

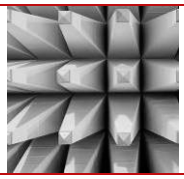

CETECOM™
CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Test report no.: 1-5863/13-02-05-B

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

Testing laboratory

CETECOM ICT Services GmbH
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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

Roche Diagnostics GmbH
Sandhofer Str. 116
68305 Mannheim / GERMANY
Phone: +49 621 759-3409
Contact: Andreas Heinrich
e-mail: andreas.heinrich@roche.com
Phone: +49 621 759-4528

Manufacturer

Roche Diagnostics GmbH
Sandhofer Str. 116
68305 Mannheim / GERMANY

Test standard/s

47 CFR Part 15	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

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

Test Item

Kind of test item:	**W-LAN b/g module**
Model name:	**HBM4**
FCC ID:	**VO9UU18**
IC:	**3100A-UU18**
Frequency:	ISM band 2400 MHz to 2483.5 MHz (lowest channel 01 – 2412 MHz, highest channel 11 – 2462 MHz)
Technology tested:	WLAN
Antenna:	Integrated chip antenna
Power supply:	3.7 V DC by Li Ion Battery
Temperature range:	+5°C to +40°C

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:

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Stefan Bös
Senior Testing Manager

Test performed:

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2013.12.11 11:40:13 +01'00'

Tobias Wittenmeier
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:	2013-03-13
Date of receipt of test item:	2013-06-19
Start of test:	2013-06-19
End of test:	2013-06-27
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	01.10.2010	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	01.12.2010	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

4 Test environment

Temperature:	T_{nom}	+22 °C	during room temperature tests
	T_{max}	+40 °C	during high temperature tests
	T_{min}	+5 °C	during low temperature tests
Relative humidity content:		55 %	
Barometric pressure:		not relevant for this kind of testing	
Power supply:	V_{nom}	3.7 V	DC by Li Ion Battery
	V_{max}	4.1 V	
	V_{min}	3.3 V	

5 Test item

Kind of test item	**:**	**W-LAN b/g module**
Type identification	**:**	**HBM4**
S/N serial number	**:**	**Prototype**
HW hardware status	**:**	**Unknown**
SW software status	**:**	**Unknown**
Frequency band [MHz]	**:**	**ISM band 2400 MHz to 2483.5 MHz** **(lowest channel 01 – 2412 MHz, highest channel 11 – 2462 MHz)**
Type of radio transmission **Use of frequency spectrum**	**:** **:**	**DSSS, OFDM**
Type of modulation	**:**	**BPSK, QPSK, 16 – QAM & 64 – QAM**
Number of channels	**:**	**11**
Antenna	**:**	**Integrated chip antenna**
Power supply	**:**	**3.7 V DC by Li Ion Battery**
Temperature range	**:**	**+5°C to +40°C**

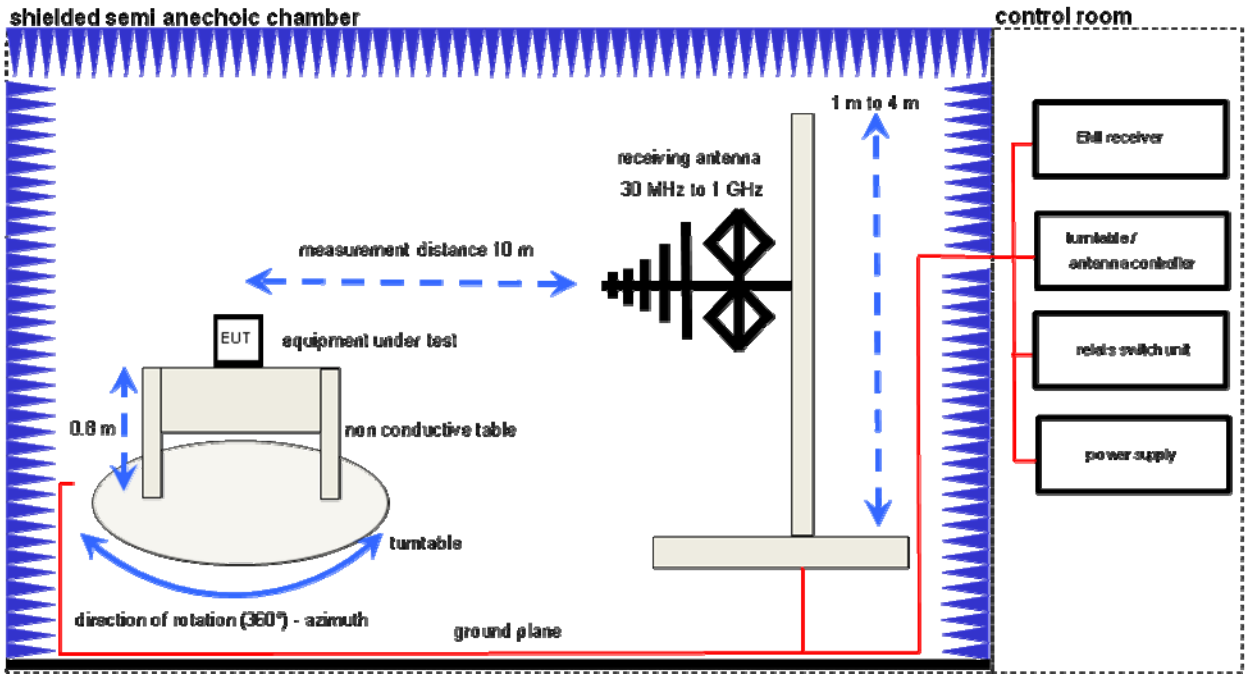
6 Test laboratories sub-contracted

None

7 Description of the test setup (WLAN 2.4 GHz FCC)

7.1 Radiated measurements chamber F

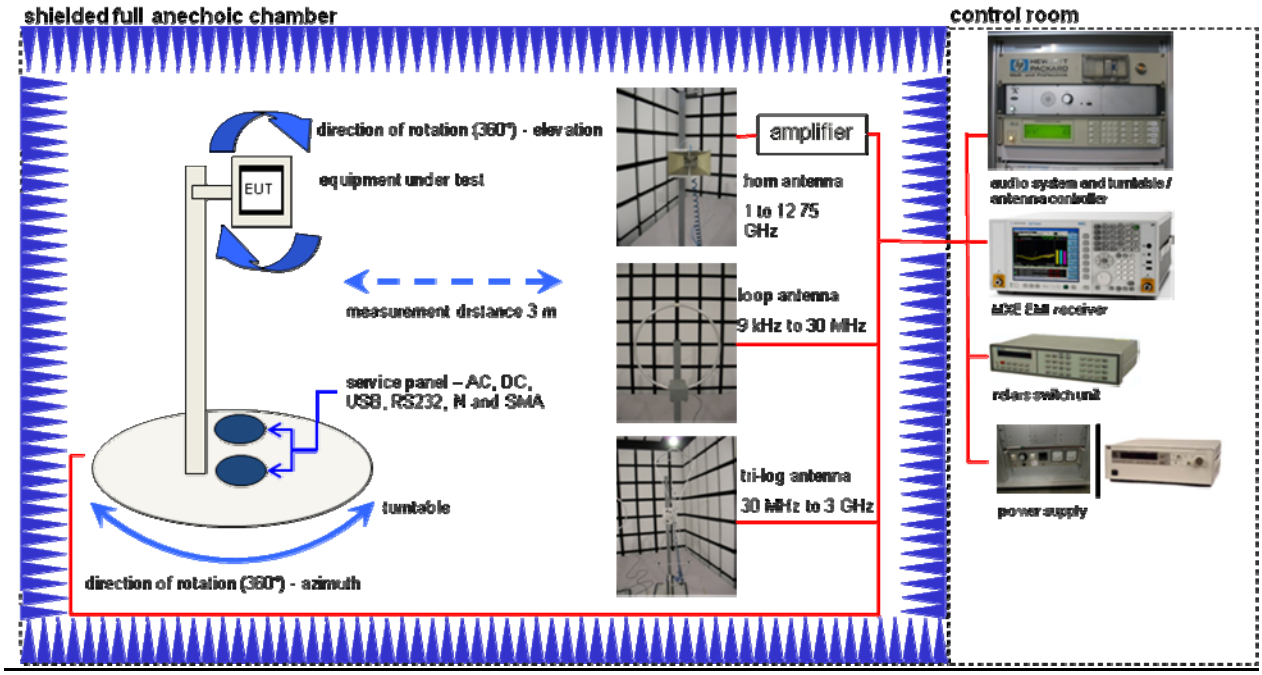
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas 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:

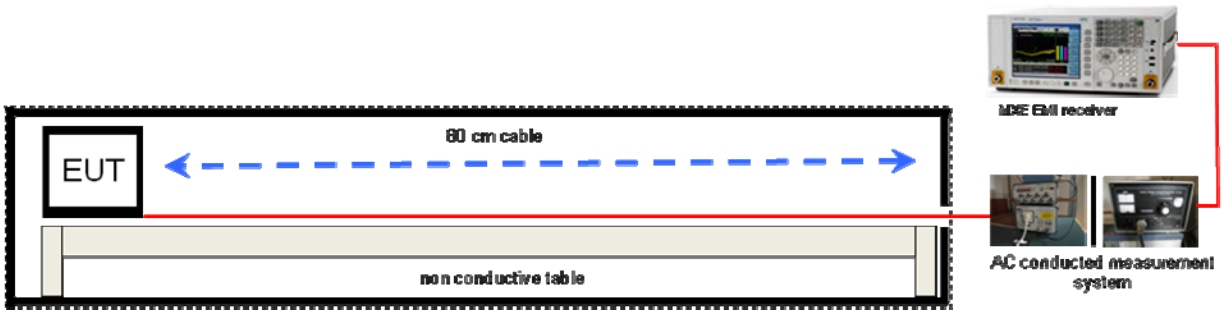
Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854
Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351
Highpass 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

7.3 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
Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443
Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517

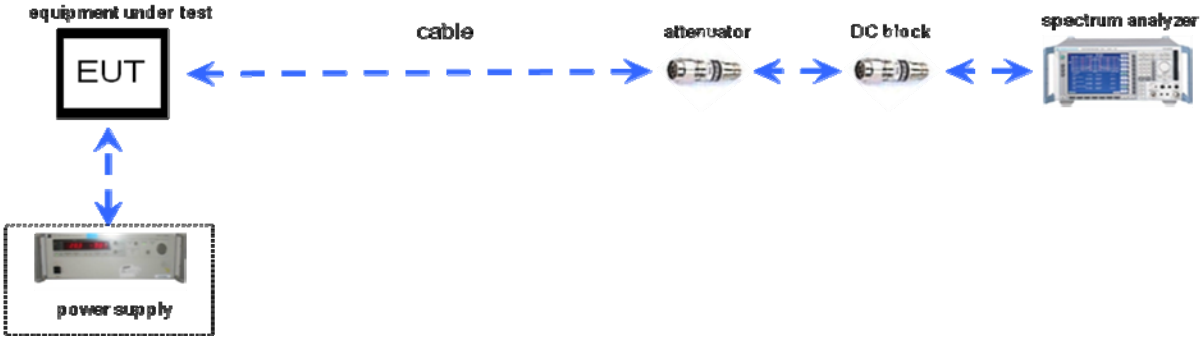
7.4 AC conducted



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

7.5 Conducted measurements



Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Signal Analyzer 50 GHz	FSU50	R&S	1166.1660.50	300003443

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 RSS 210, Issue 8	Passed	2013-12-11	-/-

Test specification clause	Test case	Guideline	Temperature conditions	Power source voltages	Mode	Pass	Fail	NA	NP	Remark
§15.247(b)(4) RSS 210 / A8.4(2)	Antenna gain	-/-	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.247(e) RSS 210 / A8.2(b)	Power spectral density	KDB 558074 DTS clause: 10.2	Nominal	Nominal	DSSS OFDM g	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth – 6 dB bandwidth	KDB 558074 DTS clause: 8.2	Nominal	Nominal	DSSS OFDM g	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
RSS Gen clause 4.6.1	Occupied bandwidth	-/-	Nominal	Nominal	DSSS OFDM g	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(b)(3) RSS-210 / A8.4(4)	Maximum output power	KDB 558074 DTS clause: 9.1.2	Nominal	Nominal	DSSS OFDM g	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted	KDB 558074 DTS clause: 13.2.1	Nominal	Nominal	DSSS OFDM g	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.205 RSS-210 / A8.5	Band edge compliance radiated	-/-	Nominal	Nominal	DSSS OFDM g	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	KDB 558074 DTS clause: 11.1 & 11.2	Nominal	Nominal	DSSS OFDM g	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	-/-	Nominal	Nominal	DSSS OFDM g	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.109 RSS-Gen	RX spurious emissions radiated	-/-	Nominal	Nominal	-/-	☒	☐	☐	☐	complies
§15.209(a) RSS-Gen	TX spurious emissions radiated < 30 MHz	-/-	Nominal	Nominal	DSSS OFDM g	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.107(a)	Conducted emissions < 30 MHz	-/-	Nominal	Nominal	DSSS OFDM g	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies

Note: NA = Not Applicable; NP = Not Performed

9 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: For radiated tests the module was built into a plastic housing

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 RSP100 test report cover sheet / performance test data

Test report number	**:**	**1-5863/13-02-05-B**		
Equipment model number:		**HBM4**		
Certification number	**:**	**3100A-UU18**		
Manufacturer (complete address)	**:**	**Roche Diagnostics GmbH Sandhofer Str. 116 68305 Mannheim / GERMANY**		
Tested to radio standards specification no.	**:**	**RSS 210, Issue 8**		
Open area test site IC No.	**:**	**IC 3462C-1**		
Frequency range	**:**	**ISM band 2400 MHz to 2483.5 MHz**		
RF-power (max.)	**:**	**Conducted values:**		
		Band	**b – mode**	**g – mode**
		2412 – 2462 MHz	**58.61 mW**	**45.19 mW**
		2422 – 2462 MHz		
		Radiated values:		
		Band	**b – mode**	**g – mode**
		2412 – 2462 MHz	**92.47 mW**	**71.29 mW**
		2422 – 2462 MHz		
Occupied bandwidth (99%-BW)	**:**	**Band**	**b – mode**	**g – mode**
		2412 – 2462 MHz	**15.4 MHz**	**19.4 MHz**
		2422 – 2462 MHz		
Necessary bandwidth (calculated)	**:**	**Band**	**b – mode**	**g – mode**
		2412 – 2462 MHz	**12.8 MHz**	**16.88 MHz**
		2422 – 2462 MHz		
Emission classification	**:**	**(according TRC-43)**	**15M4G1D**	**19M4G7D**
Type of modulation	**:**	**DSSS & OFDM technology with BPSK, QPSK, 16 QAM modulation.**		
Antenna information	**:**	**Integrated chip antenna**		
Transmitter spurious [dBµV/m @ 3m]	**:**	**50.2 @ 4874 MHz (AVG)**		

ATTESTATION:
DECLARATION OF COMPLIANCE:

I attest that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Laboratory manager:

2013-12-11	**Tobias Wittenmeier**	cn=Tobias Wittenmeier, o=CETECOM ICT Services GmbH, ou=WIT-111222, email=tobias.wittenmeier@cetecom.com, c=DE 2013.12.11 11:41:27 +01'00'
Date	Name	Signature

11 Measurement results

11.1 Antenna gain

Measurement:

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For normal WLAN devices, the DSSS mode is used.

Measurement parameters:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	3 MHz
Video bandwidth:	3 MHz
Trace-Mode:	Max hold

Limits:

FCC	IC
Antenna Gain	
6 dBi	

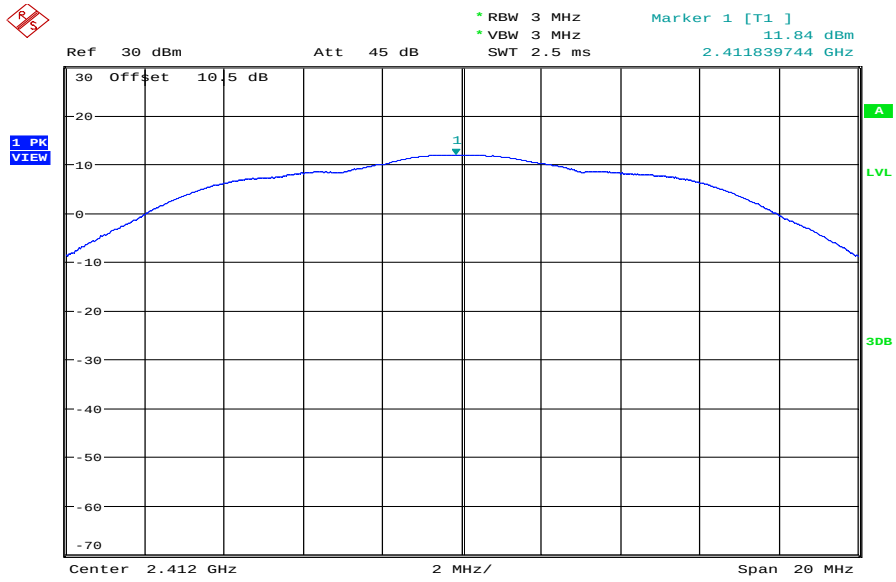
Results:

T_{nom}	V_{nom}	lowest channel 2412 MHz	middle channel 2437 MHz	highest channel 2462 MHz
Conducted power [dBm] Measured with DSSS modulation		11.84	11.61	11.49
Radiated power [dBm] Measured with DSSS modulation		13.82	13.39	13.19
Gain [dBi] Calculated		1.98	1.78	1.70
Measurement uncertainty		± 1.5 dB (cond.) / ± 3 dB (rad.)		

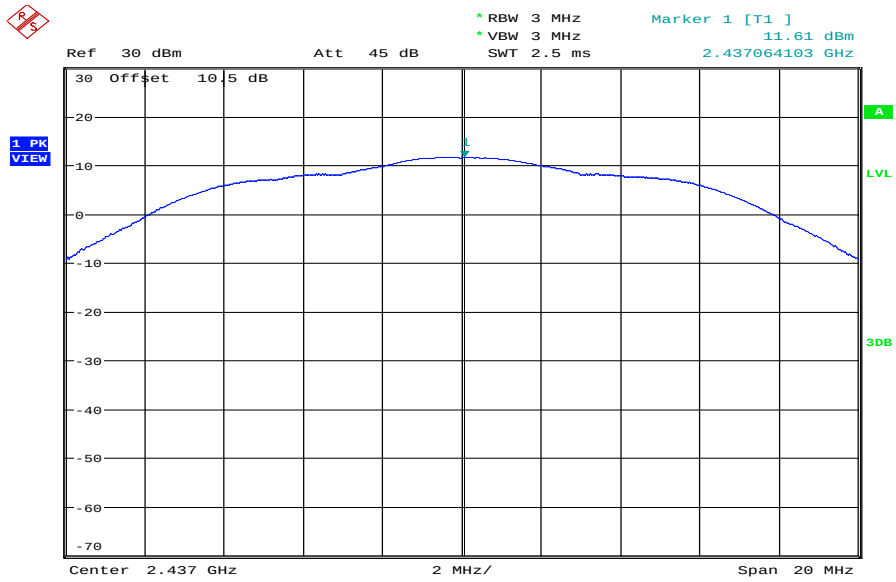
Result: Passed

Plots: DSSS / b – mode

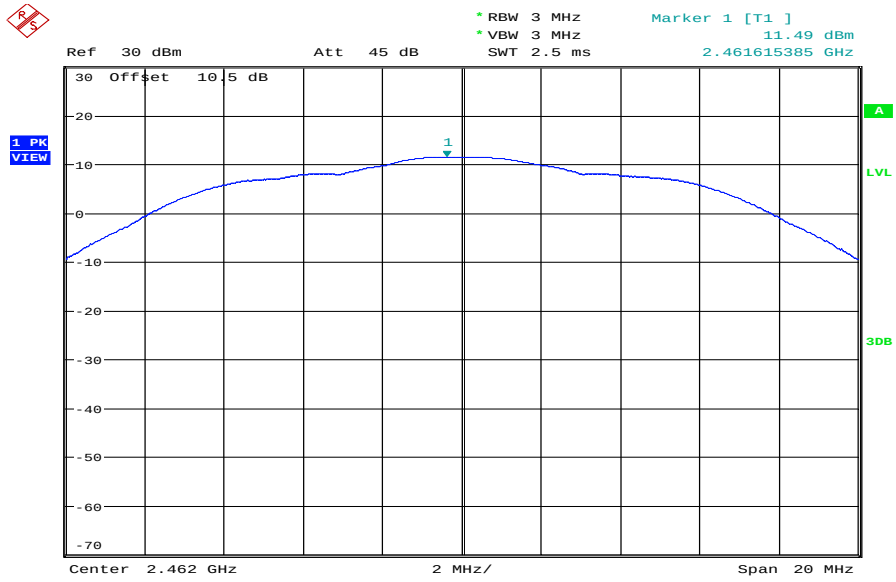
Plot 1: TX mode, lowest channel



Plot 2: TX mode, middle channel



Plot 3: TX mode, highest channel



11.2 Maximum output power

Description:

Measurement of the maximum output power conducted and radiated. The measurements are performed using the data rate producing the highest conducted output power.

Measurement:

Measurement parameter	
According to DTS clause: 9.1.2	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Span:	40 MHz
Integration bandwidth:	75 % power - bandwidth (DTS BW)
Trace-Mode:	Max hold (allow trace to fully stabilize)
Measurement function:	Channel power with DTS BW

Limits:

FCC	IC
Maximum Output Power	
Conducted: 1.0 W – Antenna Gain max. 6 dBi	

Results: DSSS / b – mode

DSSS / b – mode	Maximum Output Power [dBm]		
Frequency	2412 MHz	2437 MHz	2462 MHz
Peak output power conducted 1 MBit/s	14.36	14.23	13.86
Peak output power conducted 2 MBit/s	14.72	14.47	14.18
Peak output power conducted 5.5 MBit/s	16.55	16.37	16.03
Peak output power conducted 11 MBit/s	17.68	17.44	17.13
Output Power Radiated – EIRP*) Worst case	19.66	19.22	18.83
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: Passed

Results: OFDM / g – mode

OFDM / g – mode	Maximum Output Power [dBm]		
Frequency	2412 MHz	2437 MHz	2462 MHz
Peak output power conducted 6 MBit/s	16.11	15.85	15.37
Peak output power conducted 9 MBit/s	16.27	15.92	15.54
Peak output power conducted 12 MBit/s	16.13	16.20	15.61
Peak output power conducted 18 MBit/s	15.98	15.70	15.30
Peak output power conducted 24 MBit/s	16.42	16.06	15.82
Peak output power conducted 36 MBit/s	16.42	16.09	15.67
Peak output power conducted 48 MBit/s	16.55	16.13	15.88
Peak output power conducted 54 MBit/s	16.45	16.34	15.82
Peak output power conducted 72 MBit/s	10.74	10.34	9.96
Output Power Radiated – EIRP*) Worst case	18.53	18.12	17.58
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: **Passed**

11.3 Power spectral density

Description:

Measurement of the power spectral density of a digital modulated system. The measurement is repeated for both modulations at the lowest, middle and highest channel.

