
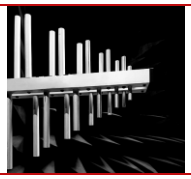
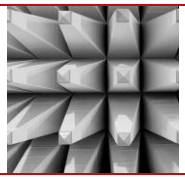

CETECOM™
CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Test report no.: 1-6965/13-09-07

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

Testing laboratory

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

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

Applicant

Sony Mobile Communications AB
Nya Vattentornet
22188 Lund / SWEDEN
Phone: +46 46 19 30 00
Fax: -/-
Contact: Mikael Nilsson
e-mail: Micke.nilsson@sonymobile.com
Phone: +46 7 03 22 75 03

Manufacturer

Sony Mobile Communications AB
Nya Vattentornet
22188 Lund / SWEDEN

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:	**Smart Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/V/VI/XIX; LTE FDD1/3/19/21; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS**
FCC ID:	**PY7PM-0741**
Frequency:	DTS band 2400 MHz to 2483.5 MHz (lowest channel 01 – 2412 MHz; highest channel 11 – 2462 MHz)
Technology tested:	WLAN (DSSS/b – mode; OFDM/g – mode & n HT20 – mode)
Antenna:	Integrated antenna
Power supply:	3.7 V DC by Li - polymer battery
Temperature range:	-30°C to +60°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:

p. o.

cn=David Lang, o=CETECOM ICT Services GmbH, ou=LNG-131017, email=david.lang@cetecom.com, c=DE
2014.03.05 15:31:36 +01'00'

Andreas Luckenbill
Expert

Test performed:

cn=Marco Bertolino, o=CETECOM ICT Services GmbH, ou=BTL-100826, email=marco.bertolino@cetecom.com, c=DE
2014.03.05 15:10:28 +01'00'

Marco Bertolino
Testing Manager

1 Table of contents

2 General information

2.1 Notes and disclaimer

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2.2 Application details

Date of receipt of order:	2013-12-19
Date of receipt of test item:	2014-02-03
Start of test:	2014-02-03
End of test:	2014-02-18
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15		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

4 Test environment

Temperature:	T_{nom}	+22 °C	during room temperature tests
	T_{max}	+60 °C	during high temperature tests
	T_{min}	-30 °C	during low temperature tests
Relative humidity content:		41 %	
Barometric pressure:		not relevant for this kind of testing	
Power supply:	V_{nom}	3.7 V	DC by Li - polymer battery
	V_{max}	4.2 V	
	V_{min}	3.3 V	

5 Test item

Kind of test item	**:**	**Smart Phone GPRS/EGPRS 850/900/1800/1900; UMTS HSPA FDDI/V/VI/XIX; LTE FDD1/3/19/21; WLAN b/g/n/a/ac; BT 4.0; RFID; A-GPS**
S/N serial number	**:**	**Radiated unit: CB5A1X9G1M** **Conducted unit: CB5A1X7XCZ**
HW hardware status	**:**	**AP2.0**
SW software status	**:**	**RF test software**
Frequency band [MHz]	**:**	**DTS 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 antenna**
Power supply	**:**	**3.7 V DC by Li - polymer battery**
Temperature range	**:**	**-30°C to +60 °C**

5.1 Additional information

Test setup- and EUT-photos are included in test report: 1-6965/13-09-01_AnnexA
1-6965/13-09-01_AnnexB
1-6965/13-09-01_AnnexD

