47.085000	11.1	1000.0	120.000	202.0	H	241.0	13.3	18.9	30.0	
708.245850	20.1	1000.0	120.000	152.0	V	-5.0	22.7	15.9	36.0	
843.832500	22.3	1000.0	120.000	123.0	V	172.0	24.5	7.7	36.0	
935.505000	21.4	1000.0	120.000	183.0	V	102.0	25.3	8.6	36.0	

Plot 7: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization**Plot 8:** Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

Plot 9: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization**Plot 10:** Middle channel, 26 GHz to 40 GHz, vertical & horizontal polarization

Plot 11: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

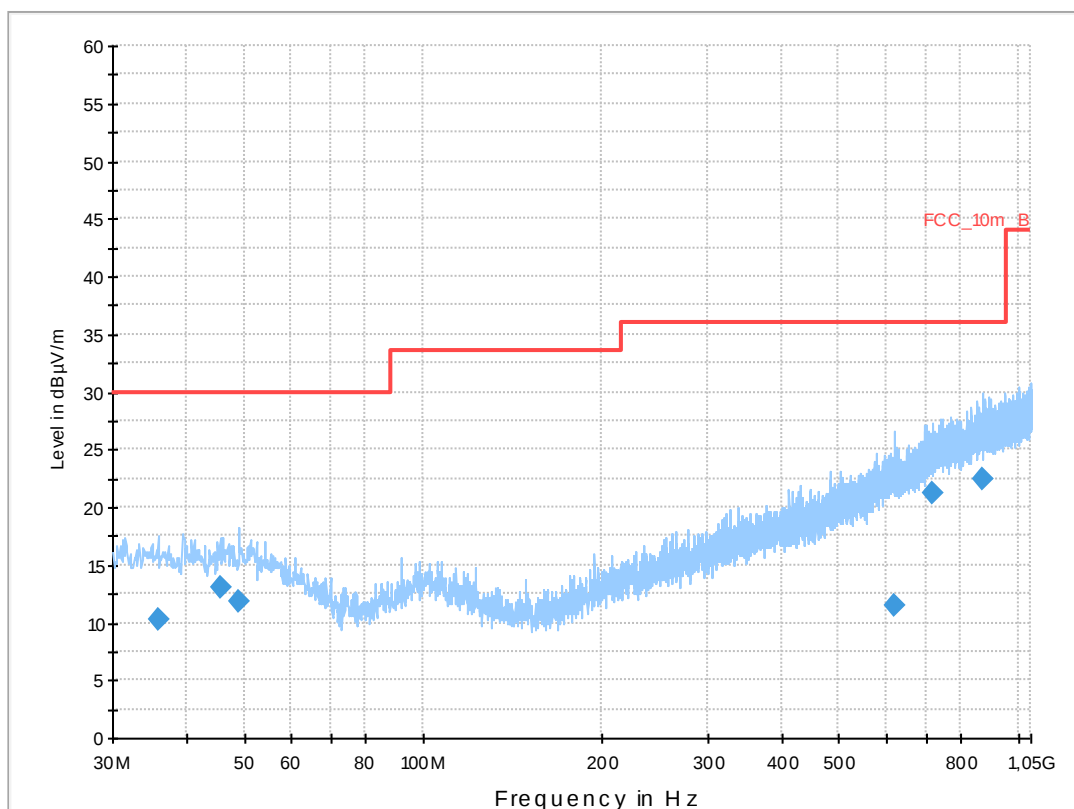
Common Information

EUT: RFW121LW
 Serial Number: IMEI: 004402242380297
 Test Description: FCC part 15 class B
 Operating Conditions: TX WLAN n-mode, 6 Mbit/s, Ch. 165
 Operator Name: Hennemann
 Comment: battery powered

Scan Setup: STAN_Fin [EMI radiated]