Measurement:

Measurement parameter	
According to DTS clause: 10.2	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	3 kHz
Video bandwidth:	10 kHz
Span:	40 MHz
Trace-Mode:	Max hold (allow trace to fully stabilize)

Limits:

FCC	IC
Power Spectral Density	
8 dBm (conducted)	

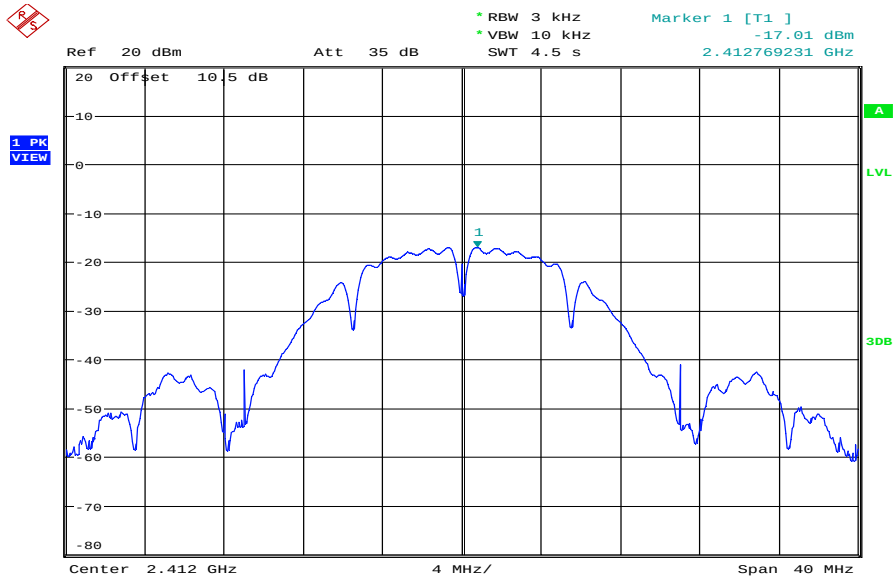
Results:

Modulation	Power Spectral density [dBm]		
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	-17.01	-17.35	-17.52
OFDM / g – mode	-16.36	-16.88	-17.64
Measurement uncertainty	± 1.5 dB		

Result: **Passed**

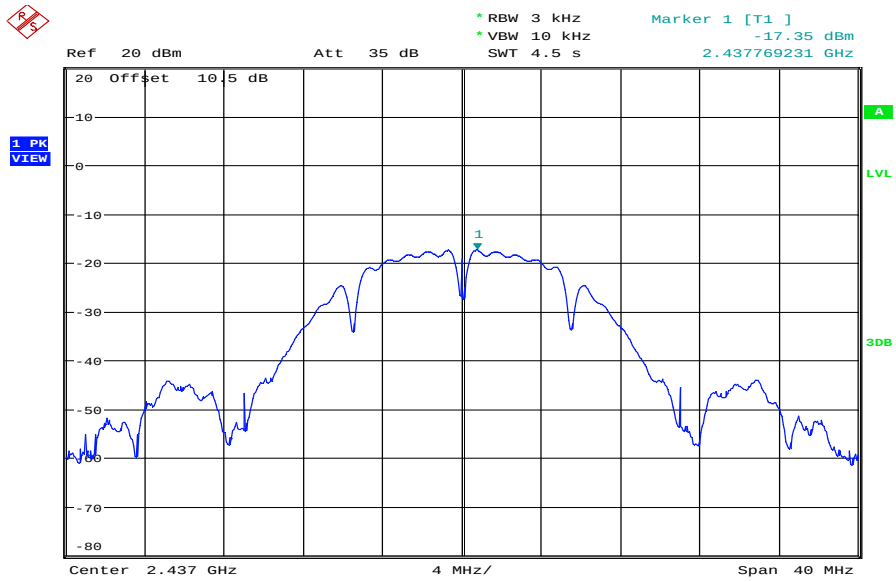
Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel



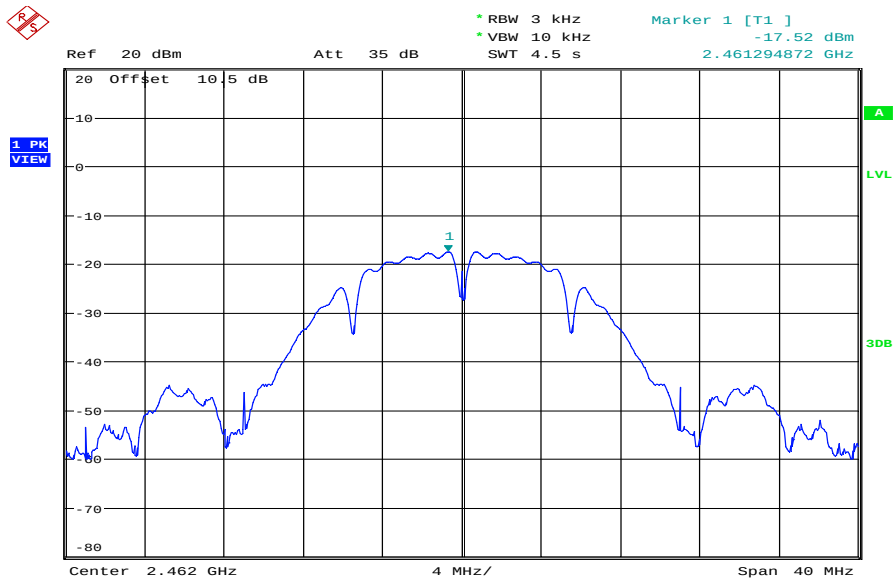
Date: 25.JUN.2013 14:51:30

Plot 2: TX mode, middle channel



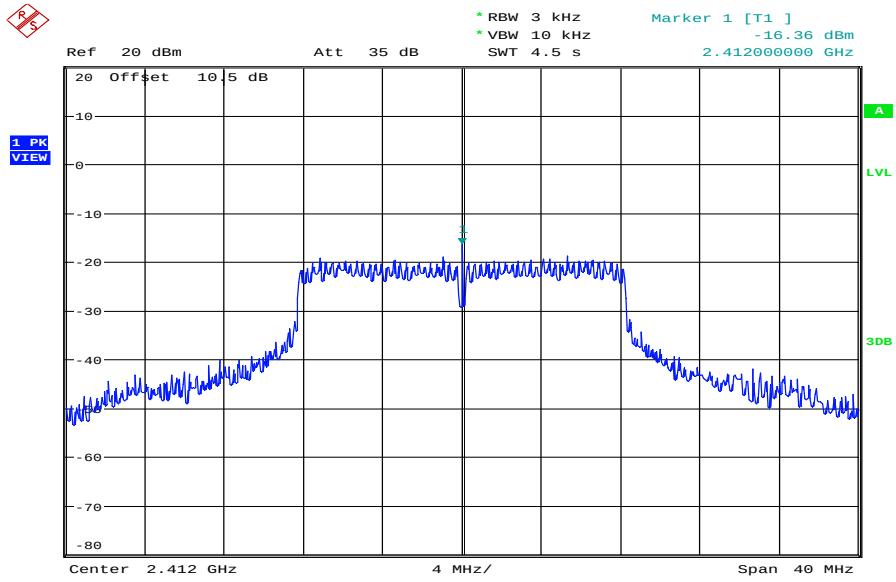
Date: 25.JUN.2013 14:56:22

Plot 3: TX mode, highest channel

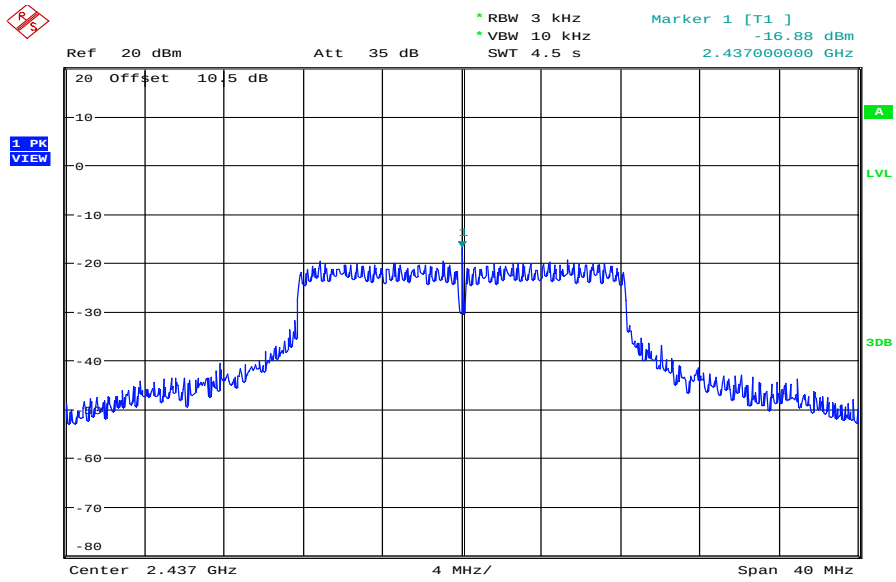


Plots: OFDM / g – mode

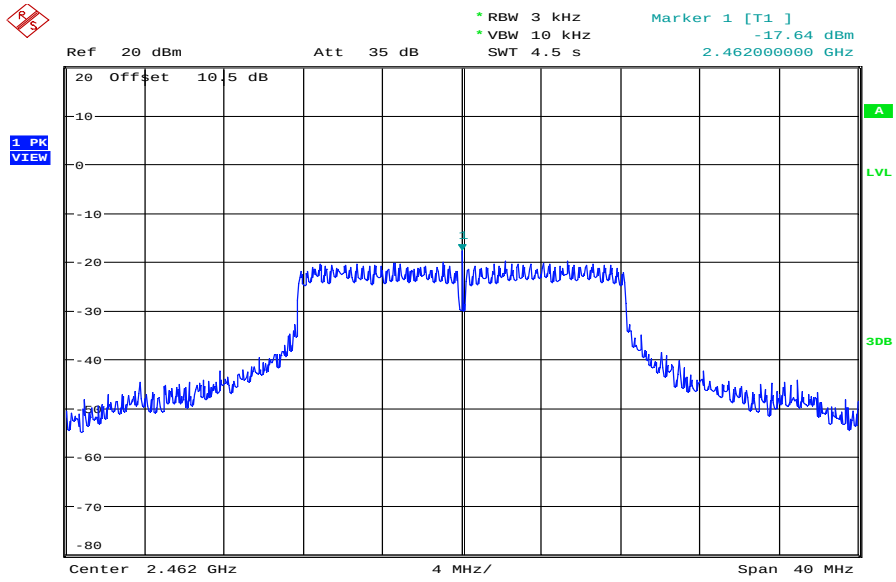
Plot 1: TX mode, lowest channel



Plot 2: TX mode, middle channel



Plot 3: TX mode, highest channel



11.4 Spectrum bandwidth – 6 dB

Description:

Measurement of the 6 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter	
According to DTS clause: 8.2	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Span:	40 MHz
Measurement procedure:	Measurement of the 75% bandwidth using the integration function of the analyzer
Trace-Mode:	Max hold (allow trace to stabilize)

Limits:

FCC	IC
Spectrum Bandwidth – 6 dB	
Systems using digital modulation techniques may operate in the 2400–2483.5 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.	

Results: DSSS / b – mode

Modulation	6 dB bandwidth [MHz]		
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode 1 Mbit/s	7.50	7.50	7.37
DSSS / b – mode 2 Mbit/s	7.56	7.50	7.44
DSSS / b – mode 5.5 Mbit/s	7.24	7.24	7.24
DSSS / b – mode 11 Mbit/s	7.44	7.44	7.44
Measurement uncertainty	± RBW		

Result: Passed

Results: OFDM / g – mode

Modulation	6 dB bandwidth [MHz]		
Frequency	2412 MHz	2437 MHz	2462 MHz
OFDM / g – mode 6 Mbit/s	12.56	12.50	12.50
OFDM / g – mode 9 Mbit/s	12.44	12.44	12.44
OFDM / g – mode 12 Mbit/s	12.50	12.56	12.50
OFDM / g – mode 18 Mbit/s	12.50	12.50	12.50
OFDM / g – mode 24 Mbit/s	12.63	12.50	12.50
OFDM / g – mode 36 Mbit/s	12.44	12.37	12.37
OFDM / g – mode 48 Mbit/s	12.56	12.56	12.50
OFDM / g – mode 54 Mbit/s	12.31	12.37	12.37
OFDM / g – mode 72 Mbit/s	12.95	12.95	12.95
Measurement uncertainty	± RBW		

Result: **Passed**

11.5 Occupied bandwidth – 99% emission bandwidth

Description:

Measurement of the 99% bandwidth of the modulated signal acc. RSS-GEN.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	500 kHz
Video bandwidth:	3 MHz
Span:	40 MHz
Measurement procedure:	Measurement of the 99% bandwidth using the integration function of the analyzer
Trace-Mode:	Max hold (allow trace to stabilize)

Usage:

-/-	IC
Occupied Bandwidth – 99% emission bandwidth	
OBW is neccessary for Emission Designator	

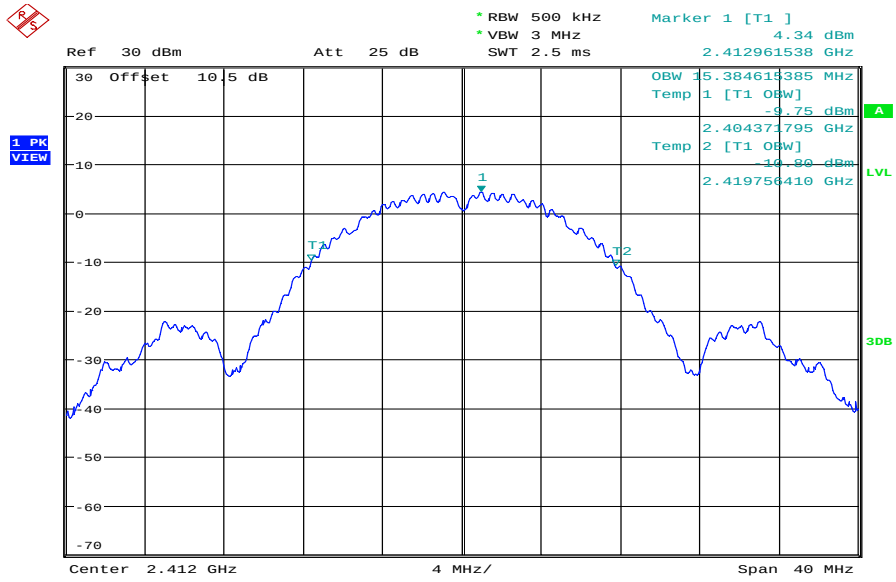
Results:

Modulation	20 dB bandwidth [MHz]		
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	15.38	15.19	15.06
OFDM / g – mode	19.42	19.17	19.17
Measurement uncertainty	± RBW		

Result: Passed

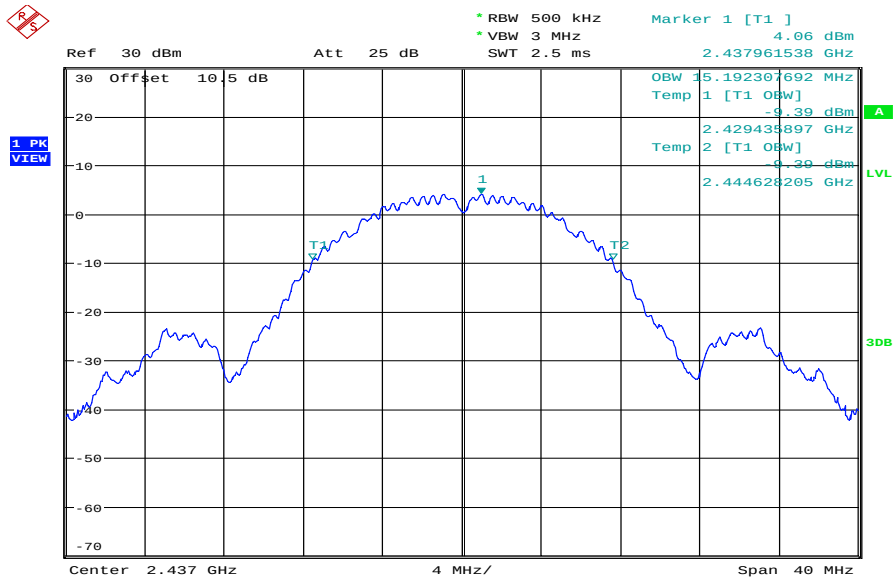
Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel



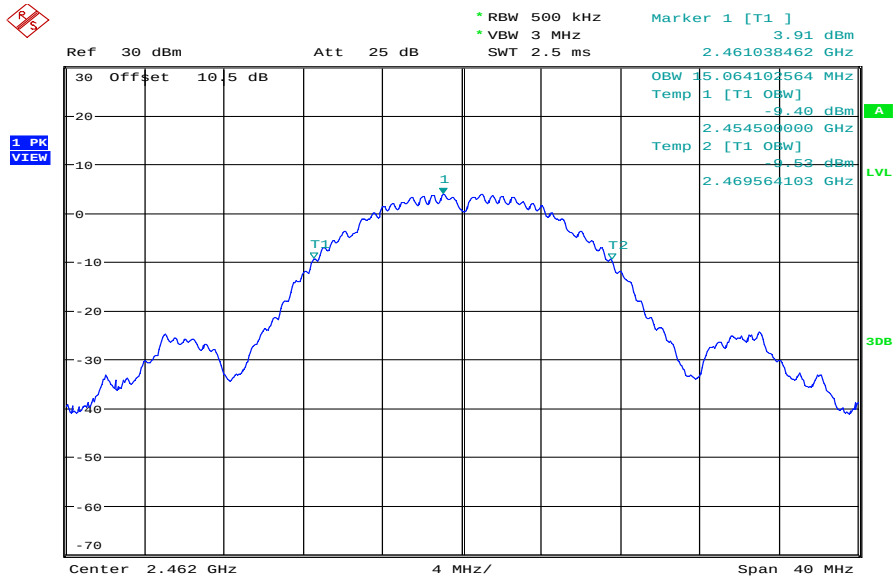
Date: 25.JUN.2013 14:42:10

Plot 2: TX mode, middle channel



Date: 25.JUN.2013 14:43:29

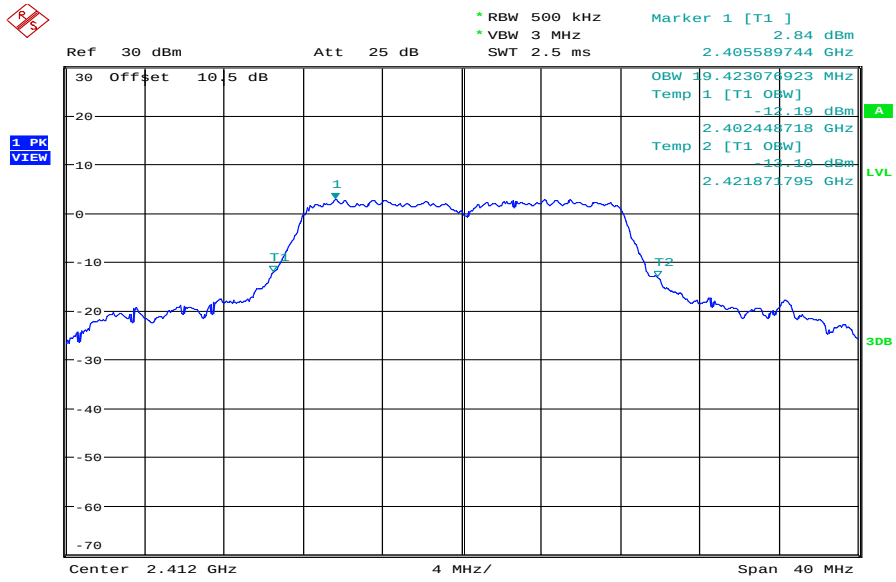
Plot 3: TX mode, highest channel



Date: 25.JUN.2013 14:47:07

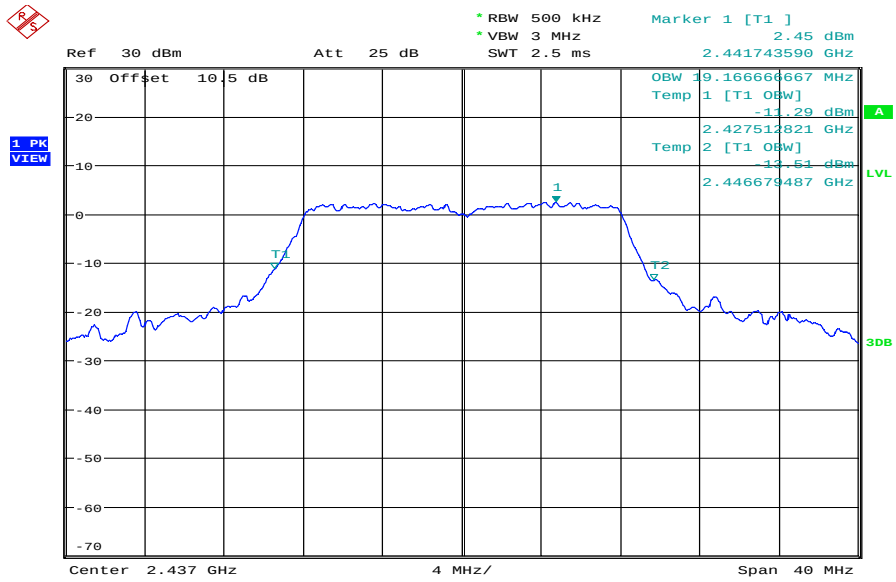
Plots: OFDM / g – mode

Plot 1: TX mode, lowest channel



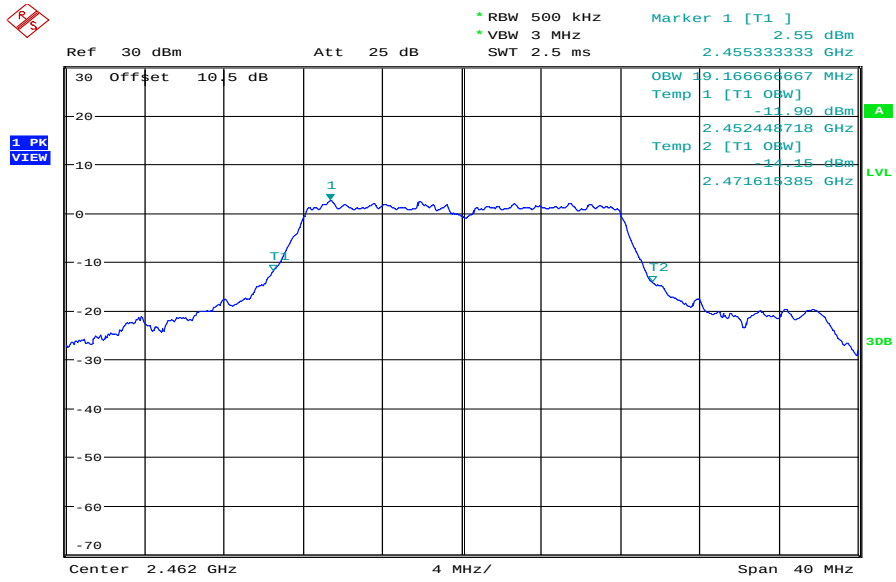
Date: 25.JUN.2013 14:45:19

Plot 2: TX mode, middle channel



Date: 25.JUN.2013 14:44:21

Plot 3: TX mode, highest channel



11.6 Band edge compliance conducted

Description:

Measurement of the conducted band edge compliance. EUT is measured at the lower and upper band edge in both modes.