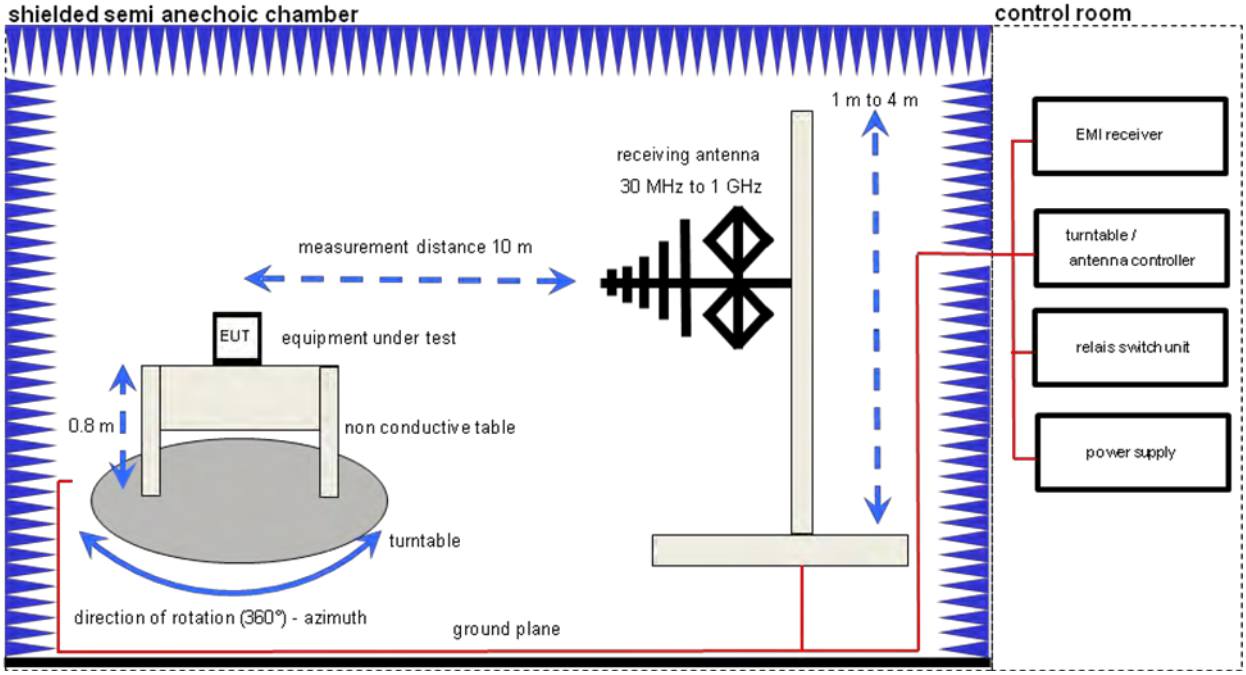
6 Test laboratories sub-contracted

None

7 Description of the test setup

7.1 Radiated measurements chamber F

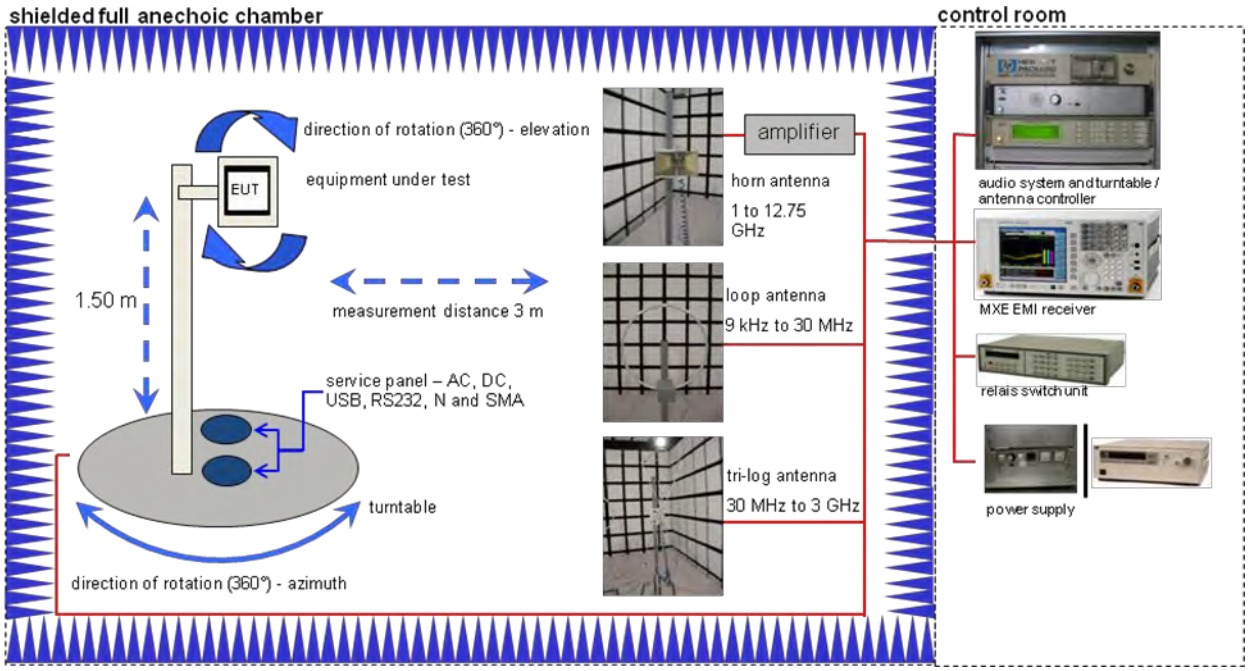
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas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

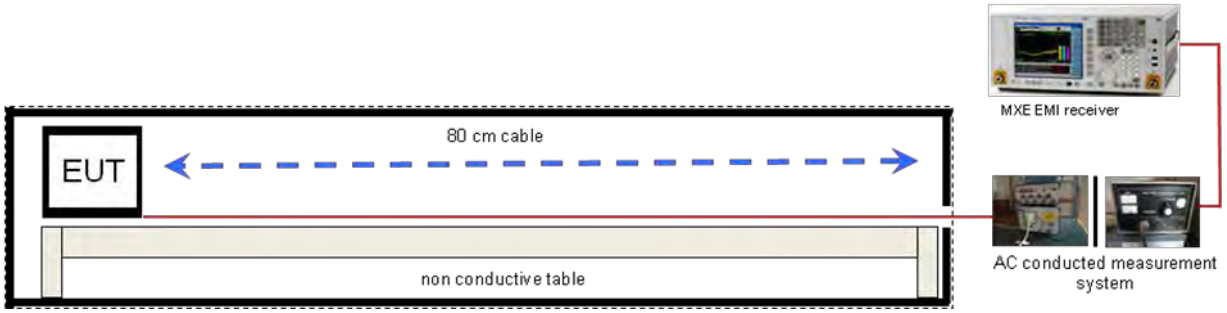
Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405
TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854
Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351
Highpass 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	8905-2342	300000256
Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996
Switch / Control Unit	3488A	HP Meßtechnik	*	300000199
Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156
Isolating Transformer	MPL IEC625 Bus Regeltrenntravo	Erfi	91350	300001155
Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997
Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143