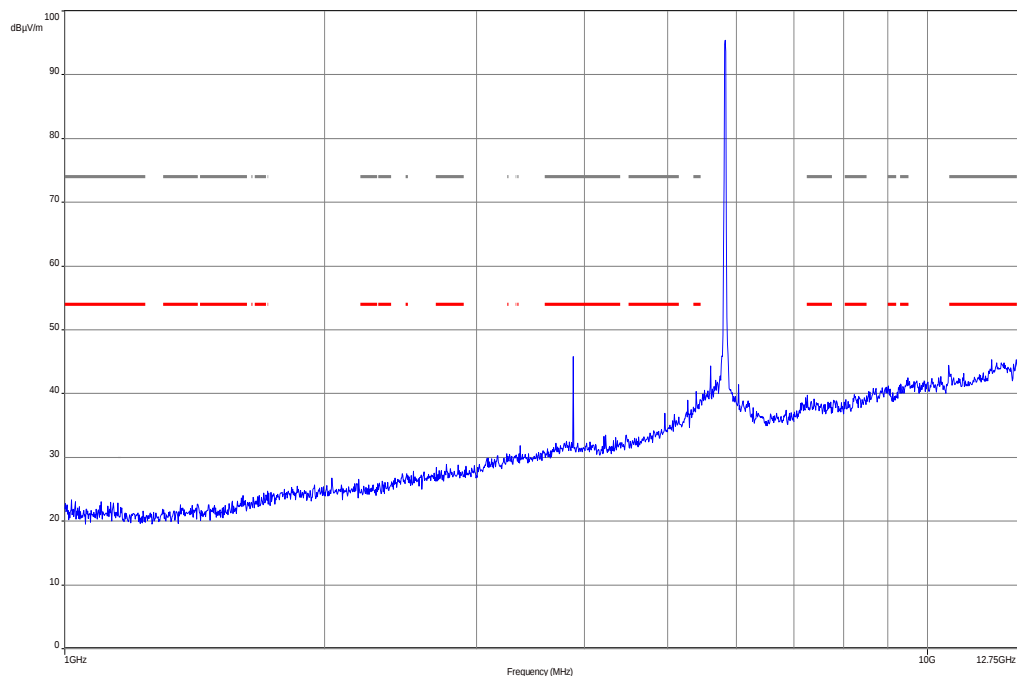
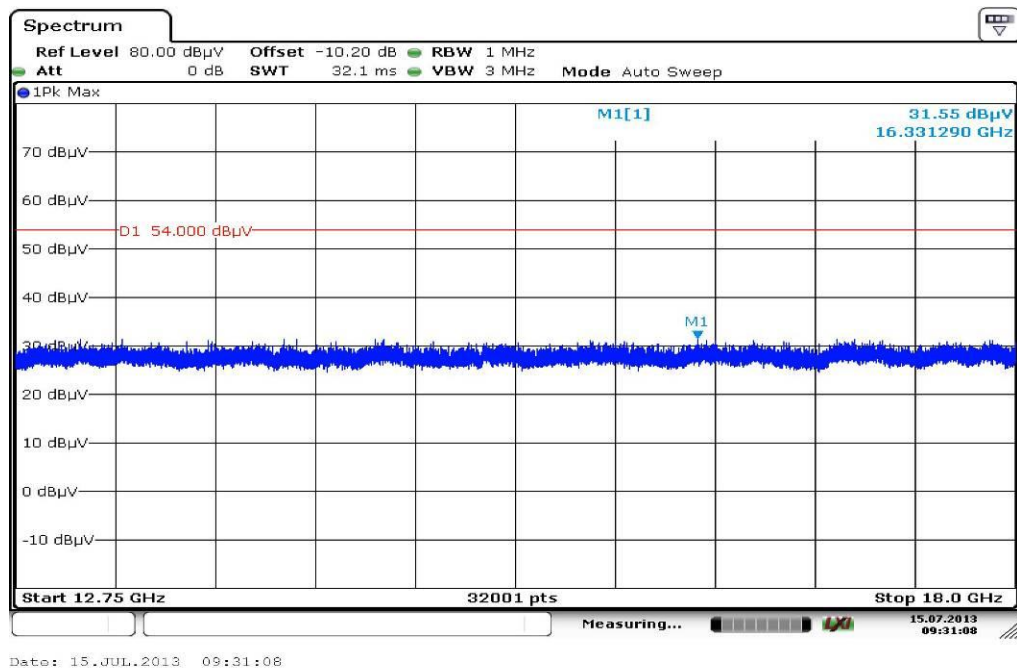
Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dB μ V/m