Measurement:

Measurement parameter	
According to DTS clause: 13.2.1	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	500 kHz
Span:	Lower Band Edge: 2300 – 2425 MHz Upper Band Edge: 2450 – 2550 MHz
Trace-Mode:	Max hold

Limits:

FCC	IC
Band Edge Compliance Conducted	
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.	

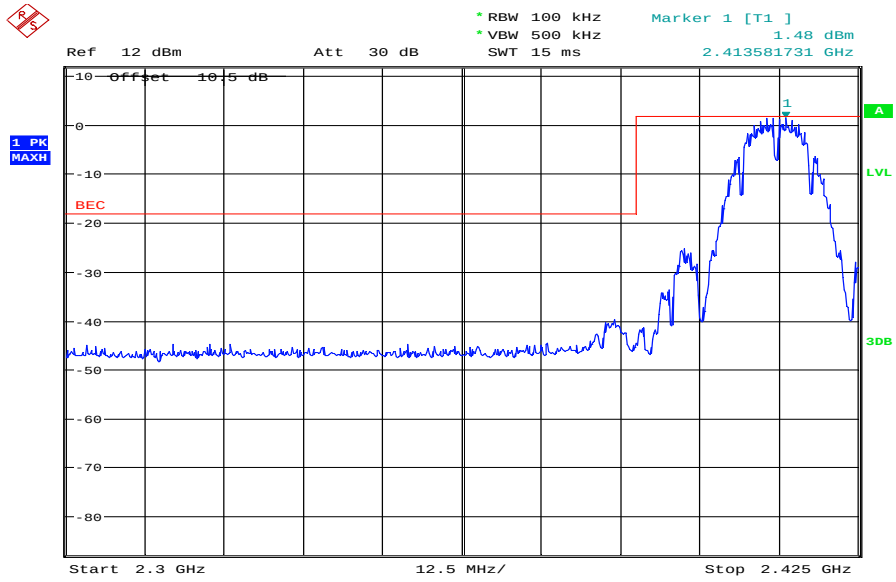
Results:

Scenario	Band Edge Compliance Conducted [dB]		
Modulation	DSSS / b – mode	OFDM / g – mode	-/-
Lower Band Edge – Channel 1	> 20 dB	> 20 dB	-/-
Upper Band Edge – Channel 11	> 20 dB	> 20 dB	-/-
Measurement uncertainty	± 1.5 dB		

Result: **Passed**

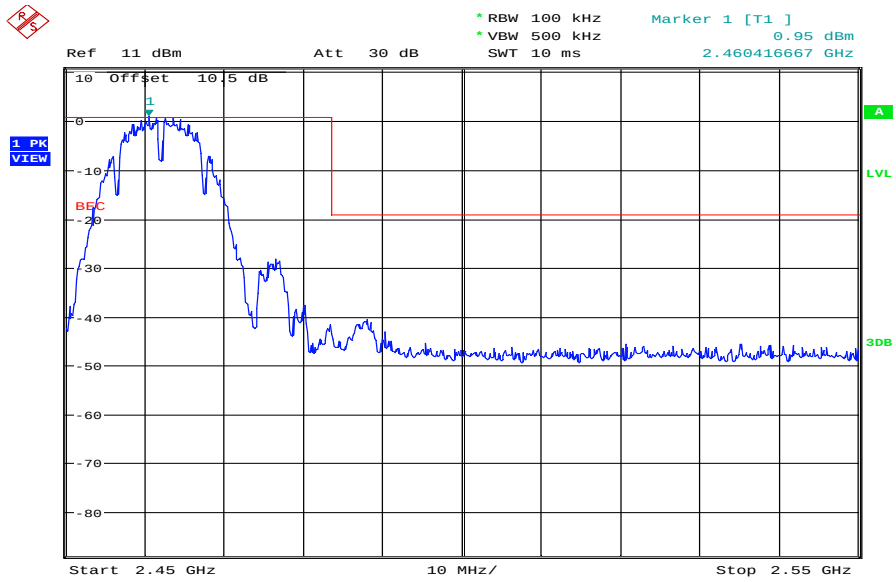
Plots: DSSS / b – mode

Plot 1: TX mode, lower band edge



Date: 25.JUN.2013 15:04:48

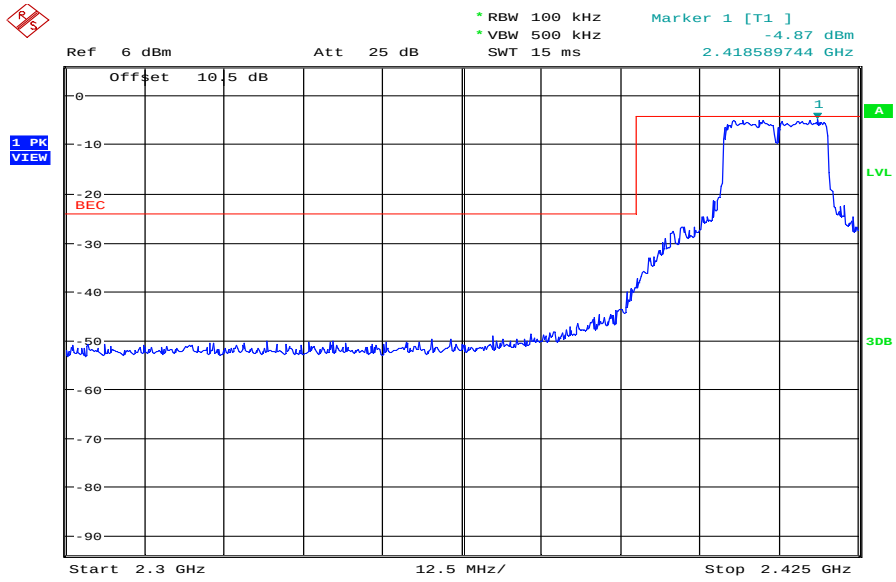
Plot 2: TX mode, upper band edge



Date: 25.JUN.2013 15:07:57

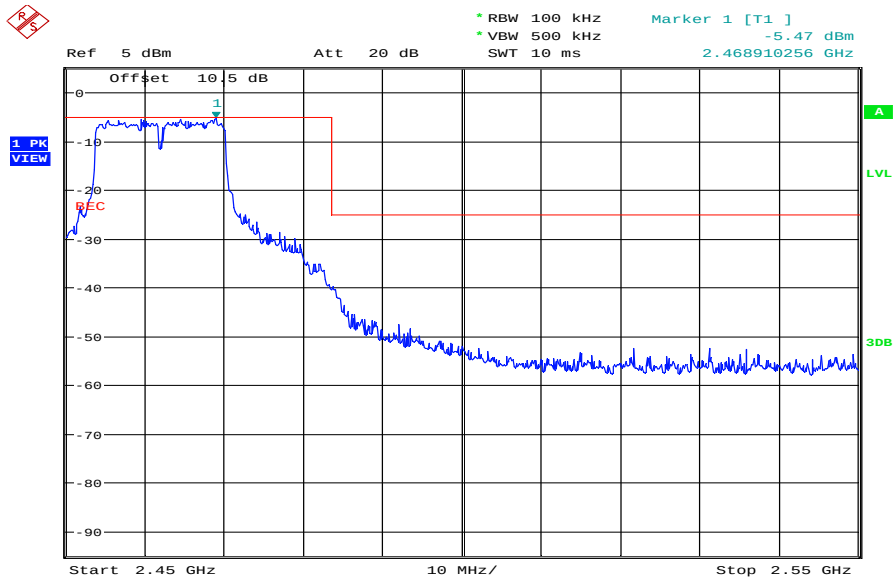
Plots: OFDM / g – mode

Plot 1: TX mode, lower band edge



Date: 25.JUN.2013 15:05:50

Plot 2: TX mode, upper band edge



Date: 25.JUN.2013 15:07:07

11.7 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 1 for the lower restricted band and to channel 11 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	IC
Band Edge Compliance 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 Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).	
54 dBµV/m AVG	

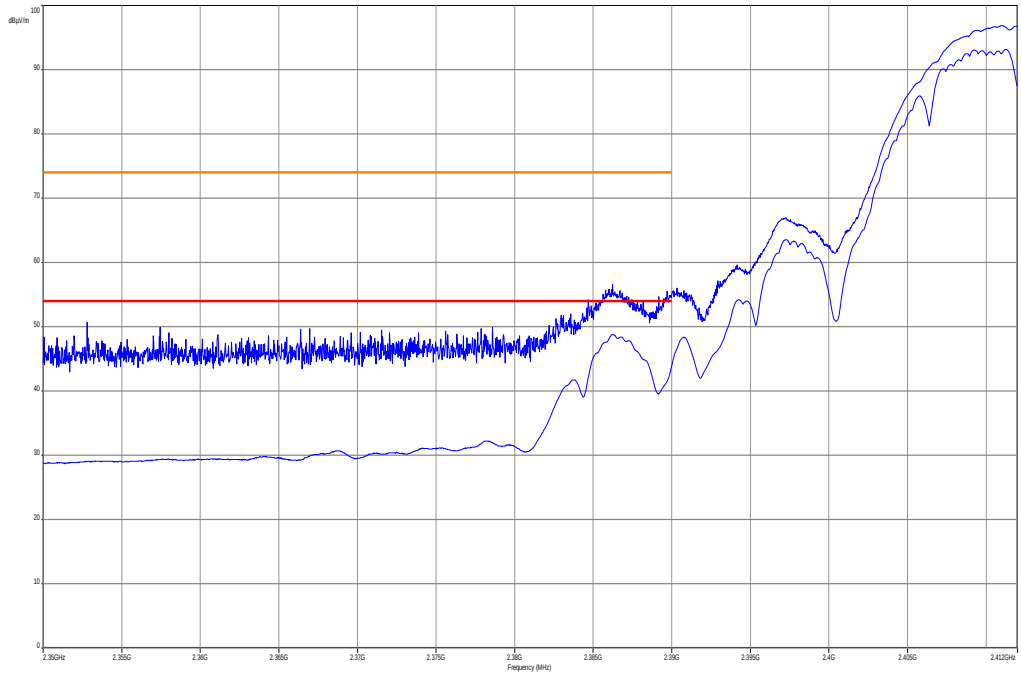
Results:

Scenario	Band Edge Compliance Conducted [dB]		
Modulation	DSSS / b – mode	OFDM / g – mode	-/-
Lower Band Edge – Channel 1	> 20 dB (Peak) > 20 dB (AVG)	> 10 dB (Peak) > 20 dB (AVG)	-/-
Upper Band Edge – Channel 11	> 20 dB (Peak) > 20 dB (AVG)	> 10 dB (Peak) > 20 dB (AVG)	-/-
Measurement uncertainty	± 3 dB		

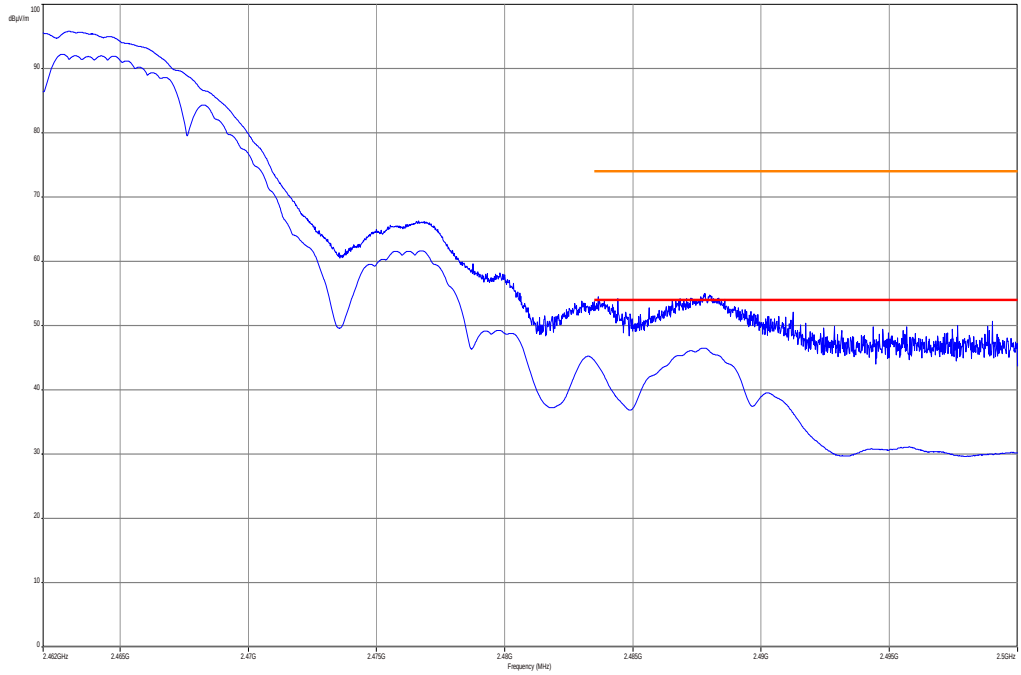
Result: Passed

Plots: DSSS/ b – mode peak / average

Plot 1: TX mode, lower band edge, vertical & horizontal polarization

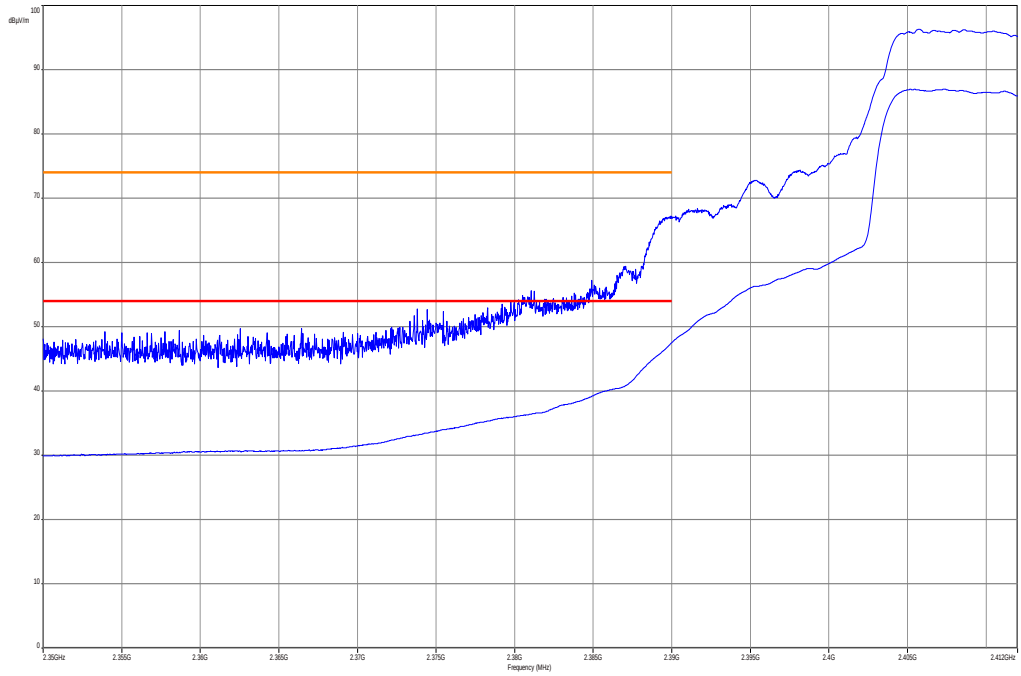


Plot 2: TX mode, upper band edge, vertical & horizontal polarization

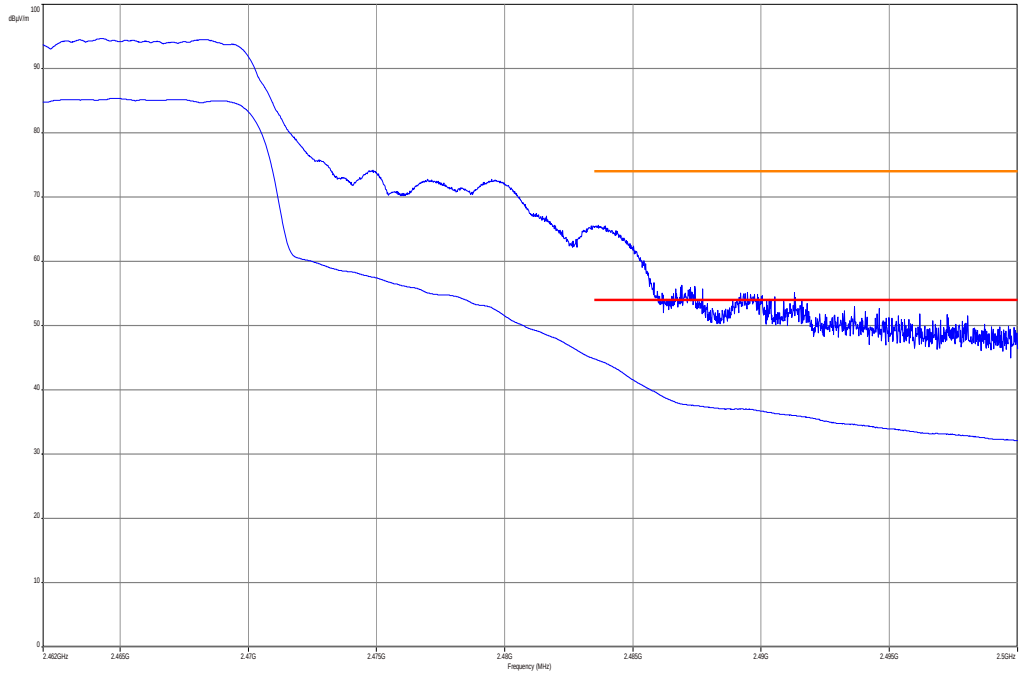


Plots: OFDM / g – mode peak / average

Plot 1: TX mode, lower band edge, vertical & horizontal polarization



Plot 2: TX mode, upper band edge, vertical & horizontal polarization



11.8 TX spurious emissions conducted

Description:

Measurement of the conducted spurious emissions in transmit mode. The measurement is performed at channel 1, 6 and 11. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
According to:	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	500 kHz
Span:	9 kHz to 25 GHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
TX Spurious Emissions Conducted	
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	

Results: DSSS / b – mode

TX Spurious Emissions Conducted					
DSSS / b – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		0.52	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2437		1.17	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2462		0.87	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: **Passed**

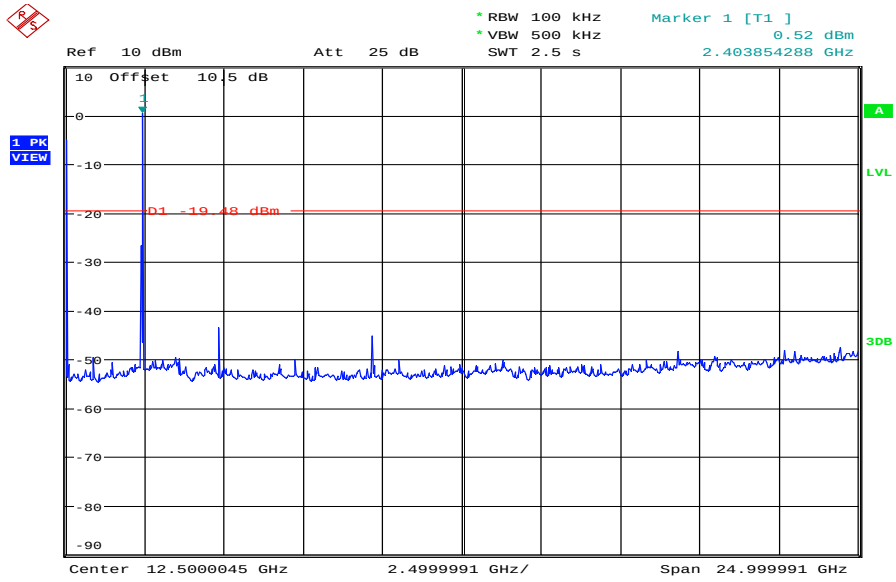
Results: OFDM / g – mode

TX Spurious Emissions Conducted					
OFDM / g – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		-3.06	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2437		-3.11	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2462		-3.86	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: **Passed**