7.3 Radiated measurements 12.75 GHz to 26 GHz

Equipment table:

Equipment	Type	Manufacturer	Serial No.	INV. No Cetecom
Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787
Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442
Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268
Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517

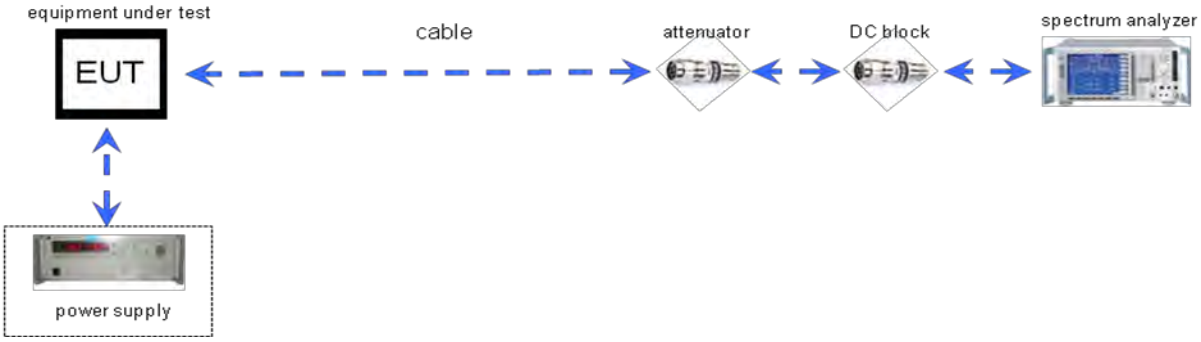
7.4 AC conducted



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 40 GHz	FSV40	R&S	101042	300004517

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	2014-03-05	-/-

Test specification clause	Test case	Guideline	Temperature conditions	Power source voltages	Mode	Pass	Fail	NA	NP	Remark
§15.247(b)(4)	Antenna gain	-/-	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.247(e)	Power spectral density	KDB 558074 DTS clause: 10.2	Nominal	Nominal	DSSS OFDM g & n	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(a)(2)	Spectrum bandwidth – 6 dB bandwidth	KDB 558074 DTS clause: 8.2	Nominal	Nominal	DSSS OFDM g & n	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
-/-	Occupied bandwidth	-/-	Nominal	Nominal	DSSS OFDM g & n	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(b)(3)	Maximum output power	KDB 558074 DTS clause: 9.1.2	Nominal	Nominal	DSSS OFDM g & n	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(d)	Band edge compliance conducted	KDB 558074 DTS clause: 13.2.1	Nominal	Nominal	DSSS OFDM g & n	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.205	Band edge compliance radiated	-/-	Nominal	Nominal	DSSS OFDM g & n	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(d)	TX spurious emissions conducted	KDB 558074 DTS clause: 11.1 & 11.2	Nominal	Nominal	DSSS OFDM g & n	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.247(d)	TX spurious emissions radiated	-/-	Nominal	Nominal	DSSS OFDM g & n	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.109	RX spurious emissions radiated	-/-	Nominal	Nominal	-/-	☒	☐	☐	☐	complies
§15.209(a)	TX spurious emissions radiated < 30 MHz	-/-	Nominal	Nominal	DSSS OFDM g & n	☒ ☒	☐ ☐	☐ ☐	☐ ☐	complies
§15.107(a) §15.207	Conducted emissions < 30 MHz	-/-	Nominal	Nominal	DSSS OFDM g & n	☒ ☒	☐ ☐	☐ ☐	☐ ☐	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

Limits:

FCC
Antenna Gain
6 dBi

Results:

T_{nom}	V_{nom}	lowest channel	middle channel	highest channel
Gain [dBi] Declared by the manufacturer		-2.7	-1.7	-0.6

Result: Passed

10.2 Identify worst case data rate

Measurement:

All modes of the module will be measured with an average power meter to identify the maximum transmission power on low, mid and high channel. In the case that only one or two channels are available, only these will be measured.

In further tests only the identified worst case modulation scheme or bandwidth will be measured.
Additional the band edge compliance test will be performed in the lowest and highest modulation scheme.

Measurement parameters:

Average Power Meter

Results:

Modulation	Modulation scheme / bandwidth		
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	1Mbit/s	1Mbit/s	1Mbit/s
OFDM / g – mode	6Mbit/s	6Mbit/s	6Mbit/s
OFDM / n – mode	MCS0	MCS0	MCS0

10.3 Maximum output power

Description:

Measurement of the maximum output power conducted. 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
Maximum Output Power
Conducted: 1.0 W – Antenna Gain max. 6 dBi

Results:

DSSS / b – mode	**Maximum Output Power [dBm]**		
Frequency	2412 MHz	2437 MHz	2462 MHz
Peak output power conducted Worst case data rate	15.21	16.71	17.09
OFDM / g – mode	**Maximum Output Power [dBm]**		
Frequency	2412 MHz	2437 MHz	2462 MHz
Peak output power conducted Worst case data rate	19.96	21.06	19.64
OFDM / n HT20 – mode	**Maximum Output Power [dBm]**		
Frequency	2412 MHz	2437 MHz	2462 MHz
Peak output power conducted Worst case data rate	20.10	21.95	20.51
Measurement uncertainty	± 1.5 dB (cond.)		