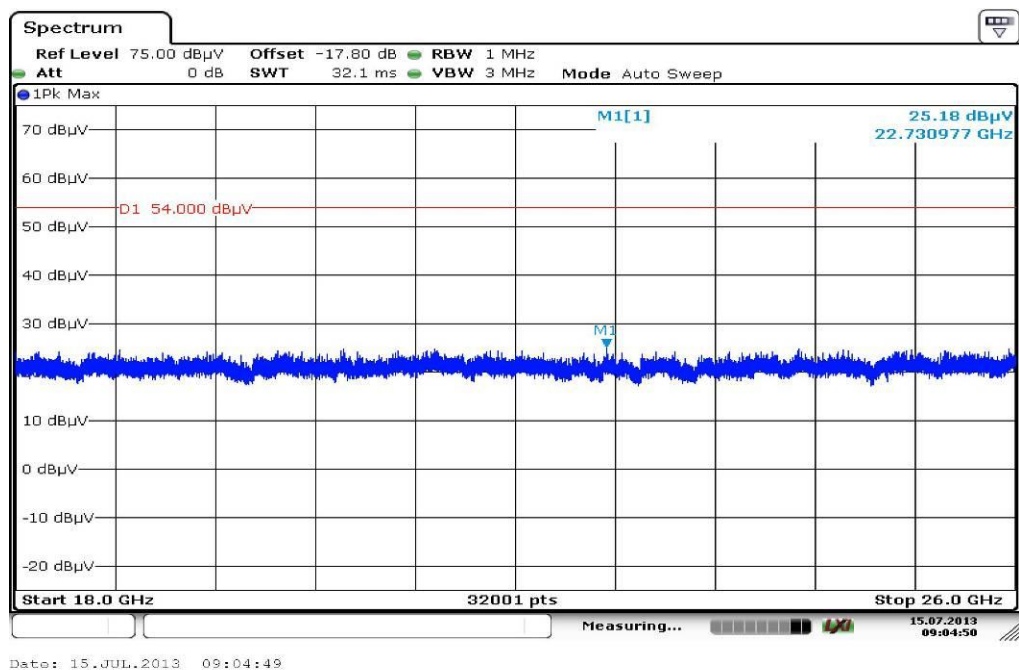
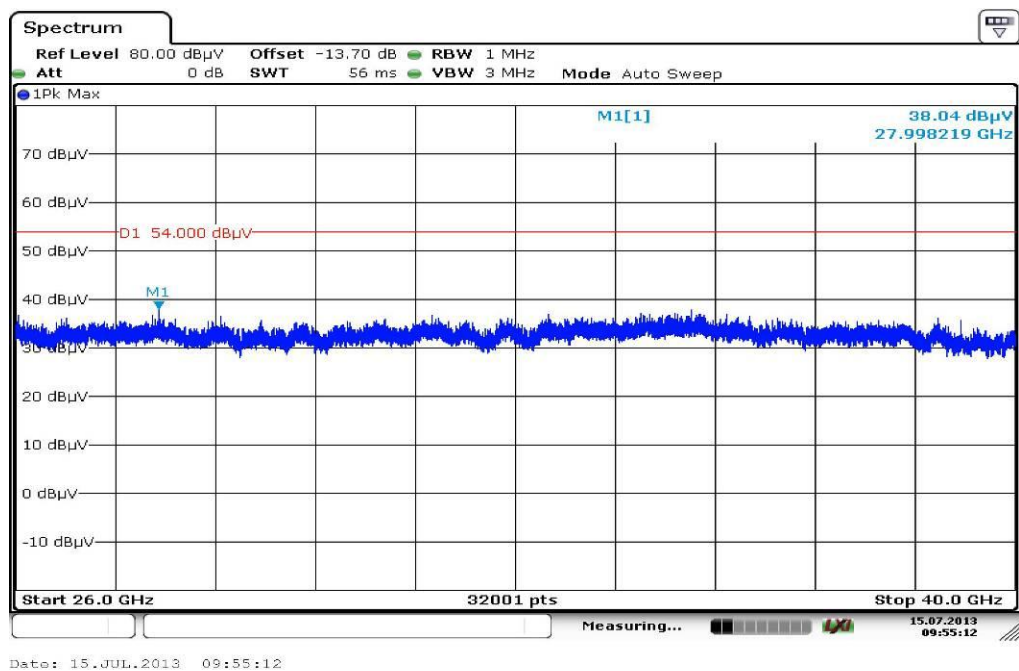
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