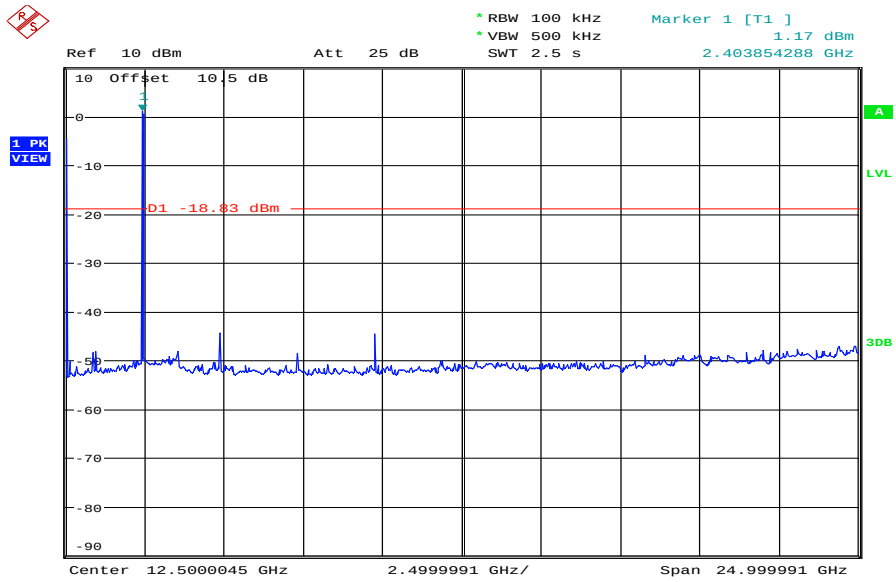
Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel, up to 25 GHz



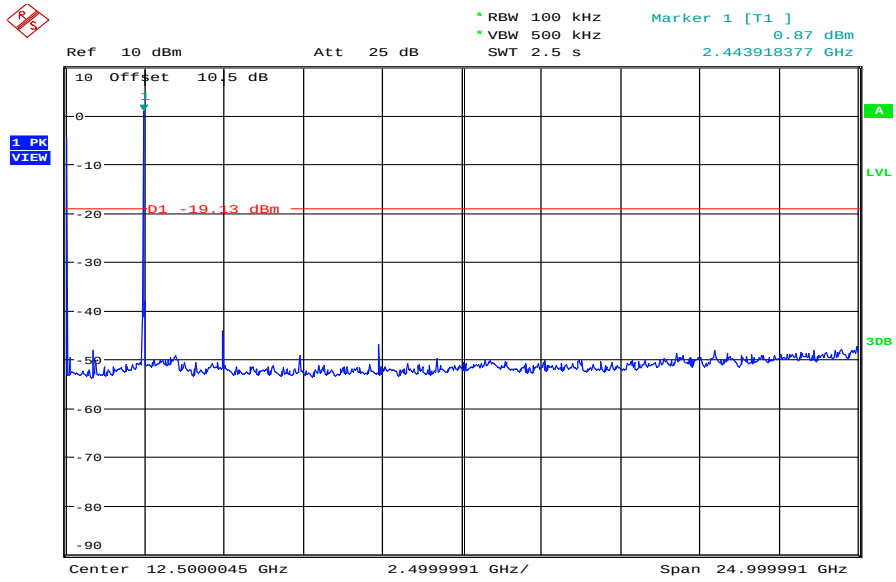
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

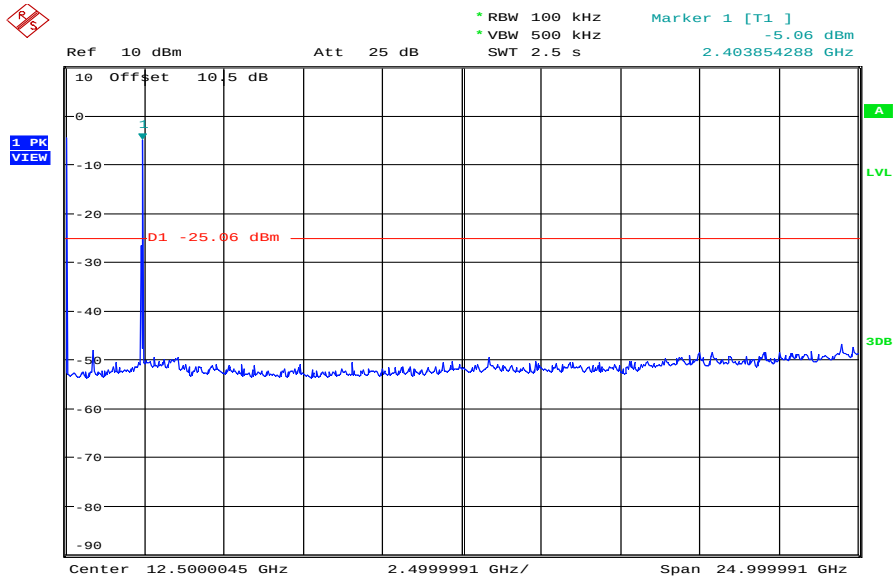
Plot 3: TX mode, highest channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

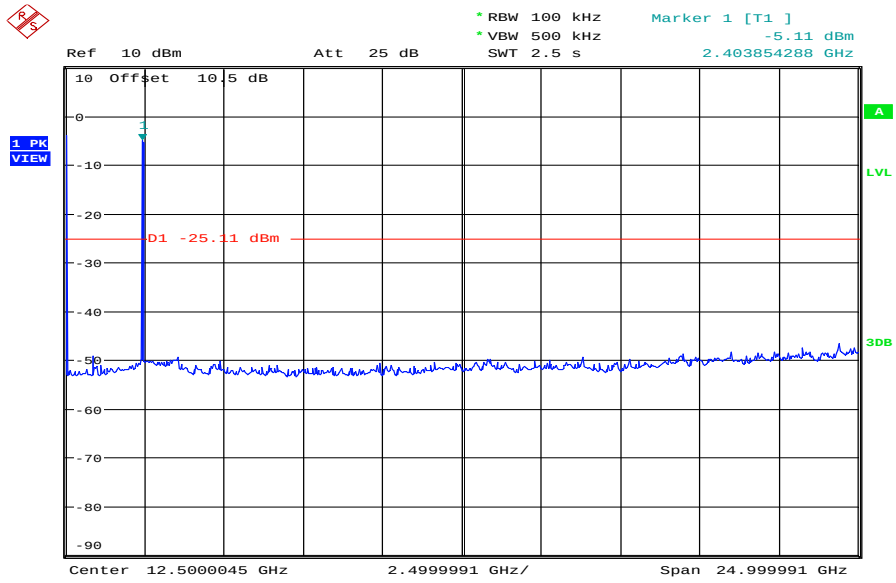
Plots: OFDM / g – mode

Plot 1: TX mode, lowest channel, up to 25 GHz



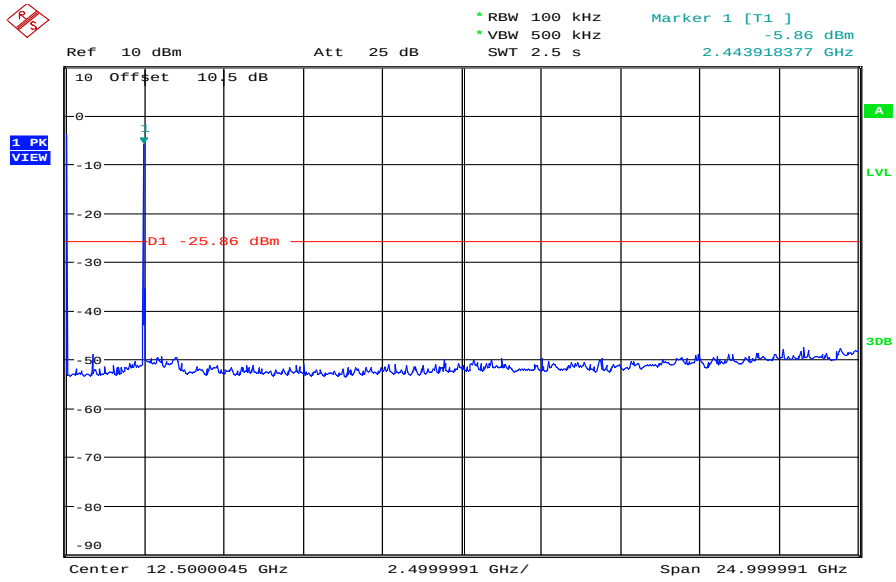
The peak at the beginning of the plot is the LO from the SA.

Plot 2: TX mode, middle channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

Plot 3: TX mode, highest channel, up to 25 GHz



The peak at the beginning of the plot is the LO from the SA.

11.9 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at channel 1, 6 and 11. 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	☒ DSSS b – mode ☒ OFDM g – mode

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	IC	
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: DSSS / b – mode

TX Spurious Emissions Radiated [dBµV/m]								
DSSS / b – mode								
2412 MHz			2437 MHz			2462 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.		
4824	PK/AVG	52.8/45.3	4874	PK/AVG	57.6/50.2	4924	PK/AVG	55.4/48.9
Measurement uncertainty			± 3 dB					

Result: **Passed**

Results: OFDM / g – mode

TX Spurious Emissions Radiated [dBµV/m]								
OFDM / g – mode								
2412 MHz			2437 MHz			2462 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.		
No traceable emissions detected			No traceable emissions detected			No traceable emissions detected		
Measurement uncertainty			± 3 dB					

Result: **Passed**

Plots: DSSS / b – mode

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

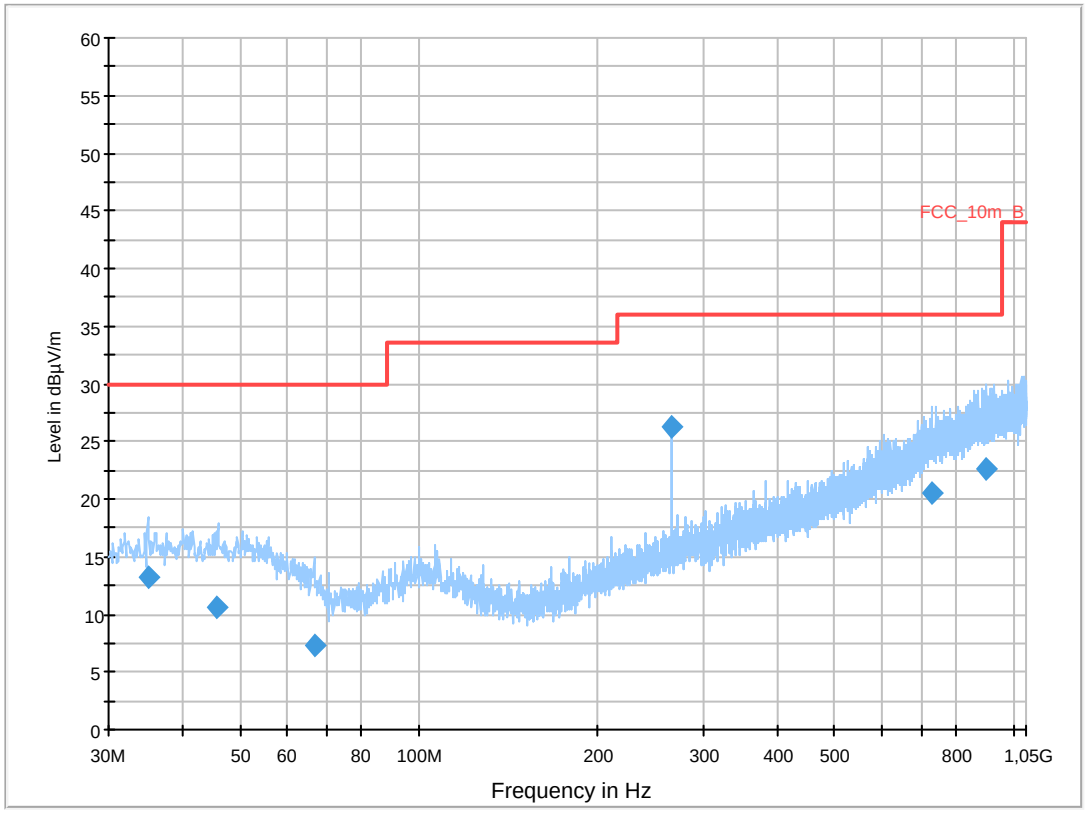
Common Information

EUT:	Coagucheck XS Pro
Serial Number:	unknown
Test Description:	FCC part 15 C class B
Operating Conditions:	WLAN TX Ch. 1 b-mode
Operator Name:	Hennemann
Comment:	battery powered 3,7/4,2 V

Scan Setup: STAN_Fin [EMI radiated]

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

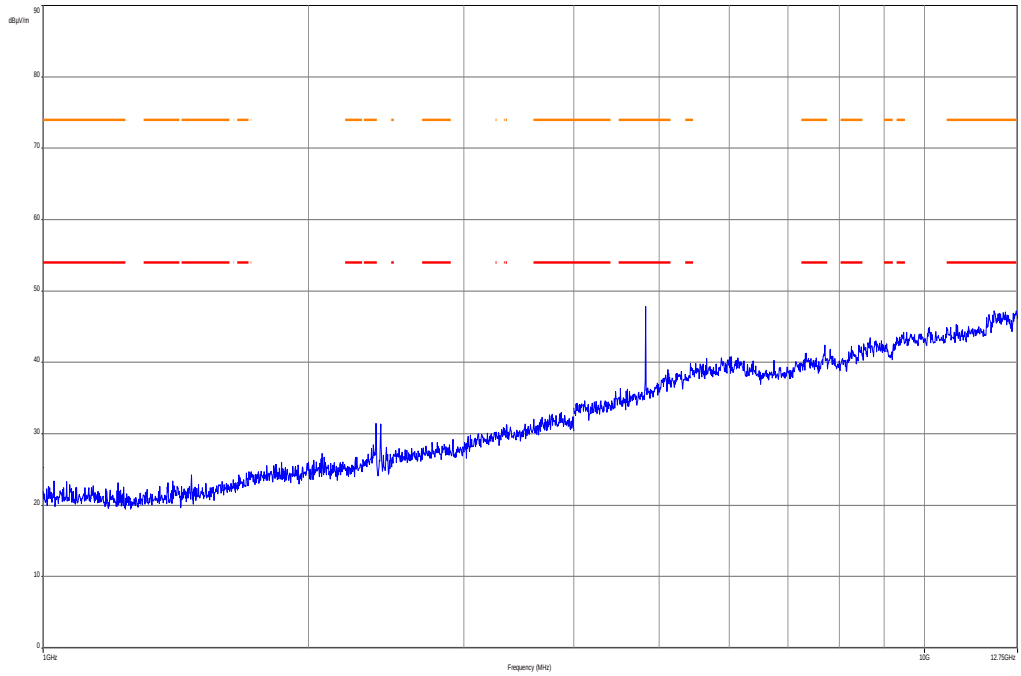
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

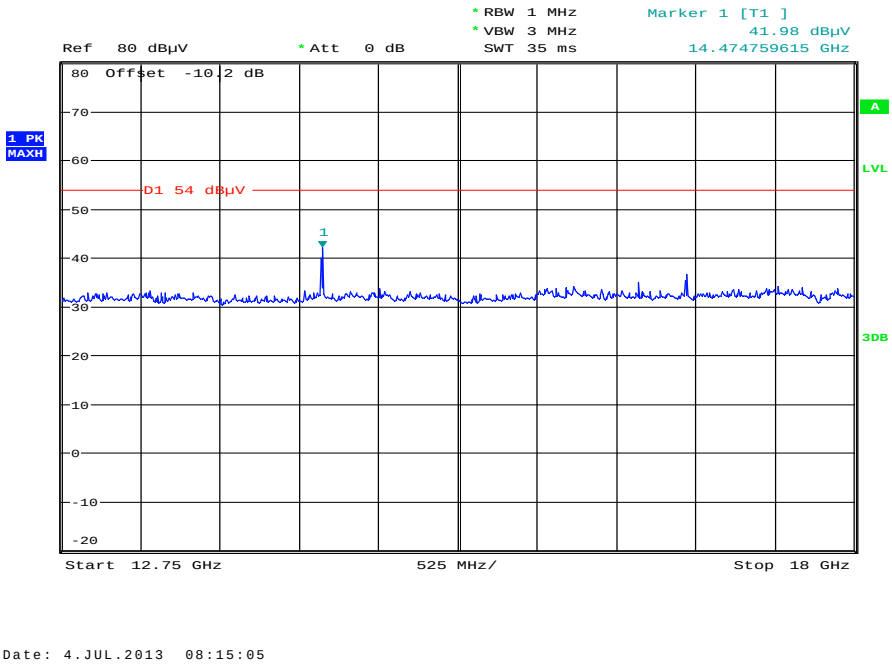
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.036550	13.2	1000.0	120.000	170.0	V	89.0	13.0	16.8	30.0	
45.689700	10.5	1000.0	120.000	170.0	H	178.0	13.3	19.5	30.0	
66.703350	7.3	1000.0	120.000	121.0	V	2.0	10.0	22.7	30.0	
265.993950	26.3	1000.0	120.000	98.0	V	-5.0	13.7	9.7	36.0	
727.072350	20.5	1000.0	120.000	170.0	H	10.0	23.1	15.5	36.0	
900.625500	22.6	1000.0	120.000	170.0	V	88.0	25.2	13.4	36.0	

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

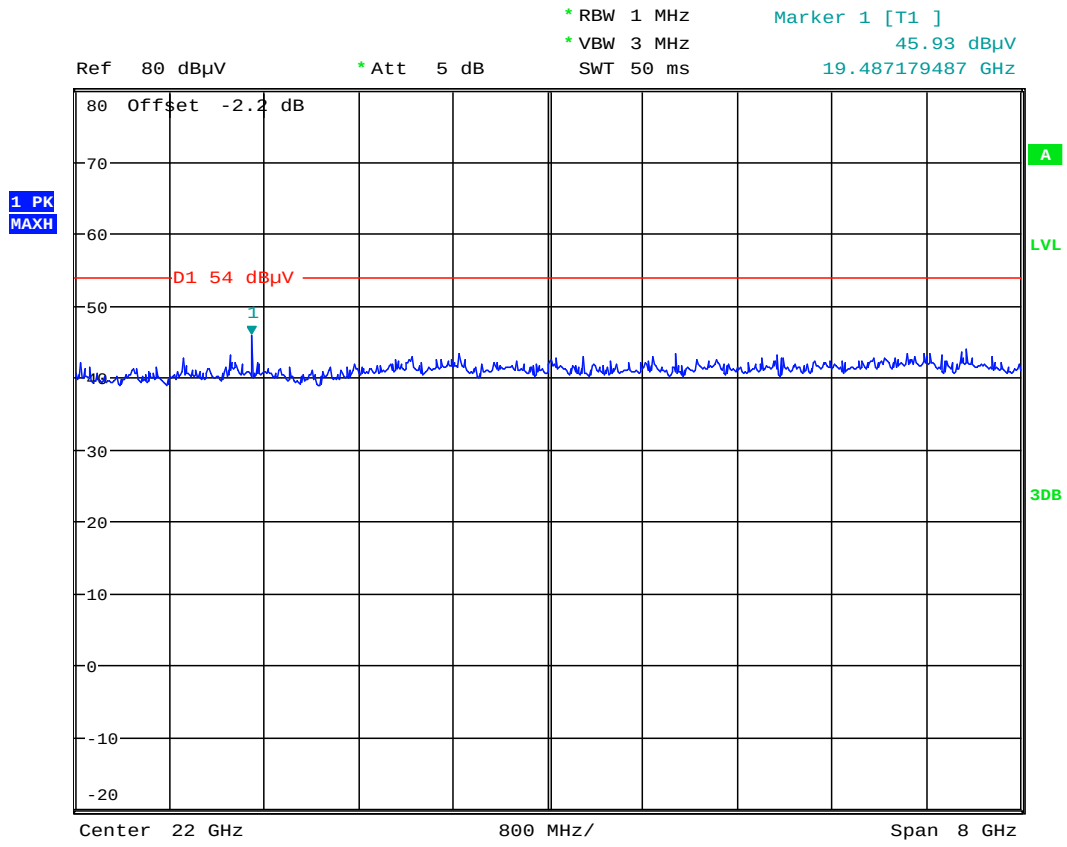


The carrier signal is notched with a 2.4 GHz band rejection filter.