Result: Passed

10.4 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
Power Spectral Density
8 dBm (conducted)

Results:

Modulation	Power Spectral density [dBm]		
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	-7.85	-5.02	-7.78
OFDM / g – mode	-12.41	-12.52	-13.45
OFDM / n HT 20 – mode	-12.05	-10.90	-12.40
Measurement uncertainty	± 1.5 dB		

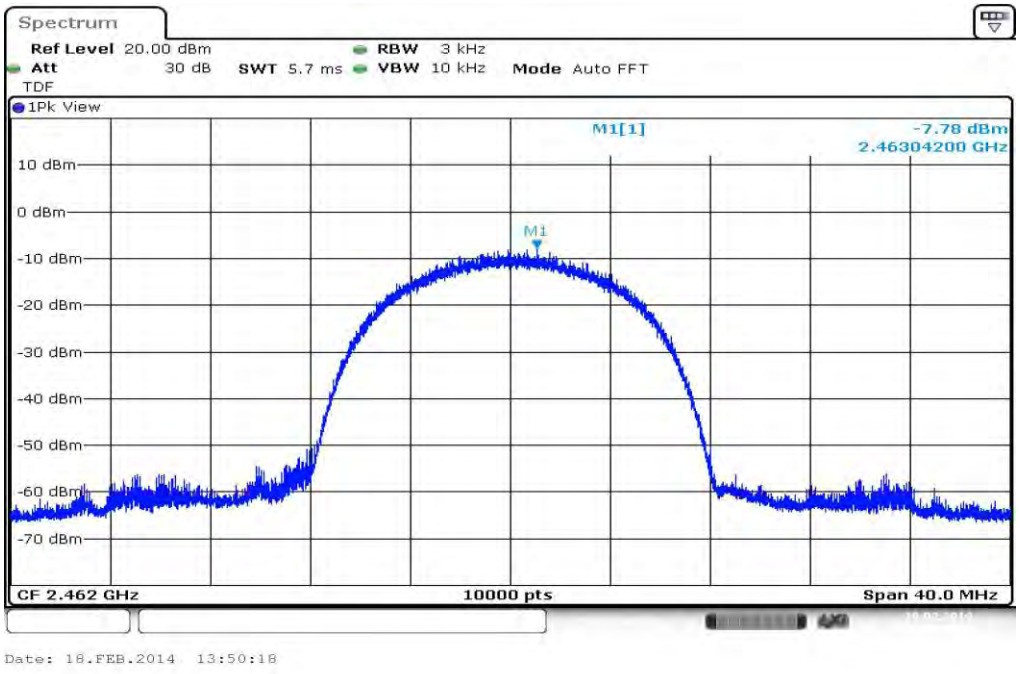