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
35.737500	10.2	1000.0	120.000	233.0	H	307.0	13.1	19.8	30.0	
45.555000	13.0	1000.0	120.000	212.0	V	192.0	13.3	17.0	30.0	
48.780000	11.9	1000.0	120.000	176.0	V	271.0	13.3	18.1	30.0	
618.795000	11.4	1000.0	120.000	143.0	V	97.0	20.9	14.6	36.0	
719.137500	21.2	1000.0	120.000	114.0	H	13.0	23.0	14.8	36.0	
871.699500	22.4	1000.0	120.000	132.0	H	-15.0	24.8	13.6	36.0	

Plot 12: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization**Plot 13:** Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization

Plot 14: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization**Plot 15:** Highest channel, 26 GHz to 40 GHz, vertical & horizontal polarization

10.10 RX spurious emissions radiated

Not performed! Tests according to manufacturer tests plan!

10.11 Spurious emissions radiated < 30 MHz

Not performed! Tests according to manufacturer tests plan!

10.12 Spurious emissions conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to mid channel. If peaks are found the lowest channel and the highest channel will be measured too. The measurement is performed with the data rate producing the highest output power. Both power lines, phase and neutral line, are measured. Found peaks are re-measured with average and quasi peak detection to show compliance to the limits.

Measurement:

Measurement parameter	
Detector:	Peak - Quasi Peak / Average
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

Limits:

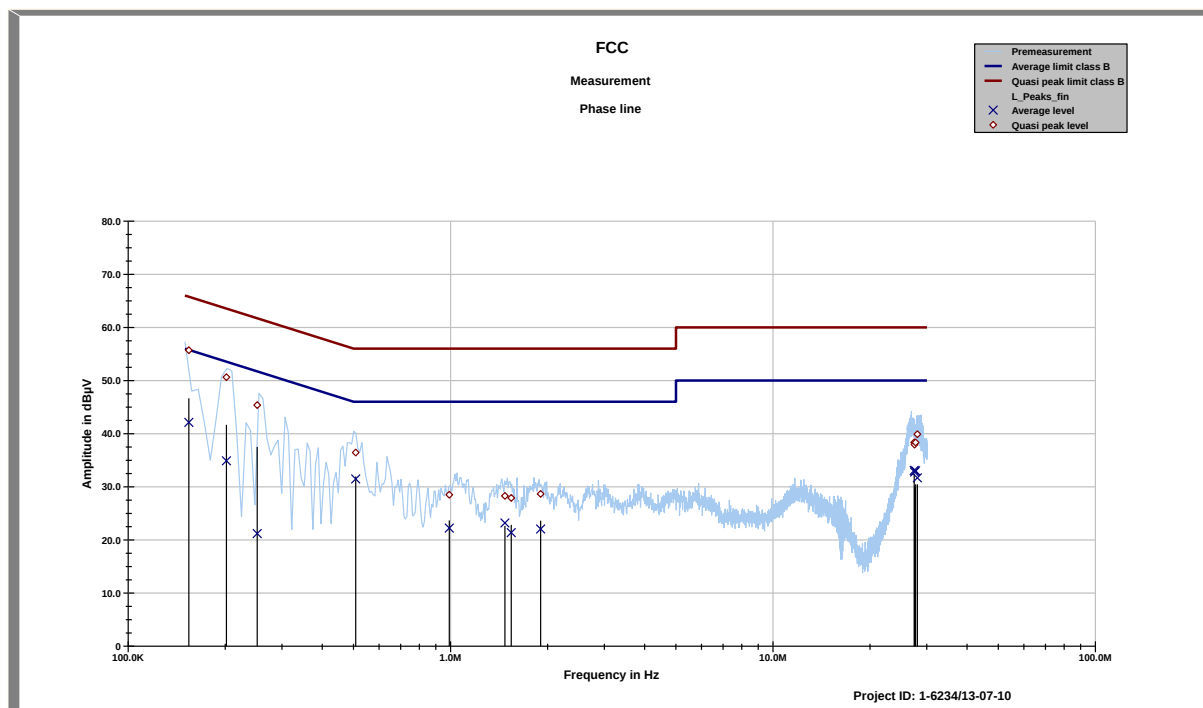
FCC		
TX Spurious Emissions Conducted < 30 MHz		
Frequency (MHz)	Quasi-Peak (dBμV/m)	Average (dBμV/m)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30.0	60	50