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



Date: 4.JUL.2013 08:08:01

Plot 5: Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization

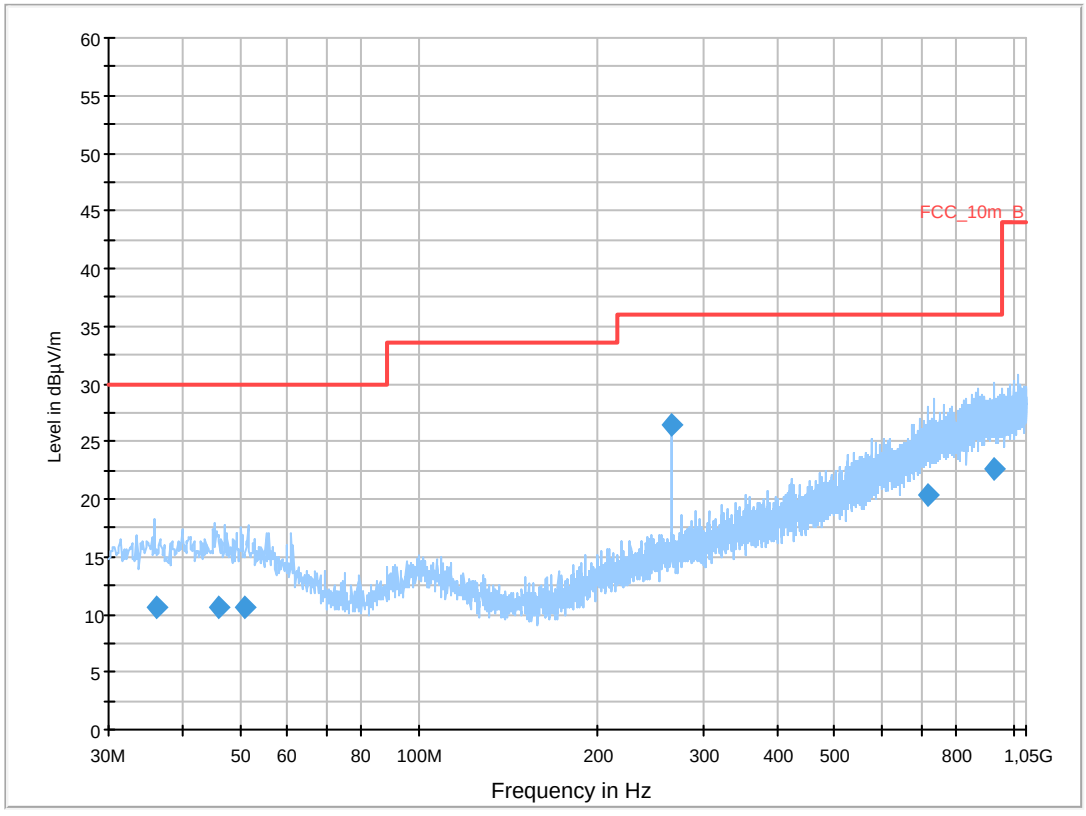
Common Information

EUT:	Coagucheck XS Pro
Serial Number:	unknown
Test Description:	FCC part 15 C class B
Operating Conditions:	WLAN TX Ch. 6 b-mode
Operator Name:	Hennemann
Comment:	battery powered 3,7/4,2 V

Scan Setup: STAN_Fin [EMI radiated]

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

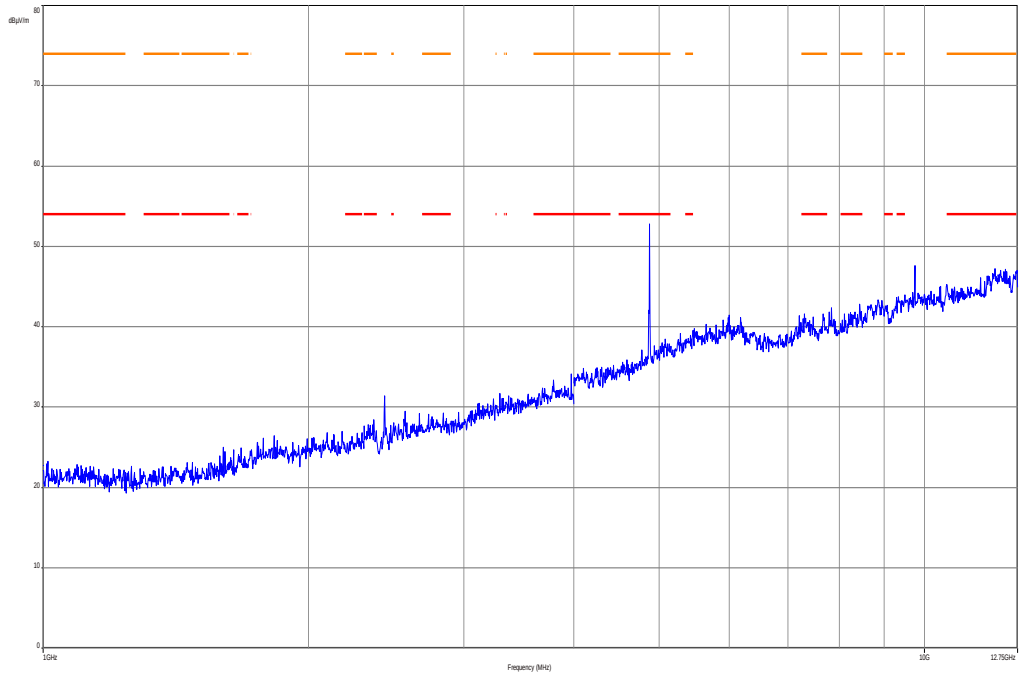
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

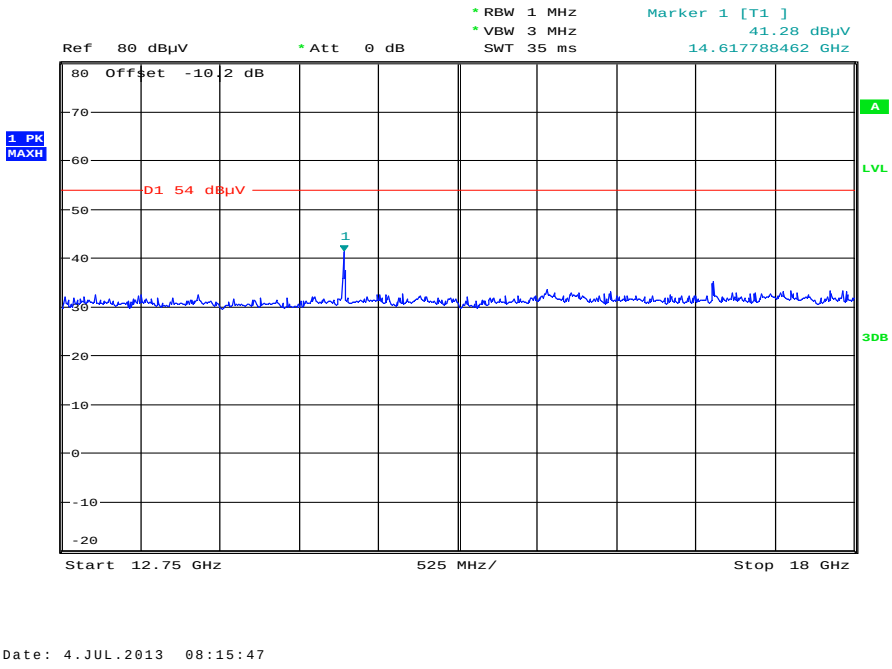
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
36.040200	10.6	1000.0	120.000	170.0	H	170.0	13.1	19.4	30.0	
45.846600	10.5	1000.0	120.000	98.0	V	100.0	13.3	19.5	30.0	
51.005100	10.6	1000.0	120.000	98.0	V	272.0	13.3	19.4	30.0	
265.988400	26.5	1000.0	120.000	111.0	V	10.0	13.7	9.5	36.0	
719.571000	20.4	1000.0	120.000	153.0	V	10.0	23.0	15.6	36.0	
925.950000	22.6	1000.0	120.000	170.0	H	-3.0	25.3	13.4	36.0	

Plot 6: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

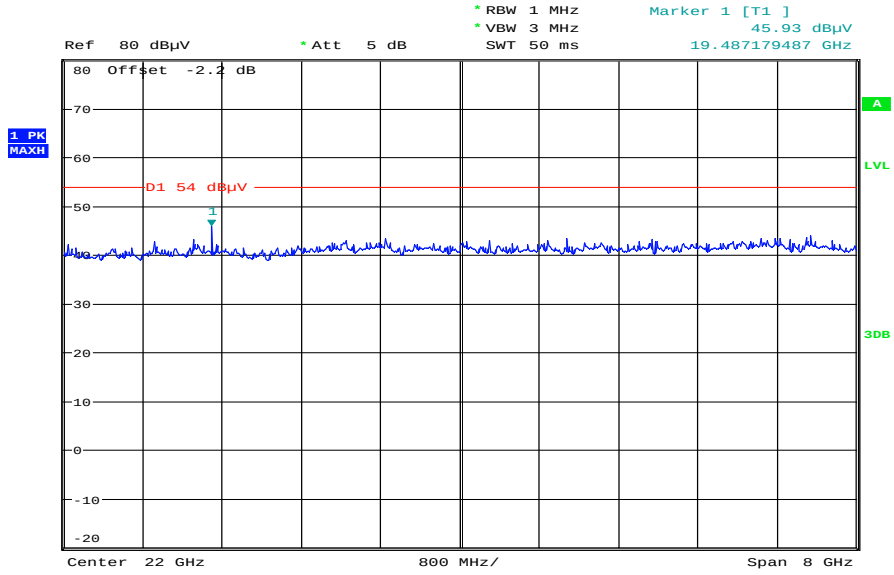


The carrier signal is notched with a 2.4 GHz band rejection filter.

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



Plot 8: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Plot 9: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

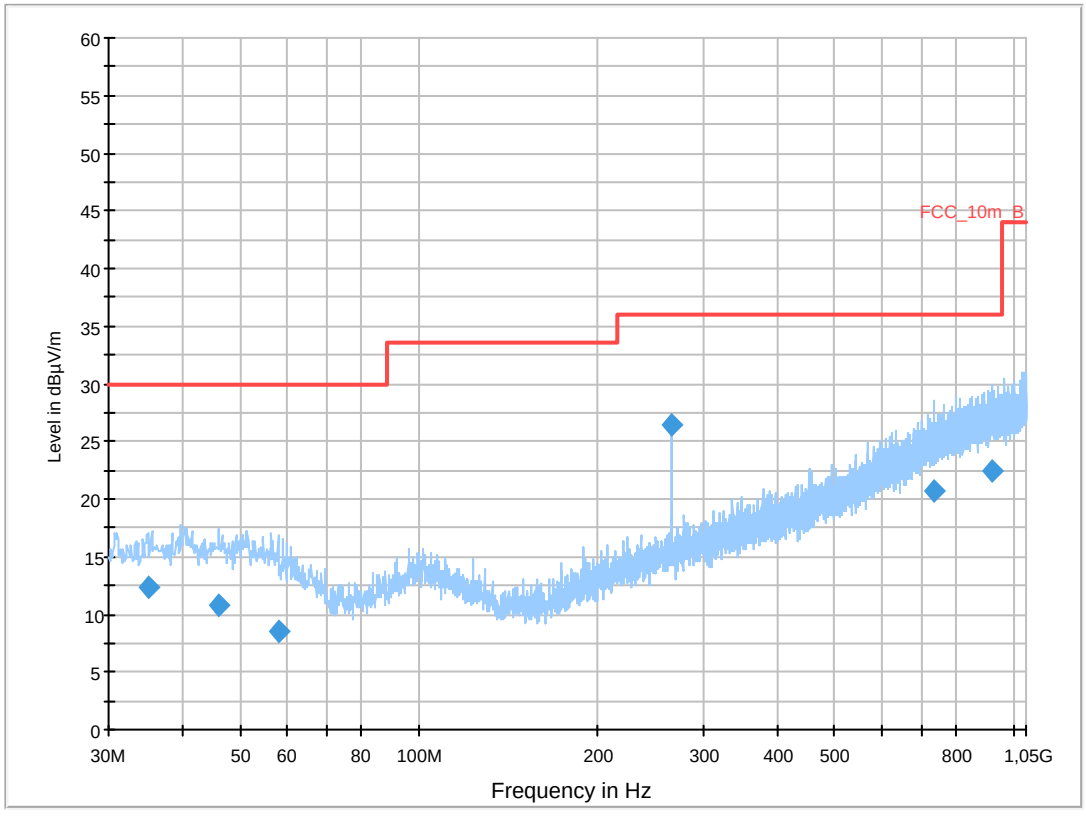
Common Information

EUT:	Coagucheck XS Pro
Serial Number:	unknown
Test Description:	FCC part 15 C class B
Operating Conditions:	WLAN TX Ch. 11 b-mode
Operator Name:	Hennemann
Comment:	battery powered 3,7/4,2 V

Scan Setup: STAN_Fin [EMI radiated]

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

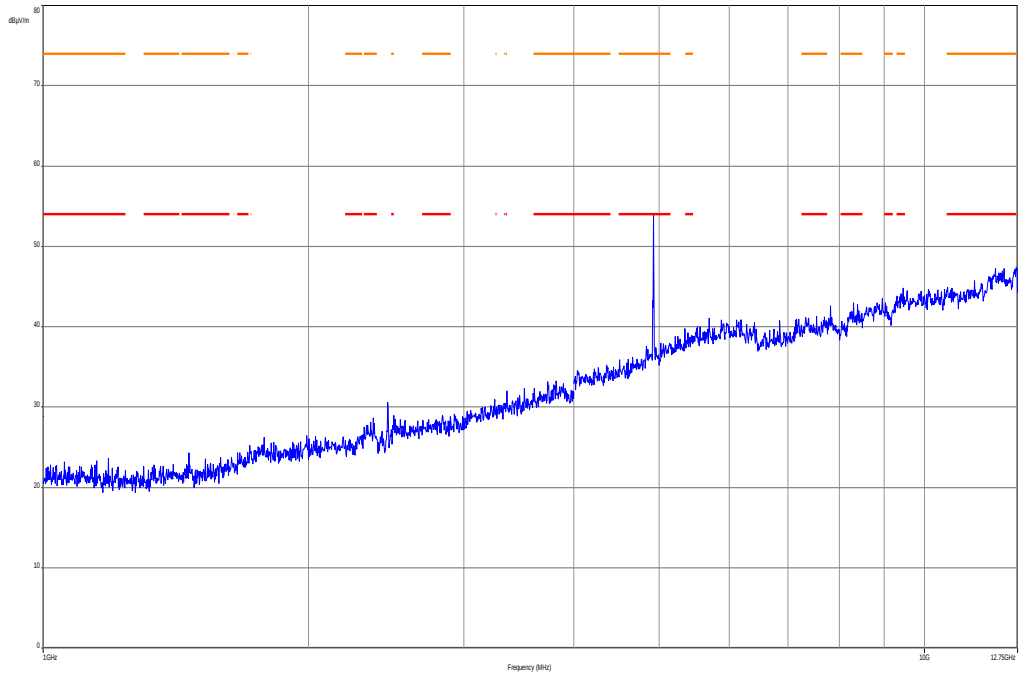
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

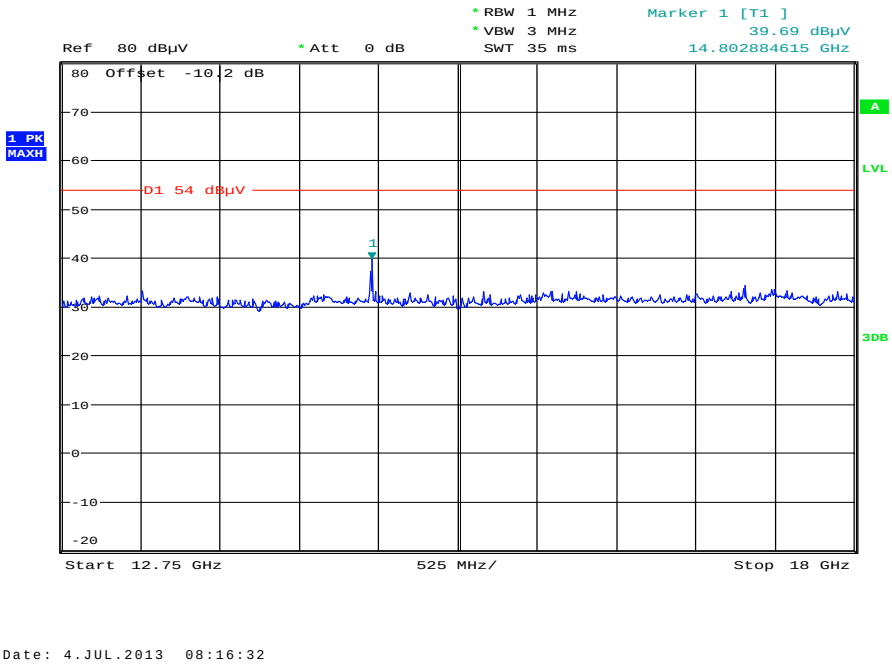
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
34.984950	12.4	1000.0	120.000	170.0	V	90.0	13.0	17.6	30.0	
45.960750	10.7	1000.0	120.000	170.0	V	2.0	13.3	19.3	30.0	
58.258650	8.5	1000.0	120.000	111.0	V	272.0	12.0	21.5	30.0	
265.982700	26.4	1000.0	120.000	98.0	V	2.0	13.7	9.6	36.0	
731.851200	20.6	1000.0	120.000	170.0	H	80.0	23.2	15.4	36.0	
923.157600	22.5	1000.0	120.000	170.0	H	268.0	25.3	13.5	36.0	

Plot 10: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

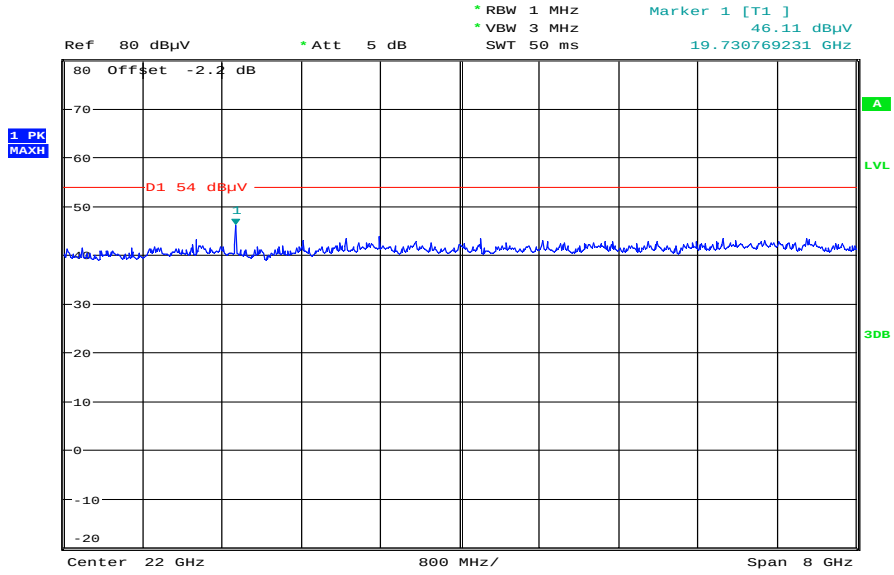


The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 11: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Plot 12: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Plots: OFDM / g – mode

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

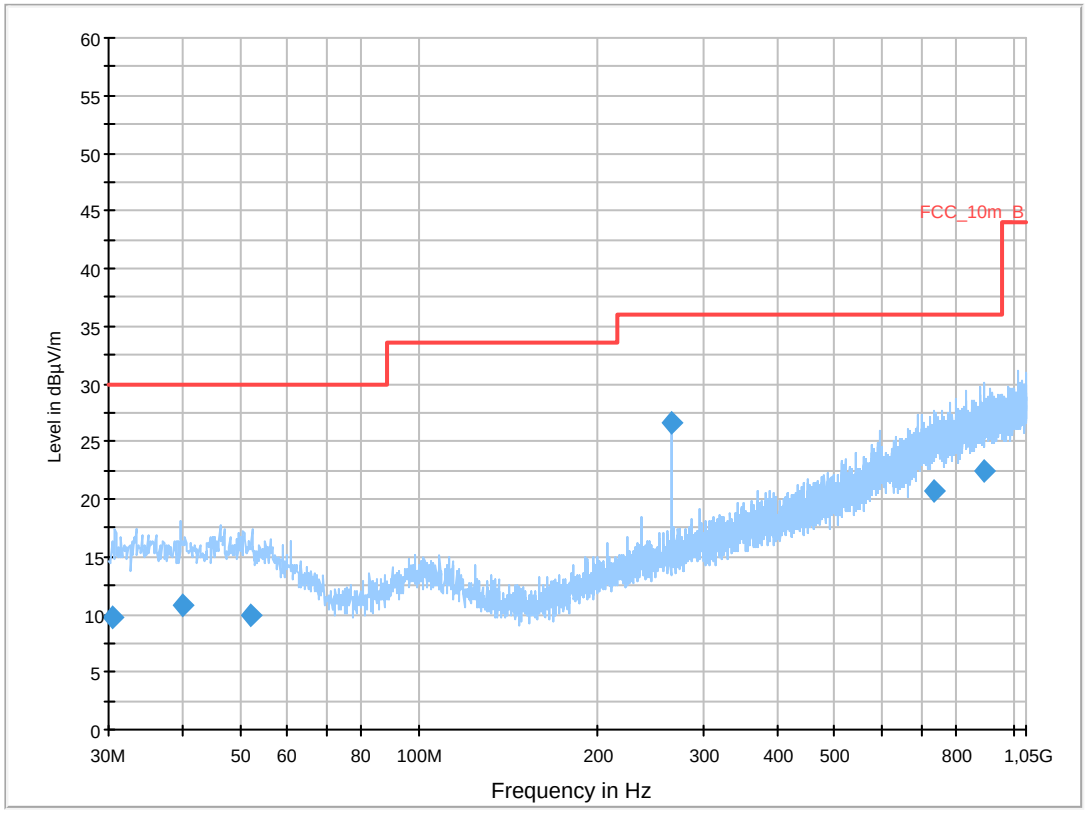
Common Information

EUT:	Coagucheck XS Pro
Serial Number:	unknown
Test Description:	FCC part 15 C class B
Operating Conditions:	WLAN TX Ch. 1 g-mode
Operator Name:	Hennemann
Comment:	battery powered 3,7/4,2 V

Scan Setup: STAN_Fin [EMI radiated]

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

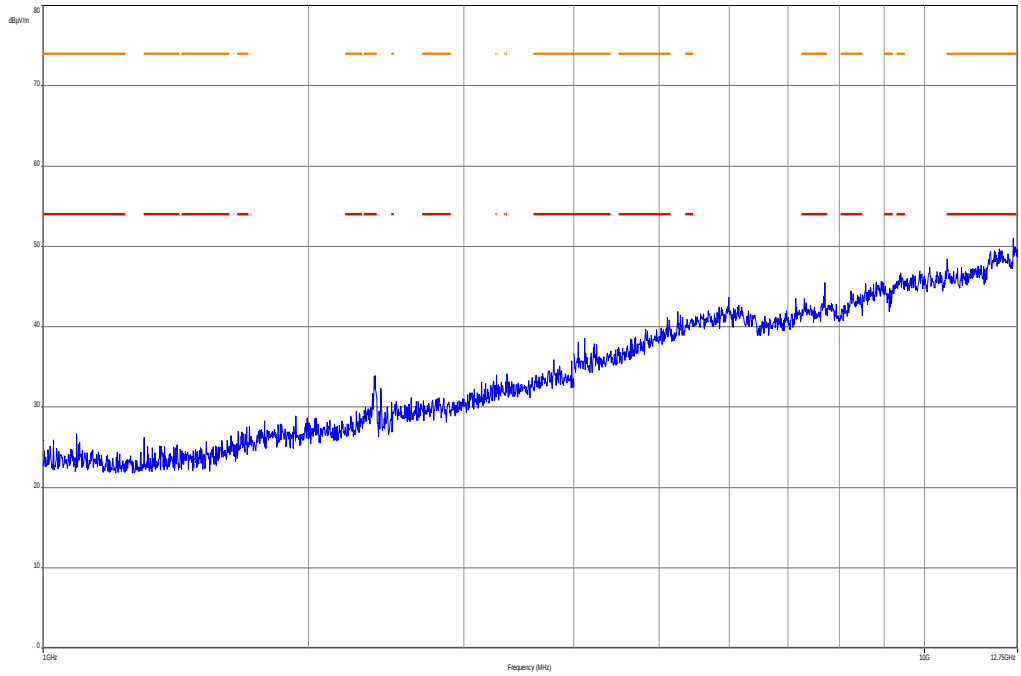
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