Result: Passed

Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel

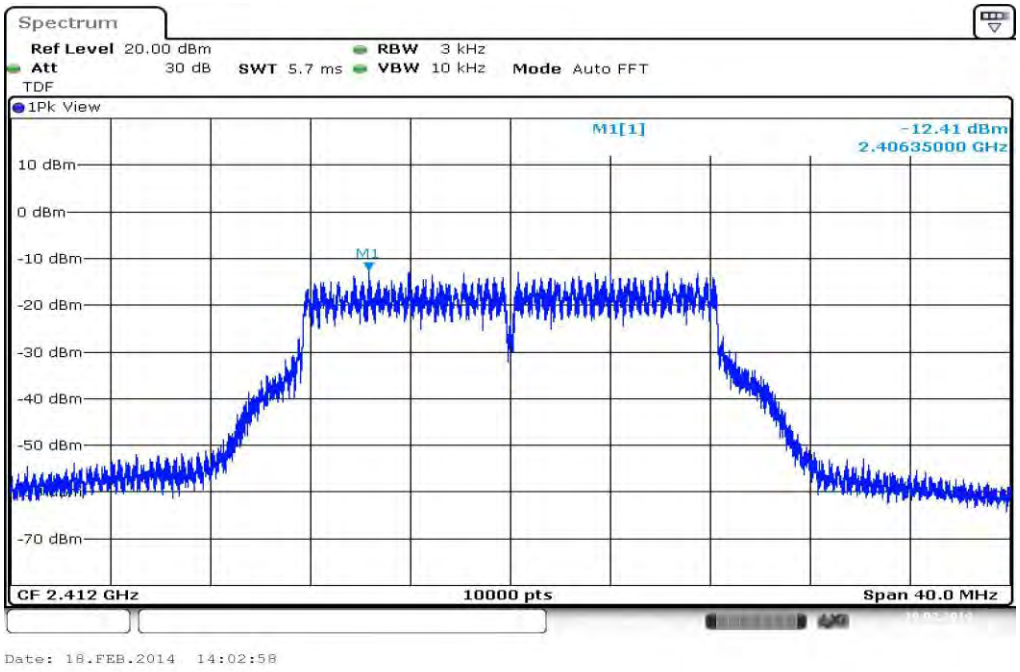
Plot 2: TX mode, middle channel

Plot 3: TX mode, highest channel

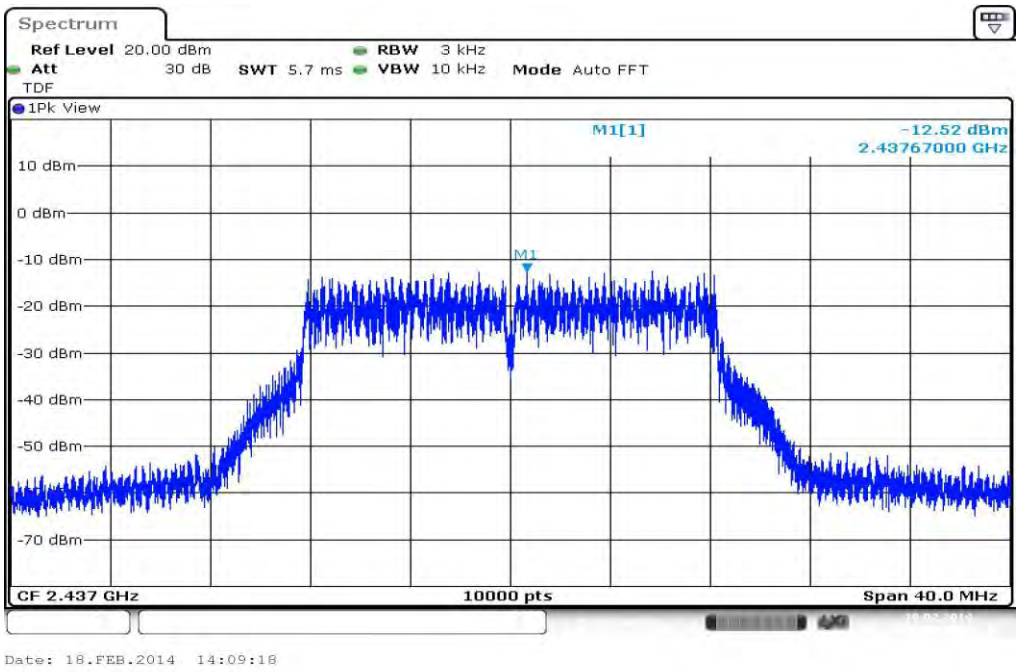


Plots: OFDM / g – mode

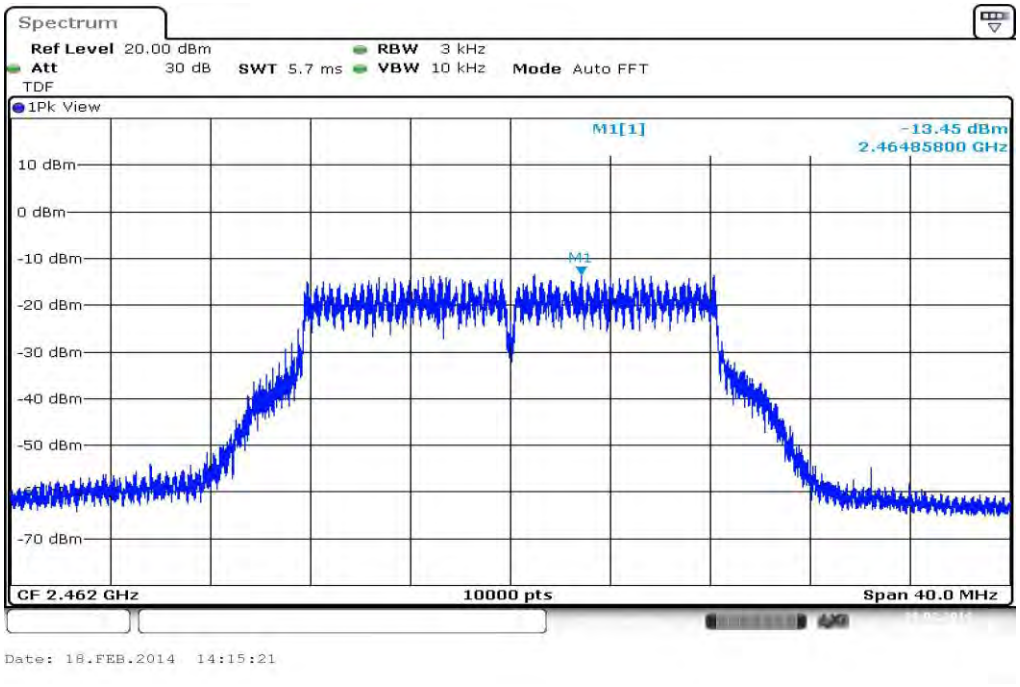
Plot 1: TX mode, lowest channel



Plot 2: TX mode, middle channel