*Decreases with the logarithm of the frequency

Results:

TX Spurious Emissions Conducted < 30 MHz [dBμV/m]		
F [MHz]	Detector	Level [dBμV/m]
No peaks detected. All detected peak values are below the average limits.		
Measurement uncertainty	± 3 dB	

Result: Passed

Plots:**Plot 1:** TX mode, 150 kHz to 30 MHz, phase line

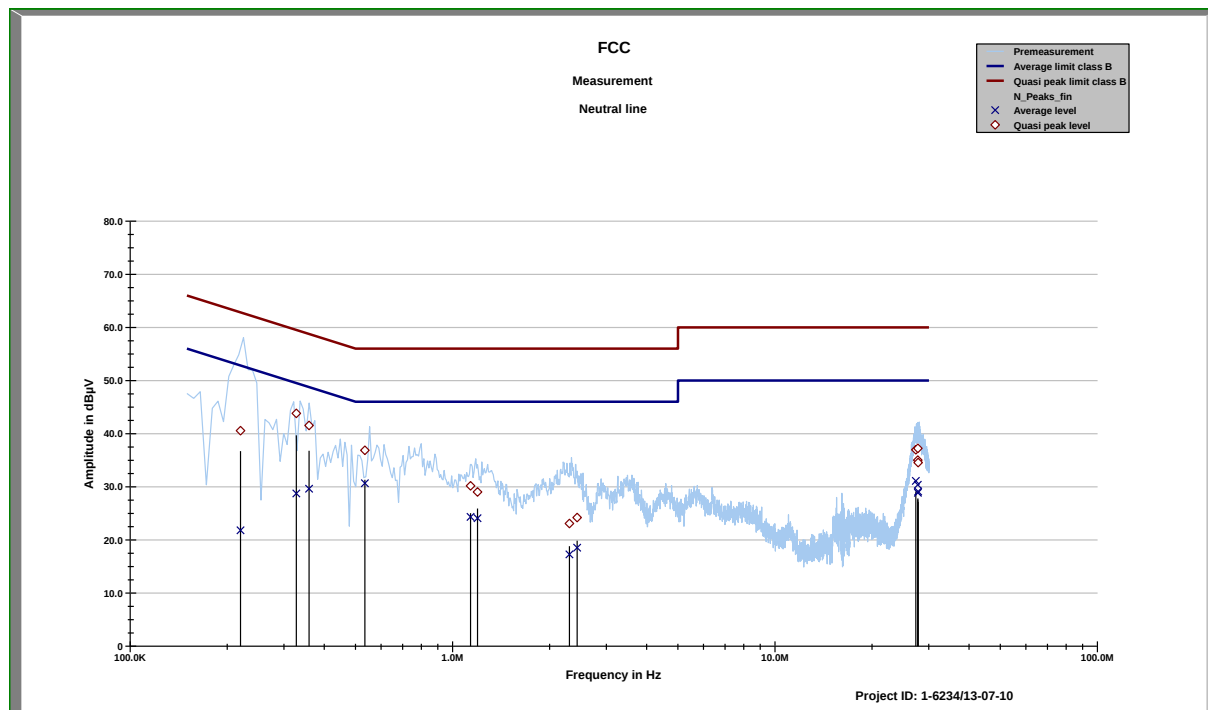
FCC
Phase line tbl

Project ID: 1-6234/13-07-10

03:25:37 PM, Tuesday, July 16, 2013

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.15421	55.70	10.07	42.13	13.75
0.20171	50.64	12.90	34.88	19.64
0.25126	45.37	16.35	21.19	31.92
0.50776	36.44	19.56	31.47	14.53
0.99041	28.51	27.49	22.23	23.77
1.4739	28.28	27.72	23.18	22.82
1.5418	27.90	28.10	21.37	24.63
1.9016	28.65	27.35	22.05	23.95
27.385	38.34	21.66	33.09	16.91
27.46	37.94	22.06	32.77	17.23
27.675	38.34	21.66	33.01	16.99
28.01	39.90	20.10	31.69	18.31

Project ID - 1-6234/13-07-10
 EUT - RFW121LW + HS3 + CH3 + USB5 + EBC
 Serial Number - IMEI: 004402242380297
 Operating mode - WLAN a-mode TX + charging

Plot 2: TX mode, 150 kHz to 30 MHz, neutral line

FCC
Neutral line tbl

Project ID: 1-6234/13-07-10

03:25:37 PM, Tuesday, July 16, 2013

Frequency	Quasi peak level	Margin quasi peak	Average level	Margin average
MHz	dBµV	dBµV	dBµV	dBµV
0.21999	40.56	22.26	21.80	32.20
0.32751	43.82	15.70	28.74	22.19
0.3589	41.55	17.21	29.64	20.40
0.53453	36.87	19.13	30.66	15.34
1.13651	30.17	25.83	24.33	21.67
1.19439	29.02	26.98	24.08	21.92
2.3032	23.08	32.92	17.28	28.72
2.4326	24.21	31.79	18.54	27.46
27.329	36.97	23.03	31.10	18.90
27.706	35.01	24.99	30.37	19.63
27.716	37.24	22.76	28.87	21.13
27.77	34.55	25.45	29.12	20.88

Project ID - 1-6234/13-07-10
 EUT - RFW121LW + HS3 + CH3 + USB5 + EBC
 Serial Number - IMEI: 004402242380297
 Operating mode - WLAN a-mode TX + charging

11 Test equipment and ancillaries used for tests

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	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	14.07.2013	14.07.2015
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.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	12.04.2012	12.04.2014
11	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	16.01.2013	16.01.2014
12	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKII	08.05.2013	08.05.2015
13	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
14	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2012	06.01.2014
15	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
16	9	Isolating Transformer	MPL IEC625 Bus Regeltrennt ravo	Erfi	91350	300001155	ne		
17	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
18	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
19	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014
20	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
21	A025	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda		300000786	ne		
22	A027	Std. Gain Horn	638	Narda		300000486	ne		

		Antenna 18.0 to 26.5 GHz							
23	n. a.	Std. Gain Horn Antenna 26.5-40.0 GHz	V637	Narda	7911	300001752	ne		
24	n. a.	Broadband Low Noise Amplifier 18-50 GHz	CBL18503 070-XX	CERNEX	19338	300004273	ne		
25	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.10.2012	22.10.2013

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlk!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

12 Observations

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

Annex A Document history

Version	Applied changes	Date of release
1.0	Initial release	2013-08-12
-A	Editorial changes	2013-08-16