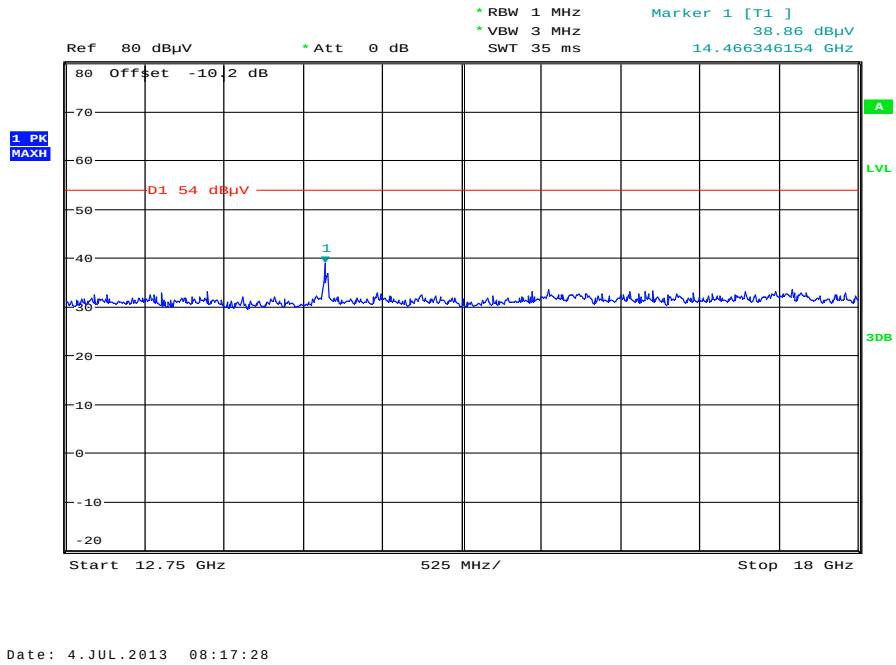
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
30.547800	9.8	1000.0	120.000	170.0	H	92.0	12.6	20.2	30.0	
39.981900	10.7	1000.0	120.000	170.0	V	0.0	13.4	19.3	30.0	
52.212600	9.9	1000.0	120.000	170.0	V	100.0	13.2	20.1	30.0	
266.008950	26.5	1000.0	120.000	98.0	V	10.0	13.7	9.5	36.0	
734.257650	20.8	1000.0	120.000	170.0	H	265.0	23.3	15.2	36.0	
889.321200	22.5	1000.0	120.000	170.0	H	170.0	25.1	13.5	36.0	

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

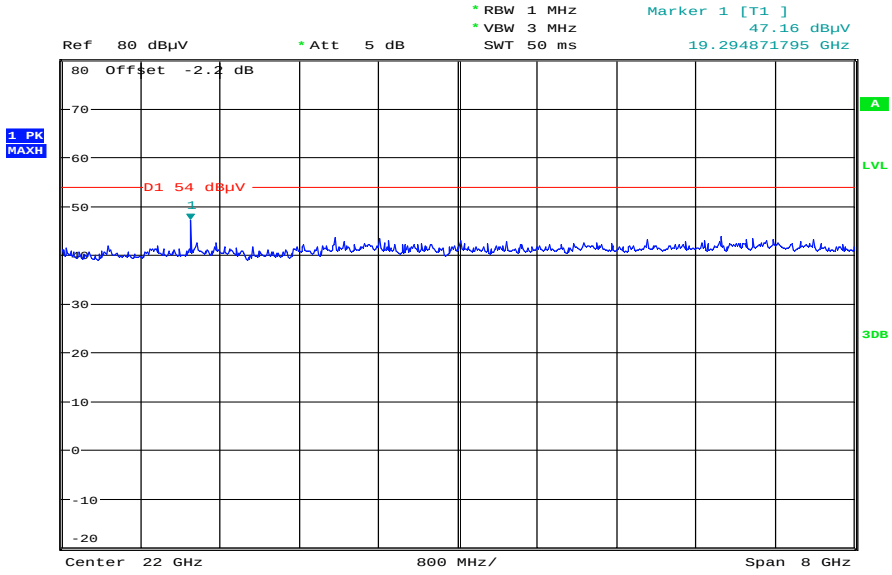


The carrier signal is notched with a 2.4 GHz band rejection filter.

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

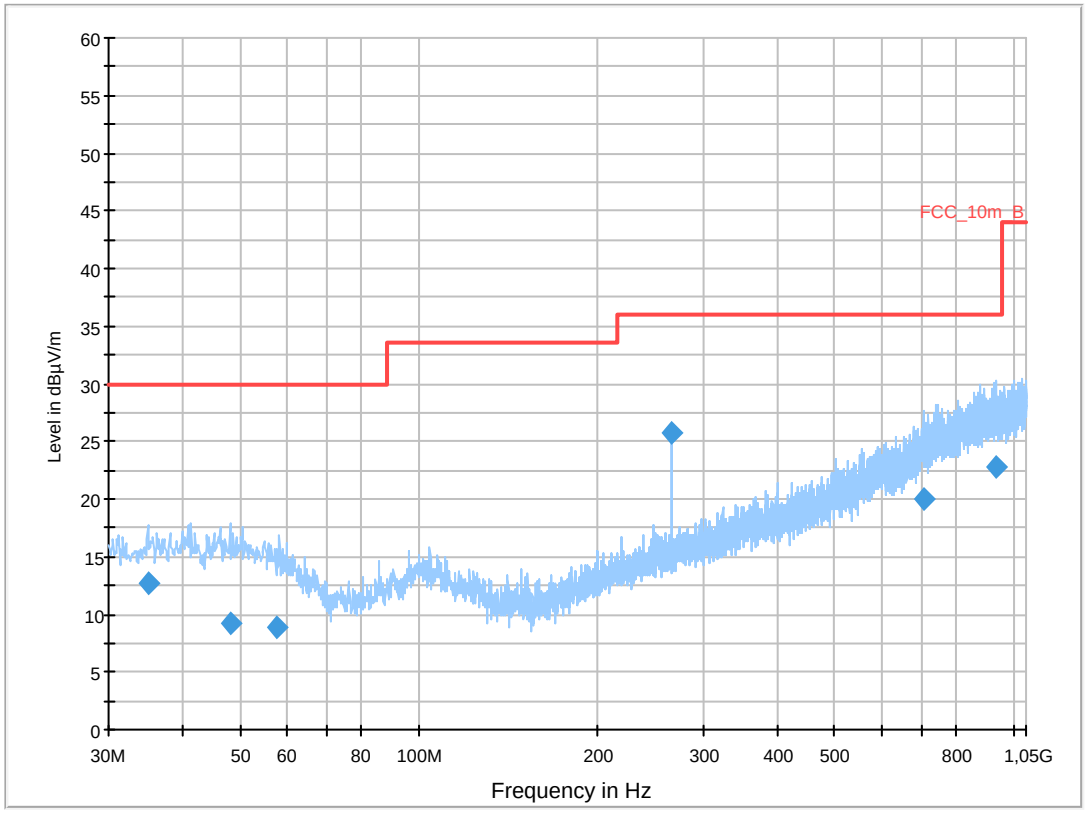
Common Information

EUT:	Coagucheck XS Pro
Serial Number:	unknown
Test Description:	FCC part 15 C class B
Operating Conditions:	WLAN TX Ch. 6 g-mode
Operator Name:	Hennemann
Comment:	battery powered 3,7/4,2 V

Scan Setup: STAN_Fin [EMI radiated]

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

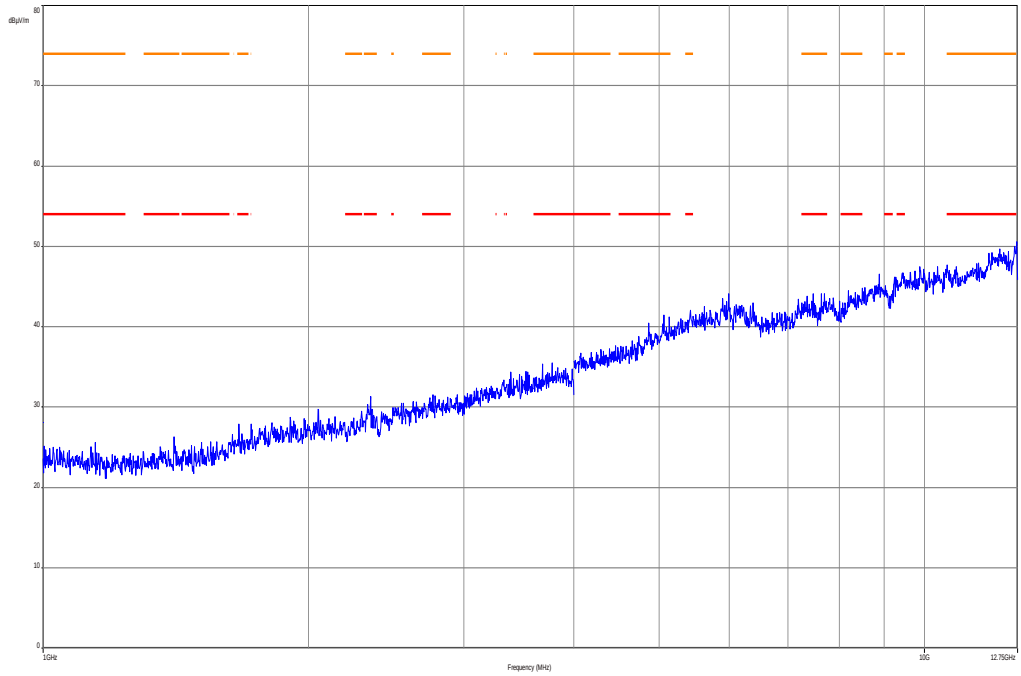
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

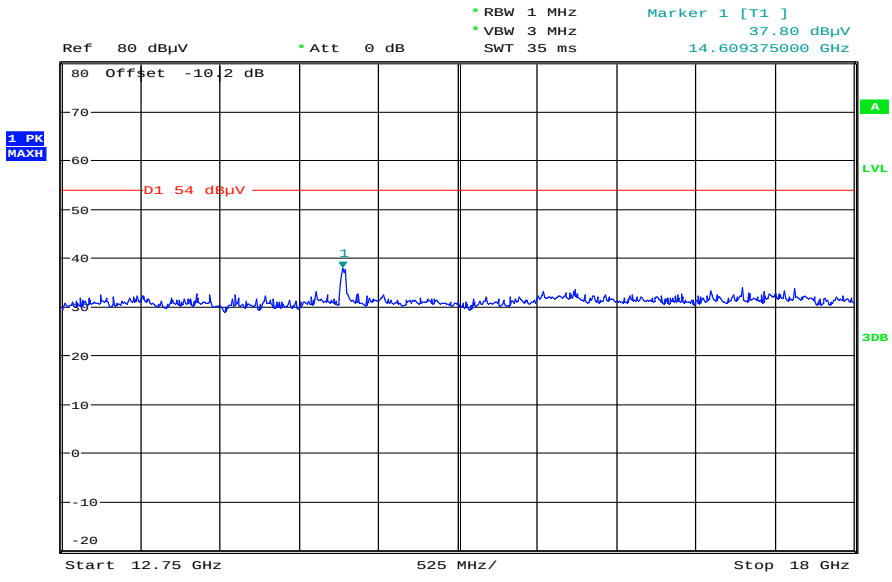
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.053500	12.7	1000.0	120.000	121.0	V	280.0	13.0	17.3	30.0	
48.081600	9.2	1000.0	120.000	111.0	H	178.0	13.3	20.8	30.0	
57.704250	8.8	1000.0	120.000	170.0	V	100.0	12.2	21.2	30.0	
265.997550	25.7	1000.0	120.000	121.0	V	10.0	13.7	10.3	36.0	
704.308800	20.1	1000.0	120.000	170.0	H	280.0	22.6	15.9	36.0	
936.595950	22.7	1000.0	120.000	170.0	V	260.0	25.3	13.3	36.0	

Plot 6: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

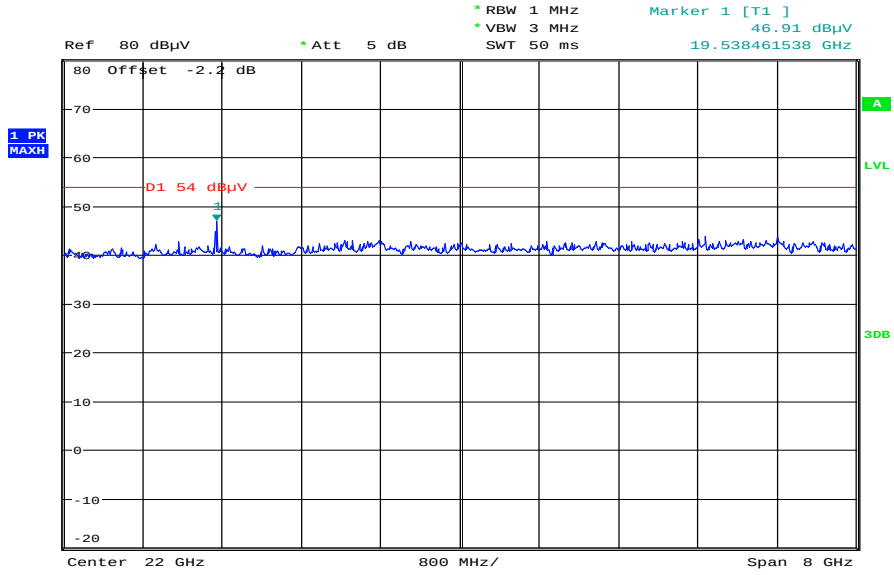


The carrier signal is notched with a 2.4 GHz band rejection filter.

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



Plot 8: Middle channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Plot 9: Highest channel, 30 MHz to 1 GHz, vertical & horizontal polarization

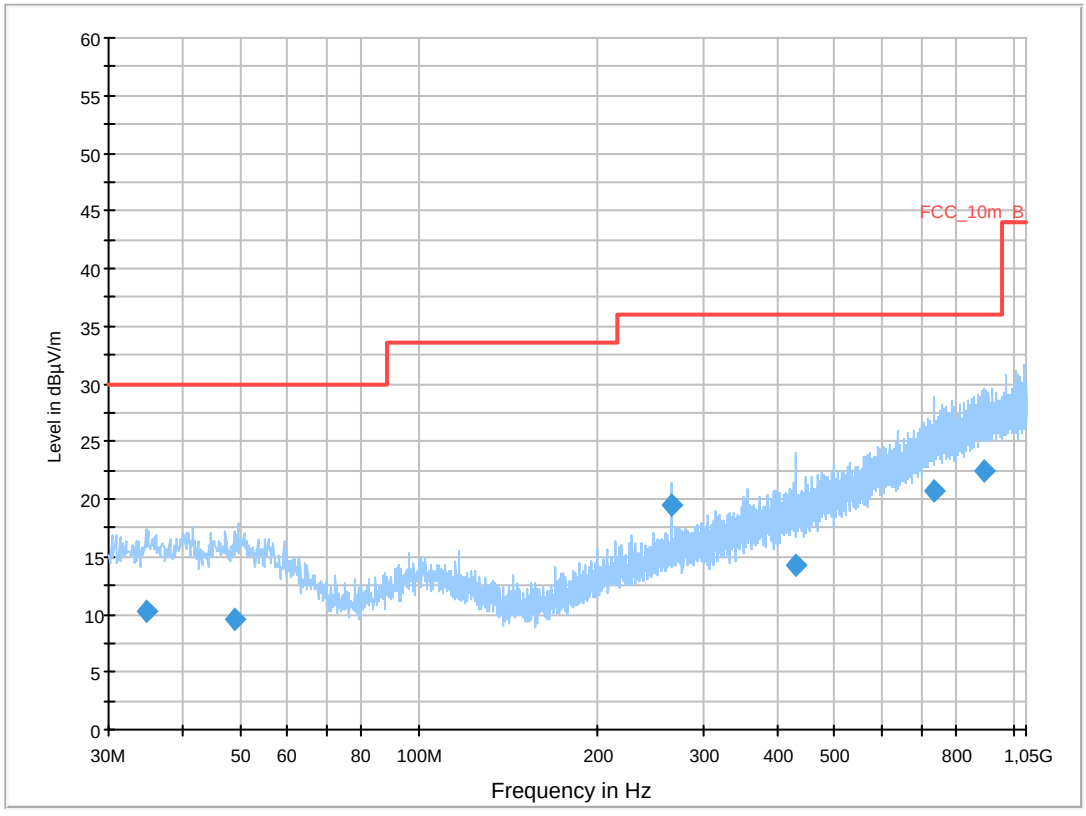
Common Information

EUT:	Coagucheck XS Pro
Serial Number:	unknown
Test Description:	FCC part 15 C class B
Operating Conditions:	WLAN TX Ch. 11 g-mode
Operator Name:	Hennemann
Comment:	battery powered 3,7/4,2 V

Scan Setup: STAN_Fin [EMI radiated]

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

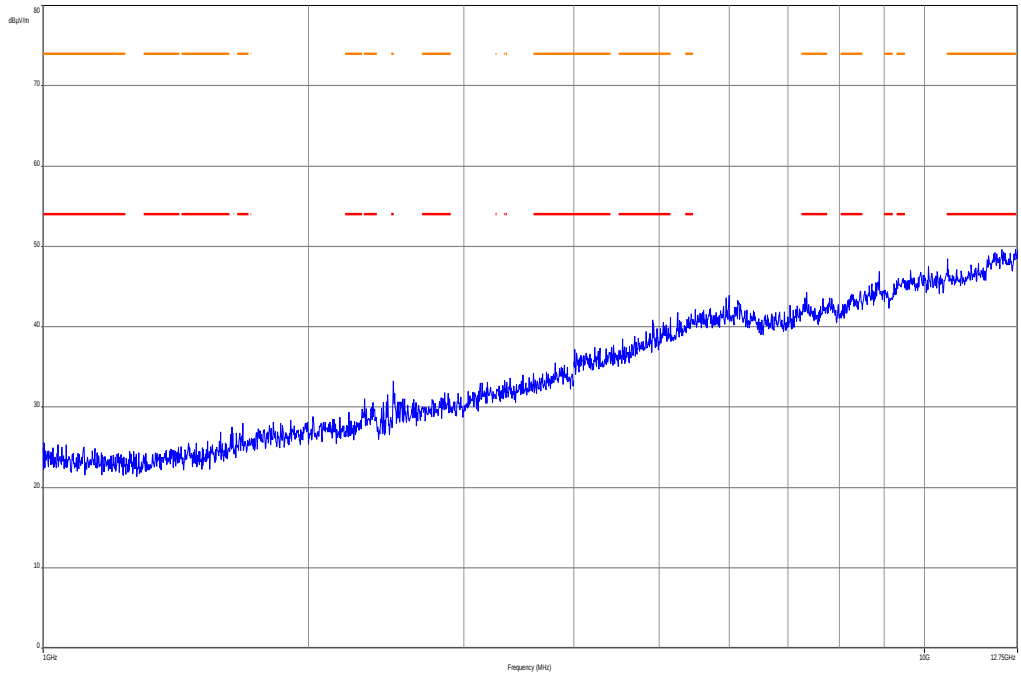
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

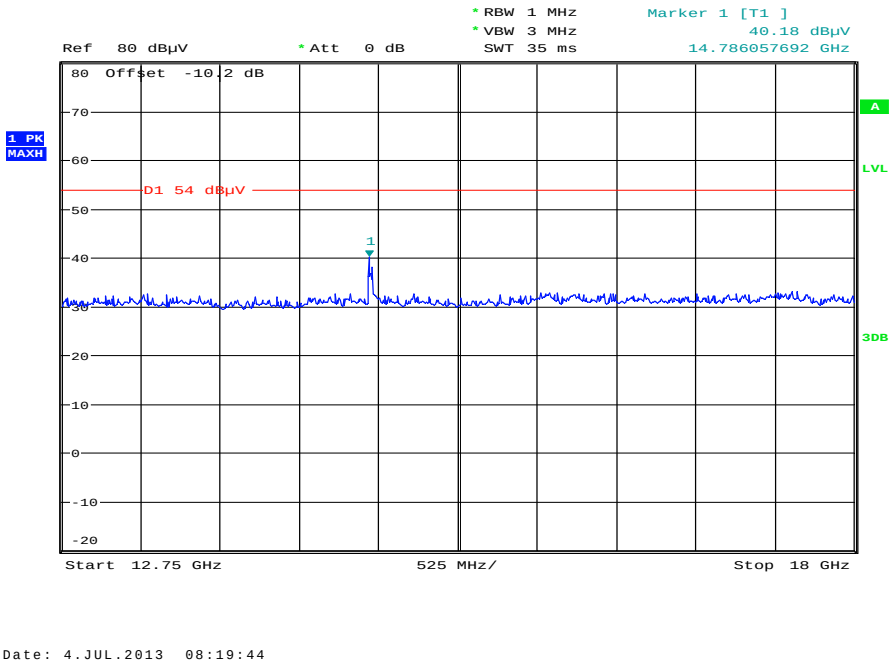
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
34.863450	10.2	1000.0	120.000	121.0	V	177.0	13.0	19.8	30.0	
49.093200	9.6	1000.0	120.000	170.0	H	272.0	13.4	20.4	30.0	
266.010300	19.5	1000.0	120.000	98.0	V	85.0	13.7	16.5	36.0	
428.782350	14.2	1000.0	120.000	119.0	H	0.0	17.3	21.8	36.0	
732.389100	20.7	1000.0	120.000	170.0	H	90.0	23.3	15.3	36.0	
889.552200	22.5	1000.0	120.000	98.0	V	261.0	25.1	13.5	36.0	