Annex B Further information**Glossary**

AVG	-	Average
DUT	-	Device under test
EMC	-	Electromagnetic Compatibility
EN	-	European Standard
EUT	-	Equipment under test
ETSI	-	European Telecommunications Standard Institute
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
Inv. No.	-	Inventory number
N/A	-	Not applicable
PP	-	Positive peak
QP	-	Quasi peak
S/N	-	Serial number
SW	-	Software

Annex C Accreditation Certificate

Front side of certificate



Deutsche Akkreditierungsstelle GmbH

Befähigung gemäß § 8 Absatz 1 AkkStelleG i.V.m. § 1 Absatz 1 AkkStelleGBV
Unterzeichnerin der Multilateralen Abkommen
von EA, ILAC und IAF zur gegenseitigen Anerkennung

Akkreditierung



Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

CETECOM ICT Services GmbH
Untertürkheimer Straße 6-10, 66117 Saarbrücken

die Kompetenz nach DIN EN ISO/IEC 17025:2005 besitzt, Prüfungen in folgenden Bereichen durchzuführen:

Drahtgebundene Kommunikation einschließlich xDSL
VoIP und DECT
Akustik
Funk einschließlich WLAN
Short Range Devices (SRD)
RFID
WiMax und Richtfunk
Mobilfunk (GSM / DCS, Over the Air (OTA) Performance)
Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
Produktsicherheit
SAR und Hearing Aid Compatibility (HAC)
Umweltsimulation
Smart Card Terminals
Bluetooth
Wi-Fi Services

Die Akkreditierungsurkunde gilt nur in Verbindung mit dem Bescheid vom 18.01.2013 mit der Akkreditierungsnummer D-PL-12076-01 und ist gültig 17.01.2018. Sie besteht aus diesem Deckblatt, der Rückseite des Deckblatts und der folgenden Anlage mit insgesamt 80 Seiten.

Registrierungsnummer der Urkunde: D-PL-12076-01-01

Frankfurt am Main, 18.01.2013
Seite 1 von 1 auf der Rückseite

Im Auftrag
Ulrich Pöhl, Abteilungsleiter

Back side of certificate

Deutsche Akkreditierungsstelle GmbH

Standort Berlin
Spittelmarkt 10
10117 Berlin

Standort Frankfurt am Main
Gartenstraße 6
60594 Frankfurt am Main

Standort Braunschweig
Rundellallee 100
38116 Braunschweig

Die auszugsweise Veröffentlichung der Akkreditierungsurkunde bedarf der vorherigen schriftlichen Zustimmung der Deutschen Akkreditierungsstelle GmbH (DAKKS). Ausgenommen davon ist die separate Weiterverbreitung des Deckblatts durch die umseitig genannte Konformitätsbewertungsstelle in unveränderter Form.

Es darf nicht der Anschein erweckt werden, dass sich die Akkreditierung auch auf Bereiche erstreckt, die über den durch die DAKKS bestätigten Akkreditierungsbereich hinausgehen.

Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom 31. Juli 2009 (BGBl. I S. 2675) sowie der Verordnung (EG) Nr. 765/2008 des Europäischen Parlaments und des Rates vom 9. Juli 2008 über die Vorschriften für die Akkreditierung und Marktüberwachung im Zusammenhang mit der Vermarktung von Produkten (Abt. L 218 vom 9. Juli 2008, S. 30). Die DAKKS ist Unterzeichnerin der Multilateralen Abkommen zur gegenseitigen Anerkennung der European co-operation for Accreditation (EA), des International Accreditation Forum (IAF) und der International Laboratory Accreditation Cooperation (ILAC). Die Unterzeichner dieser Abkommen erkennen ihre Akkreditierungen gegenseitig an.

Der aktuelle Stand der Mitgliedschaft kann folgenden Webseiten entnommen werden:

EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

Note:

The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.

<http://www.cetecom.com/eu/de/cetecom-group/europa/deutschland-saarbruecken/akkreditierungen.html>