Plot 10: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization



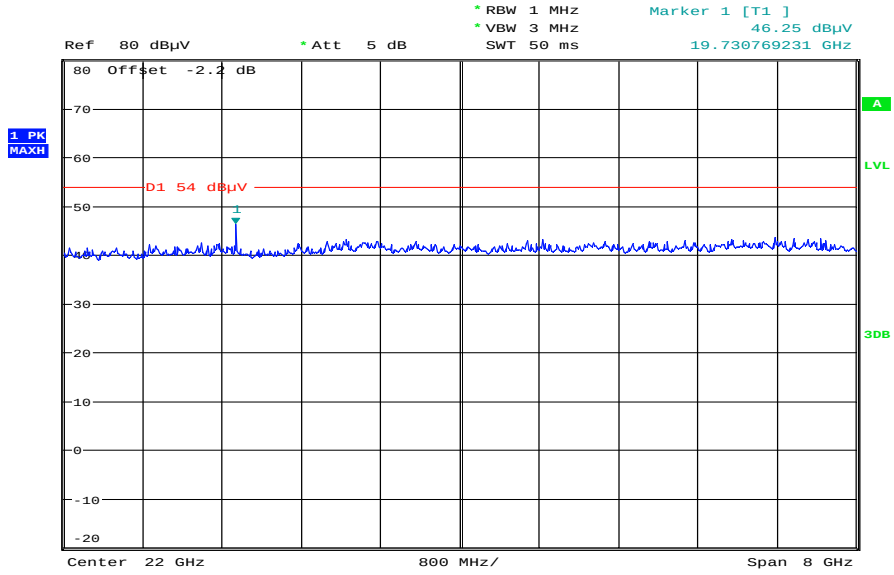
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 11: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 4.JUL.2013 08:19:44

Plot 12: Highest channel, 18 GHz to 26 GHz, vertical & horizontal polarization



Date: 4.JUL.2013 08:10:50

11.10 RX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in idle/receive mode. The results are valid for both modes.

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

Limits:

FCC		IC
RX Spurious Emissions Radiated		
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:

RX Spurious Emissions Radiated [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.		
Measurement uncertainty	± 3 dB	

Result: **Passed.**

Plots: RX / Idle – mode

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

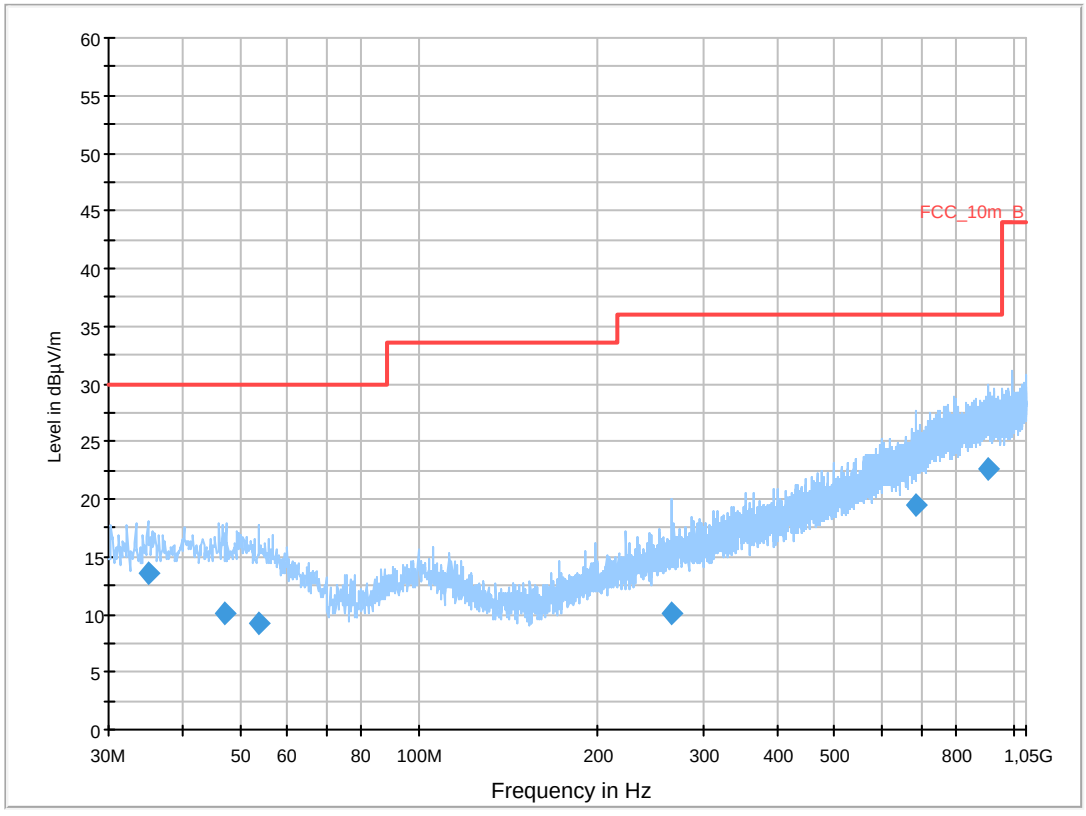
Common Information

EUT:	Coagucheck XS Pro
Serial Number:	unknown
Test Description:	FCC part 15 C class B
Operating Conditions:	WLAN RX
Operator Name:	Hennemann
Comment:	battery powered 3,7/4,2 V

Scan Setup: STAN_Fin [EMI radiated]

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

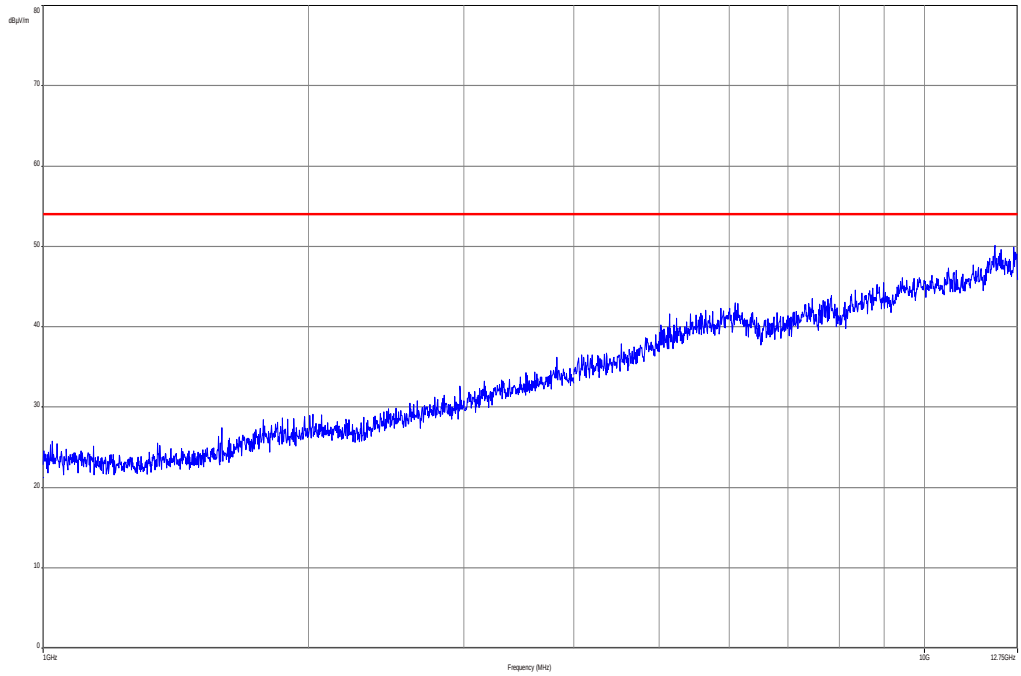
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



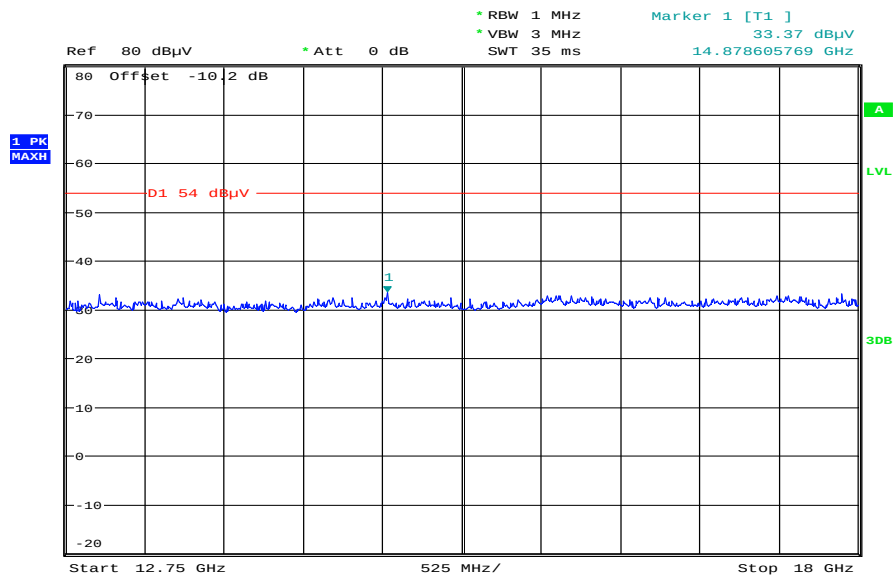
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.028450	13.6	1000.0	120.000	143.0	V	280.0	13.0	16.4	30.0	
46.932450	10.0	1000.0	120.000	98.0	V	170.0	13.3	20.0	30.0	
53.666550	9.3	1000.0	120.000	170.0	V	280.0	13.0	20.7	30.0	
265.684800	10.1	1000.0	120.000	170.0	V	-10.0	13.7	25.9	36.0	
684.324900	19.4	1000.0	120.000	170.0	H	182.0	22.1	16.6	36.0	
908.635950	22.6	1000.0	120.000	120.0	H	272.0	25.2	13.4	36.0	

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

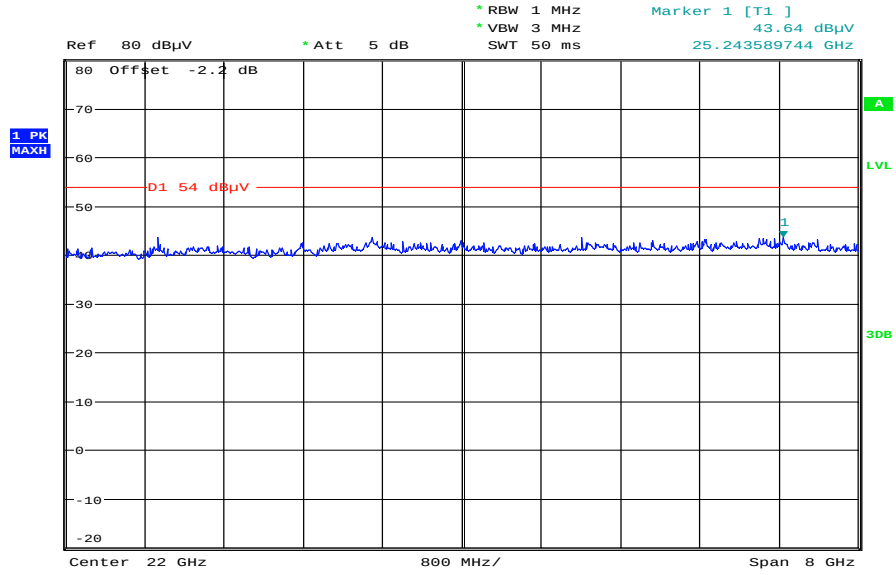


Plot 3: 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 4.JUL.2013 08:20:27

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



11.11 Spurious emissions radiated < 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is representative for all channels and modes. If peaks are found channel 1 and channel 11 will be measured too. The measurement is performed with the data rate producing the highest output power. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
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		IC
TX Spurious Emissions Radiated < 30 MHz		
Frequency (MHz)	Field Strength (dBµV/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

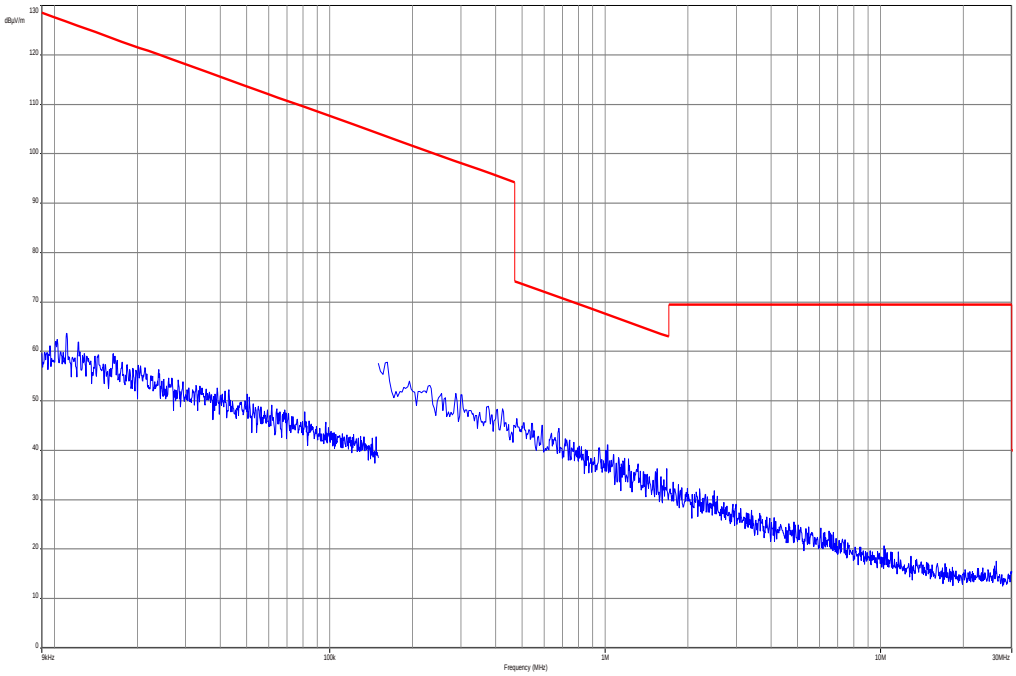
Results:

TX Spurious Emissions Radiated < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
No peaks found.		
Measurement uncertainty	± 3 dB	

Result: Passed

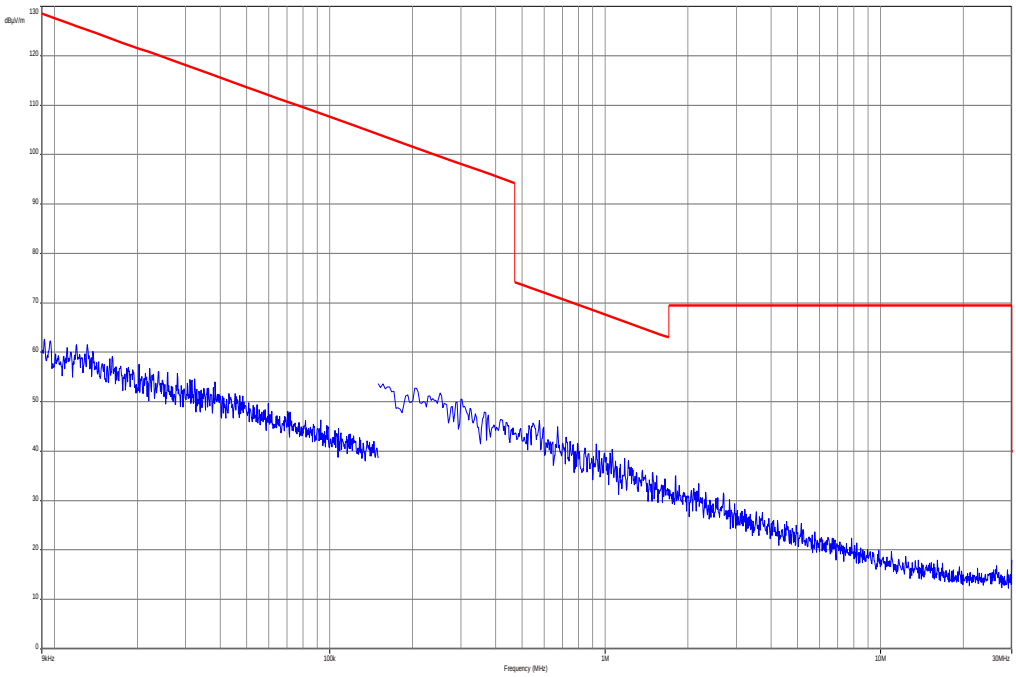
Plots: TX mode

Plot 1: 9 kHz to 30 MHz



Plots: RX / Idle – mode

Plot 1: 9 kHz to 30 MHz



11.12 Spurious emissions conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to channel 6. This measurement is repeated for DSSS and OFDM modulation. If peaks are found channel 1 and channel 11 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 remeasured 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		IC
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

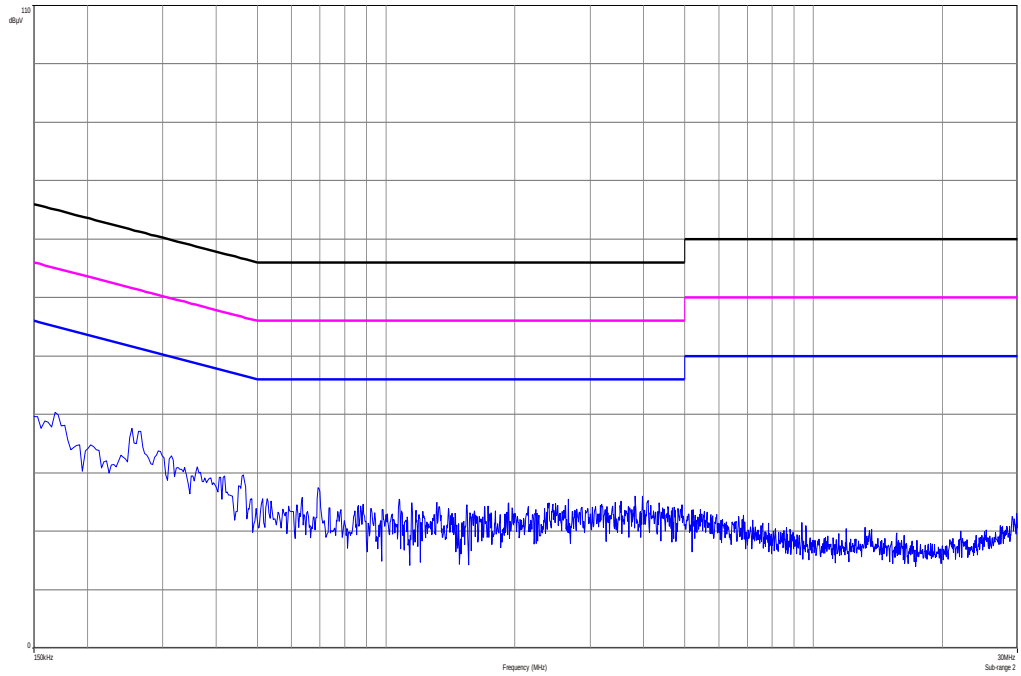
Results:

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	

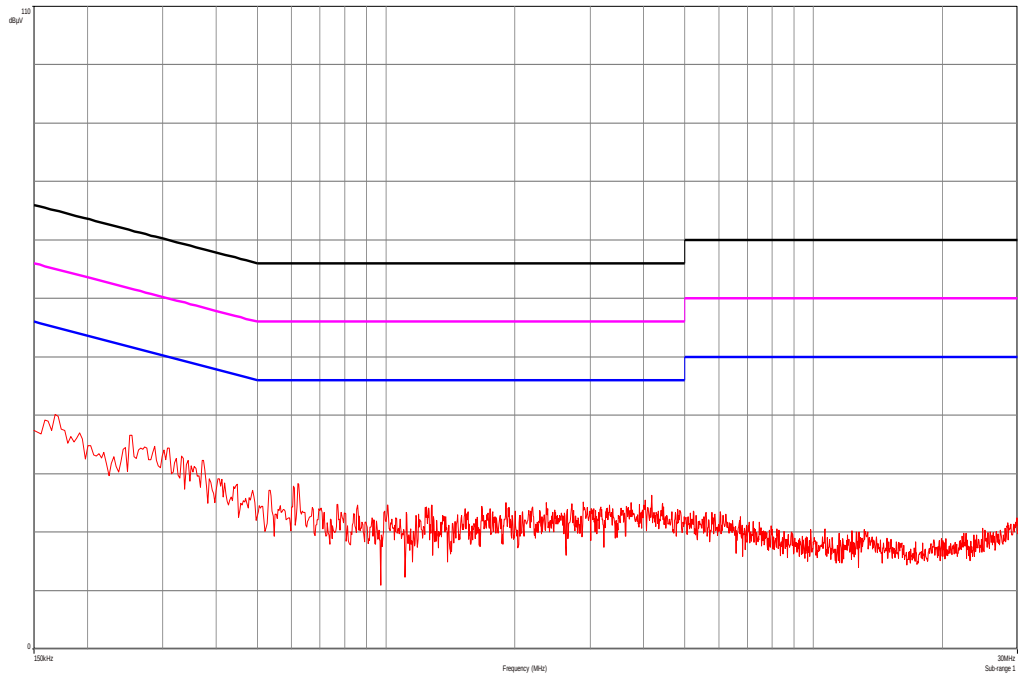
Result: **Passed**

Plots:

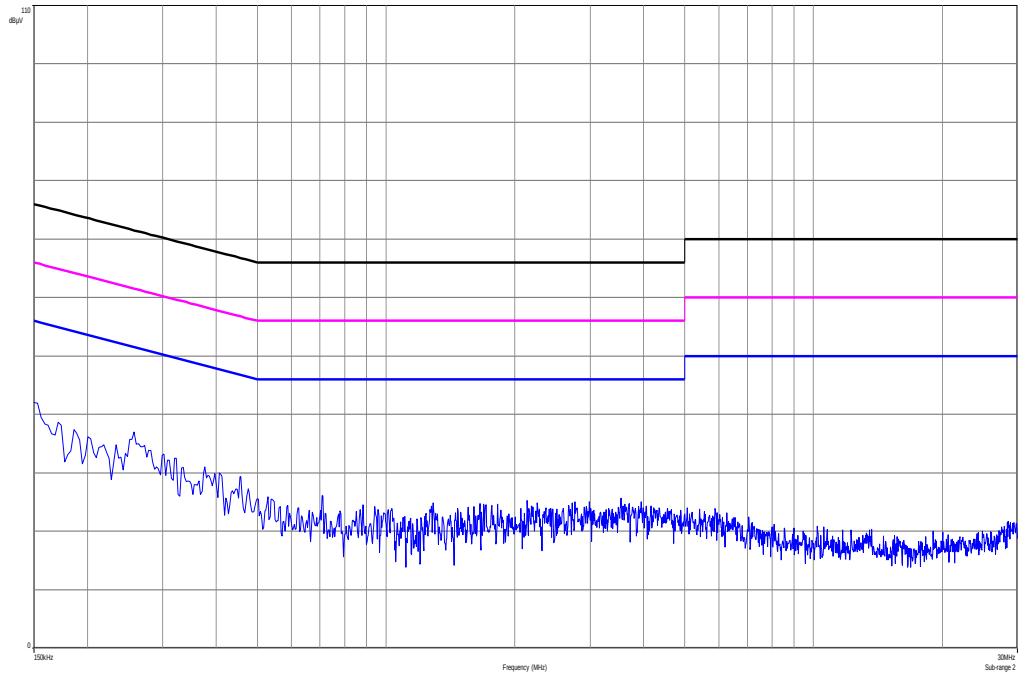
Plot 1: TX mode, 150 kHz to 30 MHz, phase line



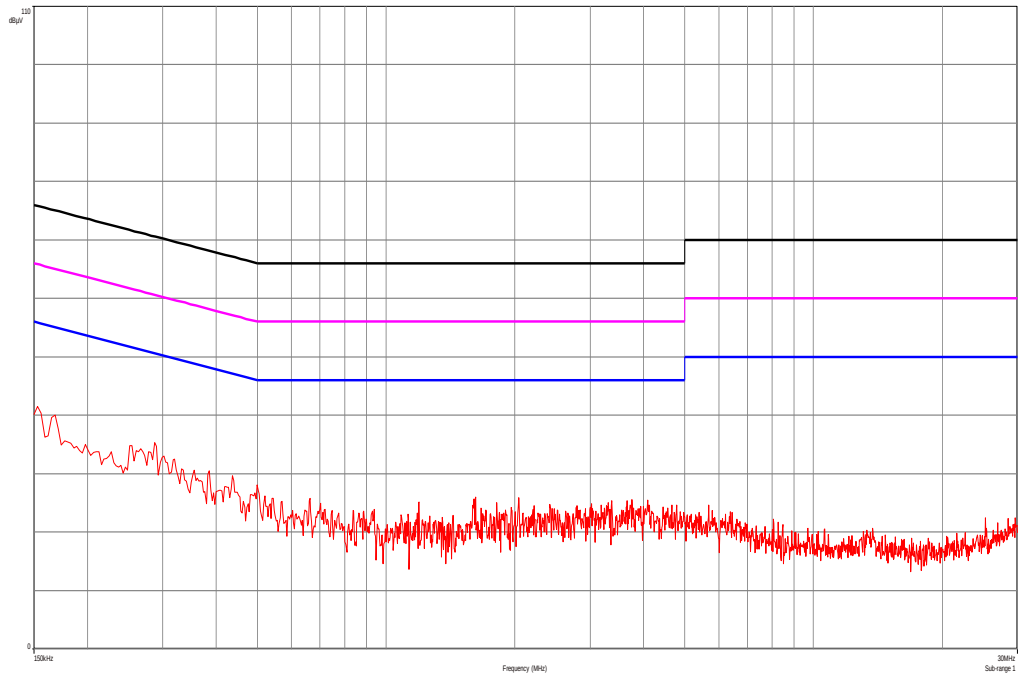
Plot 2: TX mode, 150 kHz to 30 MHz, neutral line



Plot 3: RX / Idle – mode, 150 kHz to 30 MHz, phase line



Plot 4: RX / Idle – mode, 150 kHz to 30 MHz, neutral line



12 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	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKl!	08.05.2013	08.05.2015
2	n. a.	Active Loop Antenna 10 kHz to 30 MHz	6502	EMCO	2210	300001015	ne		
3	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
4	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
5	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2012	06.01.2014
6	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
7	9	Isolating Transformer	MPL IEC625 Bus Regeltrennt ravo	Erfi	91350	300001155	ne		
8	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
9	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
10	n. a.	Band Reject filter	WRCG1855/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
11	n. a.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
12	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
13	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKl!	14.10.2011	14.10.2014
14	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014
15	ECT-0002	Temperature and Climatic Test Chamber	VUK04/1500	Heraeus Voetsch	31098	300001507	g	20.09.2011	20.09.2013
16	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	Ve	09.10.2012	09.10.2014

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
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

13 Observations

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

Annex A Photographs of the test setup

Photo documentation:

Photo 1:

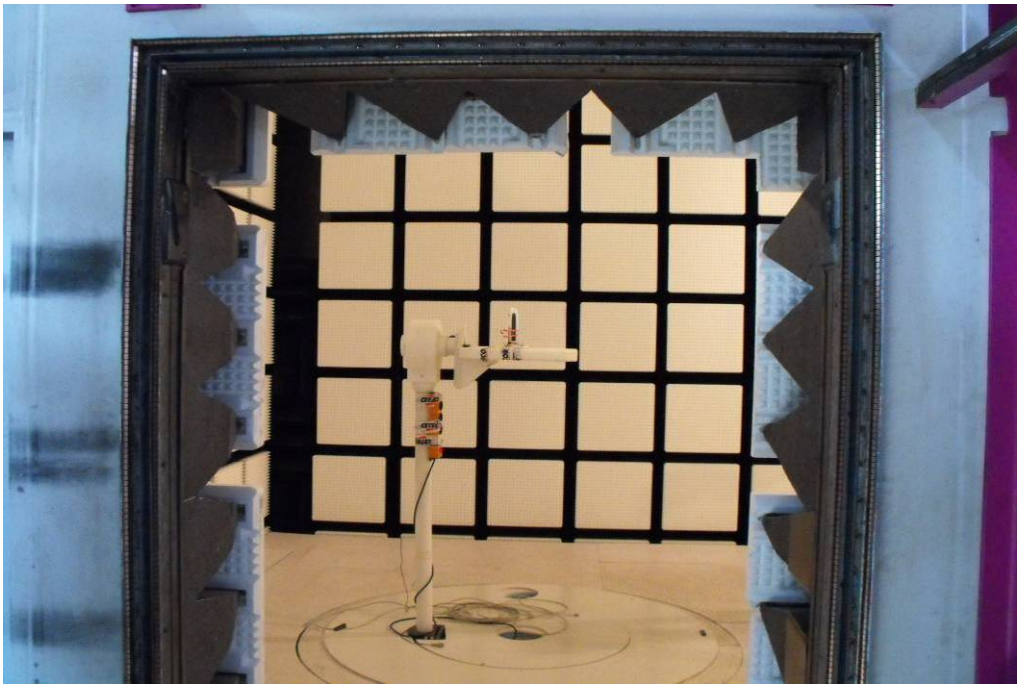


Photo 2:

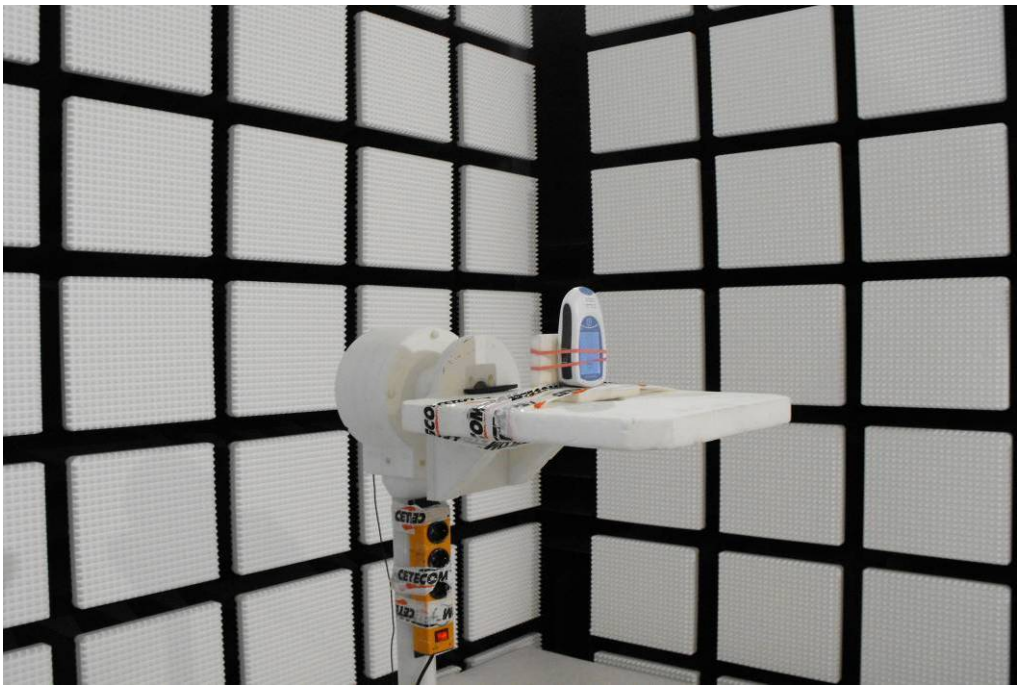


Photo 3:

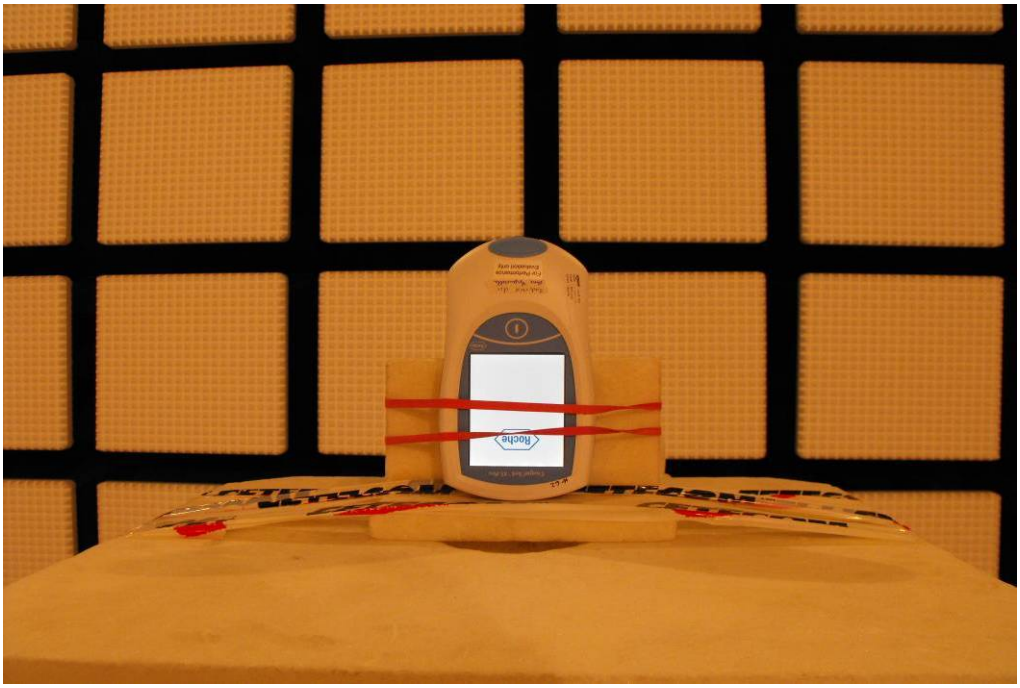


Photo 4:

Photo 5:

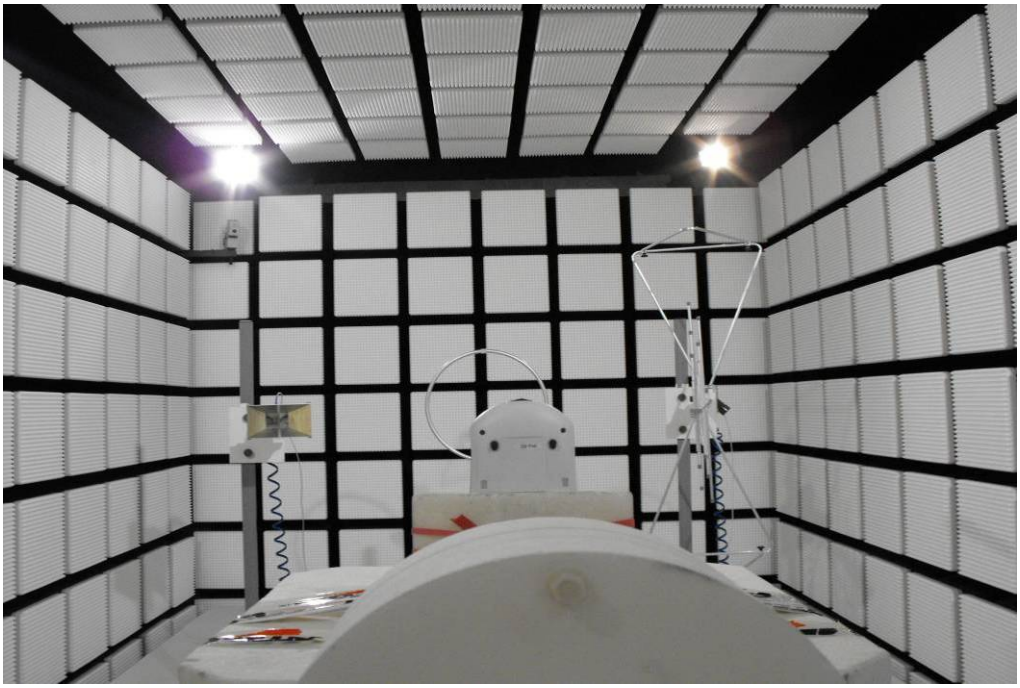


Photo 6:

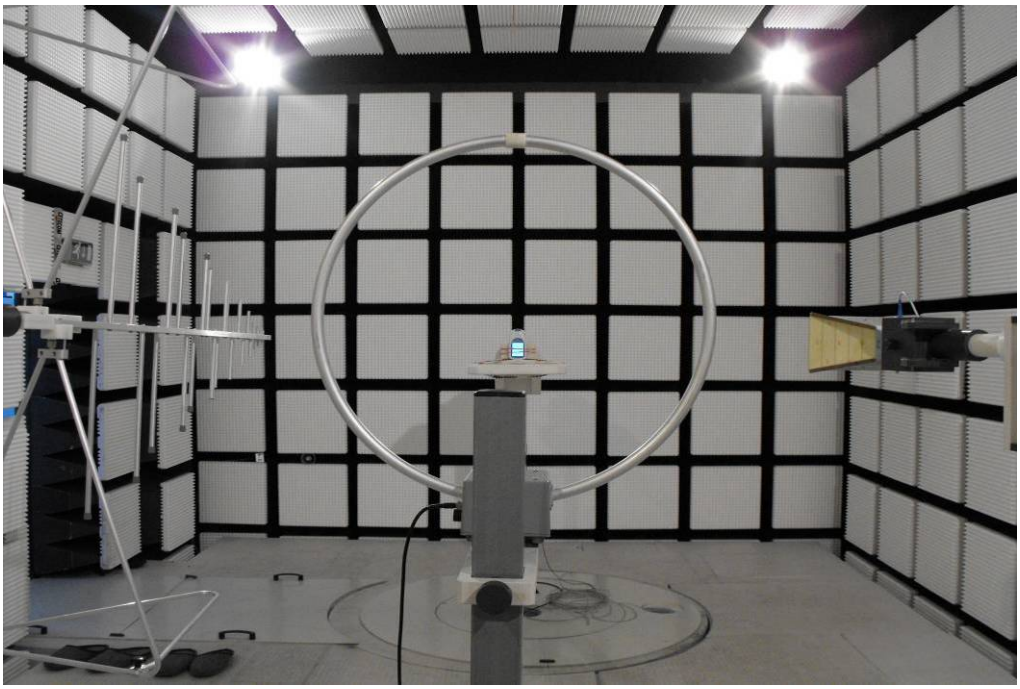


Photo 7:

Photo 8:

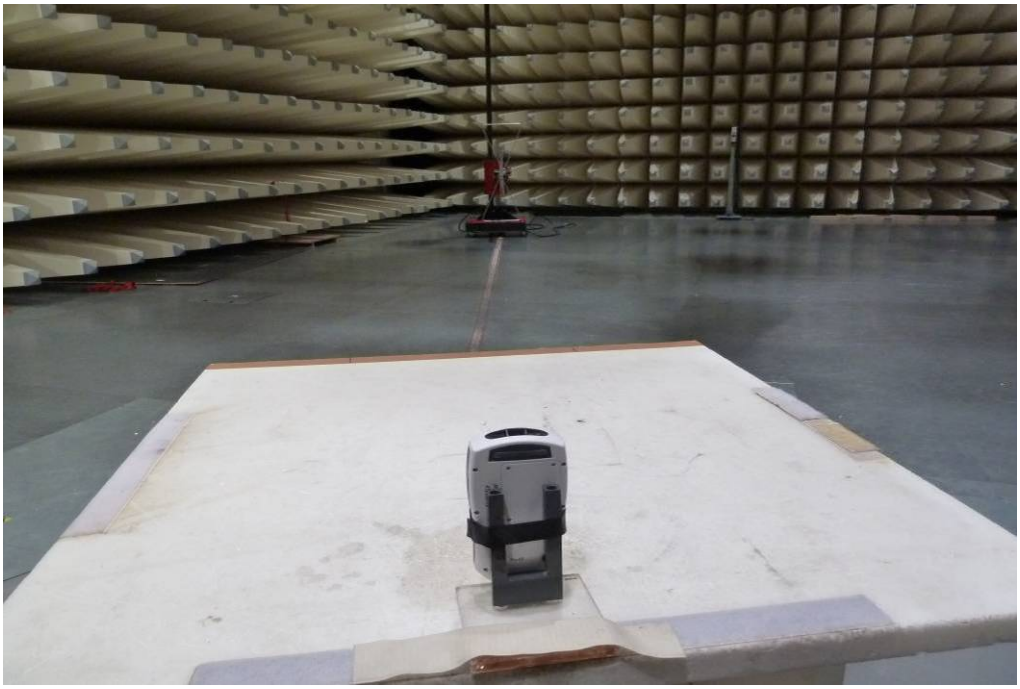


Photo 9:

Annex B Photographs of the EUT

Photo documentation:

Photo 1:

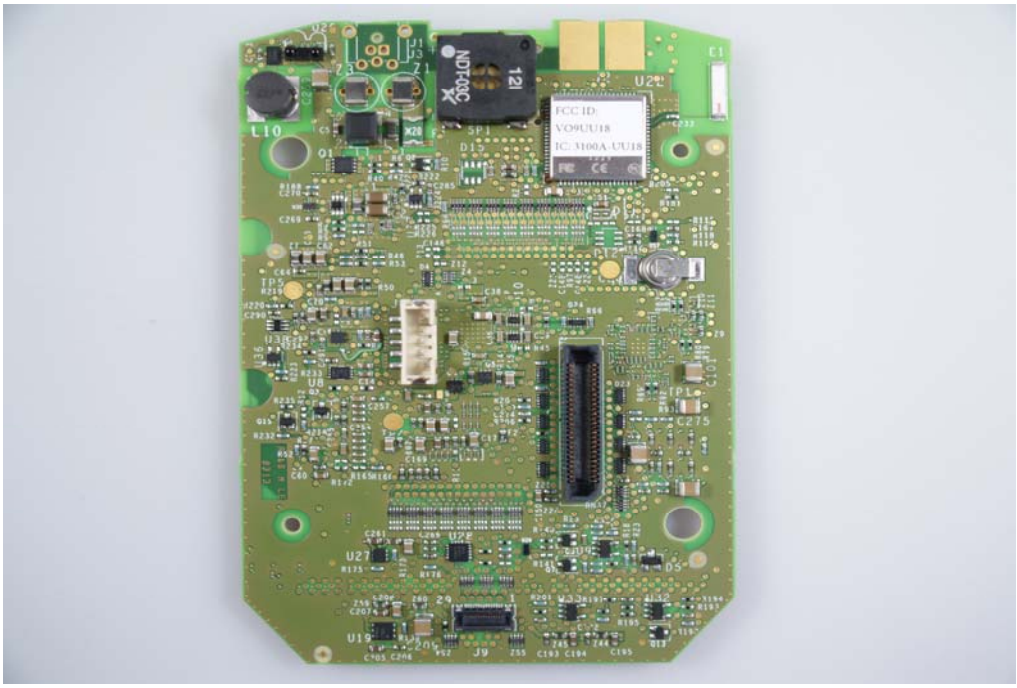


Photo 2:

Photo 3:

Annex C Document history

Version	Applied changes	Date of release
1.0	Initial release	2013-08-12
-A	Correction of cover sheet	2013-08-23
-B	Correction of model name	2013-12-11

Annex D 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
IC - Industry Canada
Inv. No. - Inventory number
N/A - Not applicable
PP - Positive peak
QP - Quasi peak
S/N - Serial number
SW - Software

Annex E Accreditation Certificate

Front side of certificate

DAkkS
Deutsche Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Beliehene 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

Im Auftrag
Dr.-Ing. (FH) Ralf Egner
Abteilungsleiter

Siehe Hinweise auf der Rückseite

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
Rundeallee 100
38116 Braunschweig

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Die Akkreditierung erfolgte gemäß des Gesetzes über die Akkreditierungsstelle (AkkStelleG) vom 31. Juli 2009 (BGBl. I S. 2625) 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 (Abl. 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