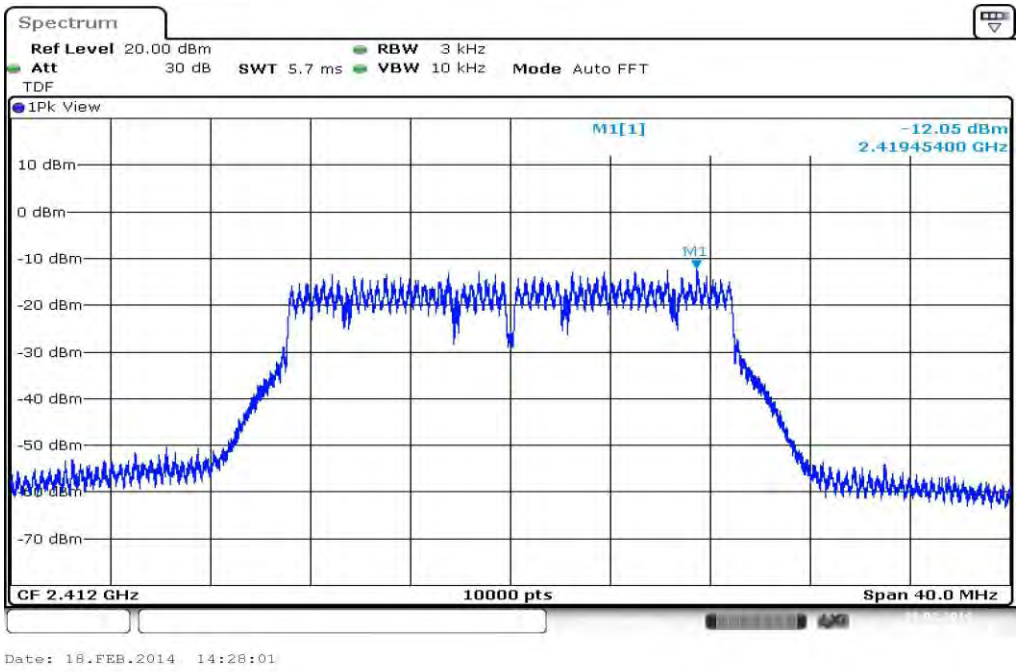


Plot 3: TX mode, highest channel

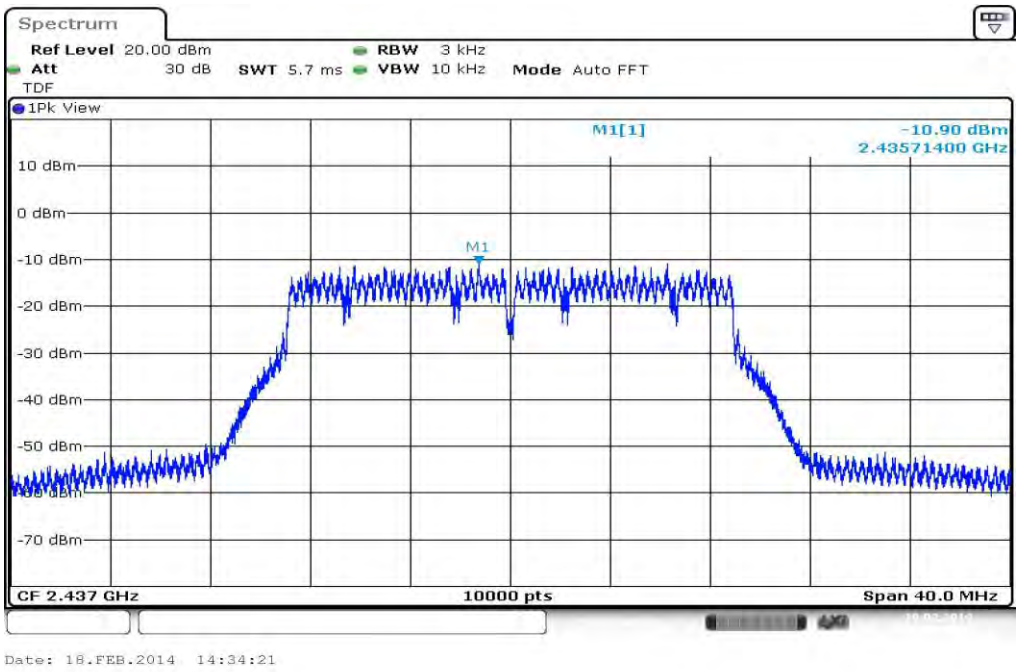


Plots: OFDM / n – mode

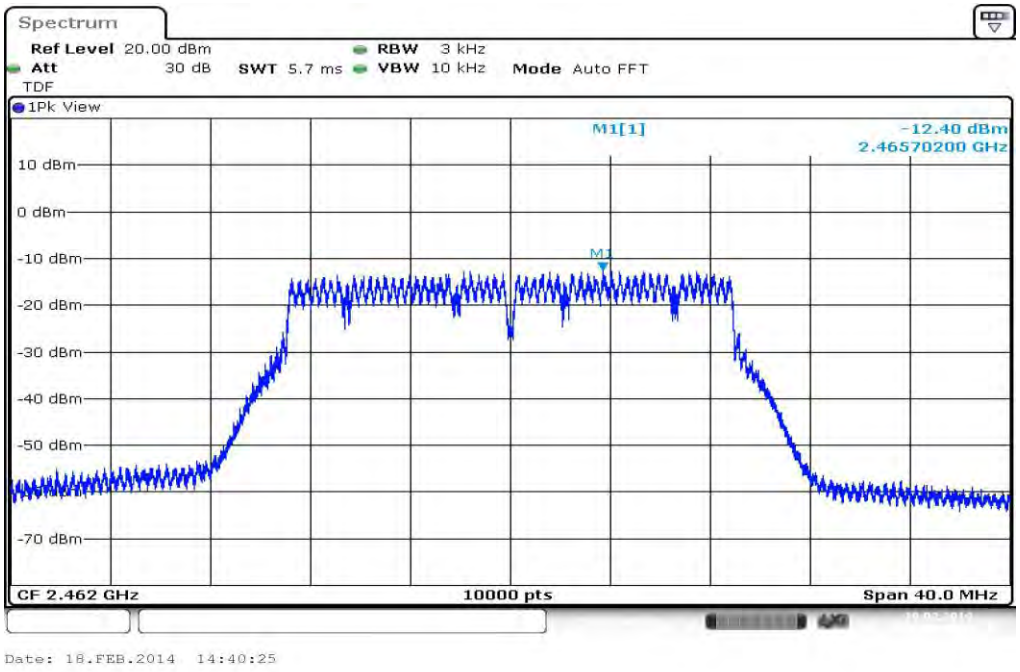
Plot 1: TX mode, lowest channel



Plot 2: TX mode, middle channel



Plot 3: TX mode, highest channel



10.5 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
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:

Frequency	6 dB bandwidth [MHz]		
	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	5.66	5.70	5.66
OFDM / g – mode	12.37	12.37	12.40
OFDM / n HT20 – mode	13.28	12.93	13.27
Measurement uncertainty	± RBW		

Result: Passed

10.6 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:

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

Results:

Modulation	20 dB bandwidth [MHz]		
Frequency	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	10.98	10.96	11.31
OFDM / g – mode	17.87	17.28	17.85
OFDM / n HT20 – mode	18.48	18.17	18.45
Measurement uncertainty	± RBW		

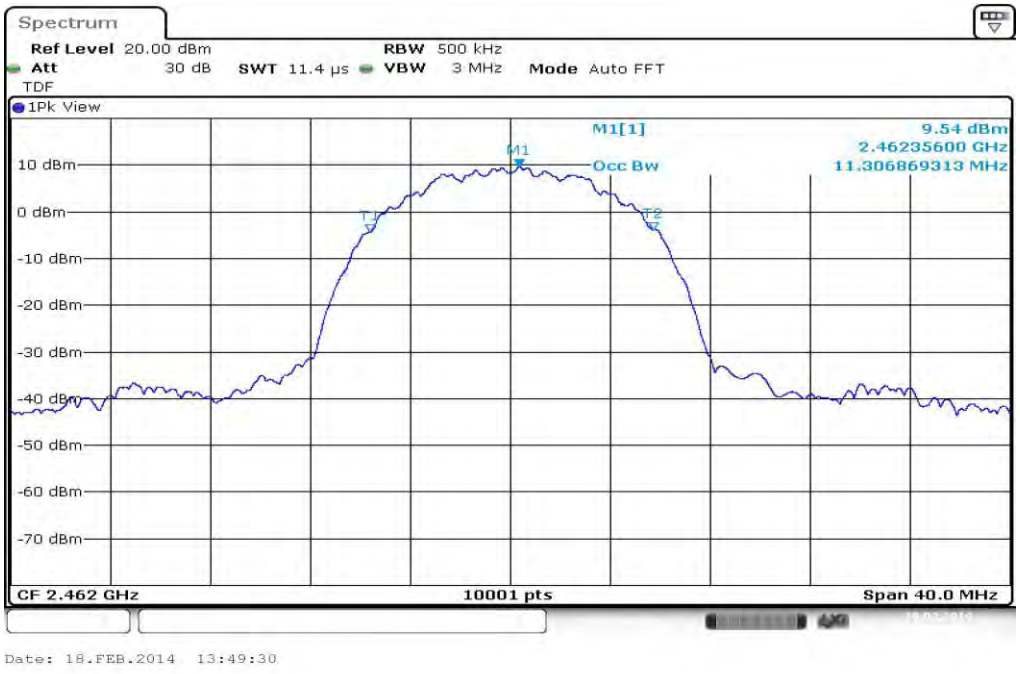
Result: Passed

Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel

Plot 2: TX mode, middle channel

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

Plots: OFDM / n – mode

Plot 1: TX mode, lowest channel

Plot 2: TX mode, middle channel

Plot 3: TX mode, highest channel

10.7 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
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.

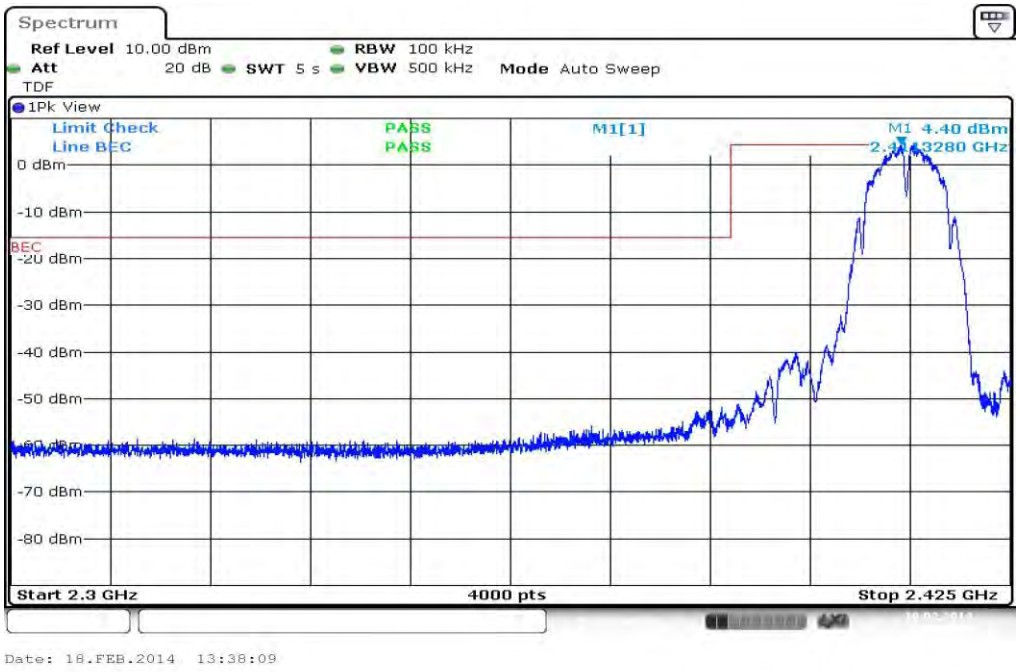
Results:

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

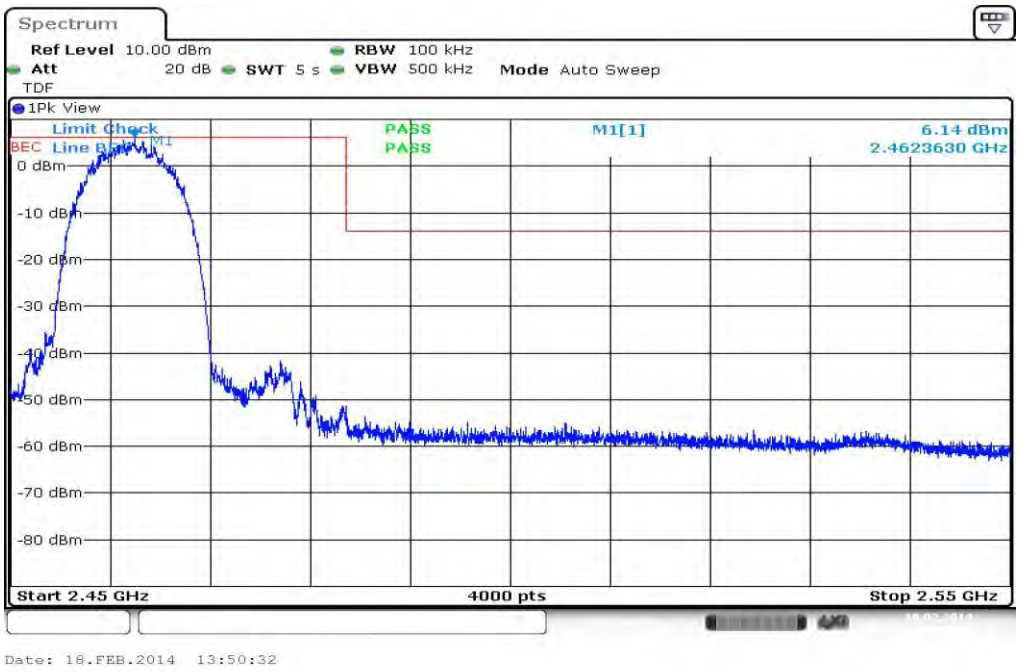
Result: Passed

Plots: DSSS / b – mode

Plot 1: TX mode, lower band edge

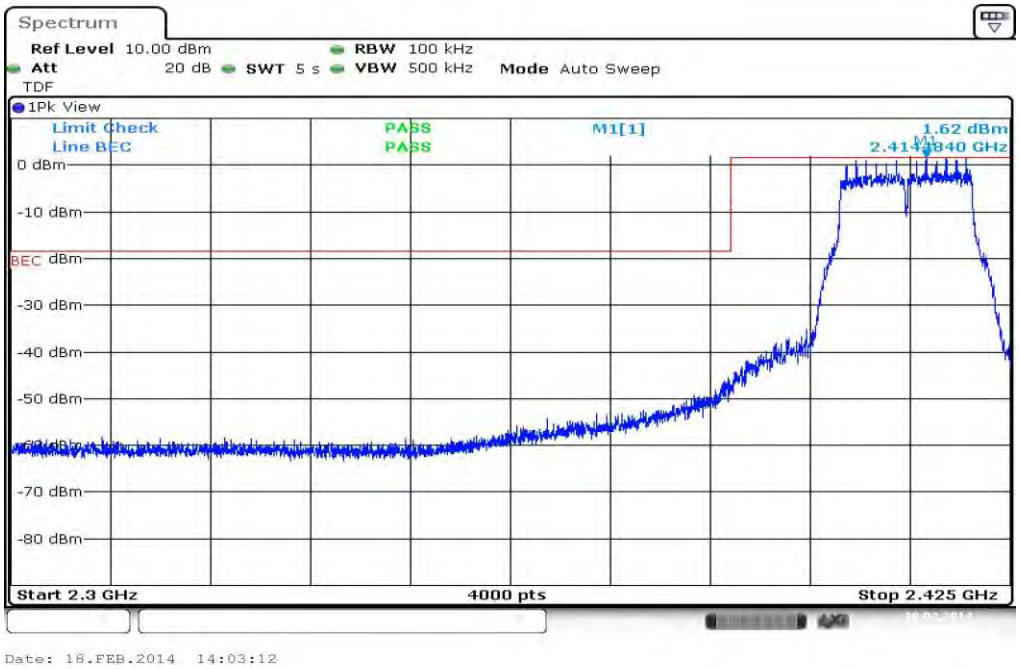


Plot 2: TX mode, upper band edge

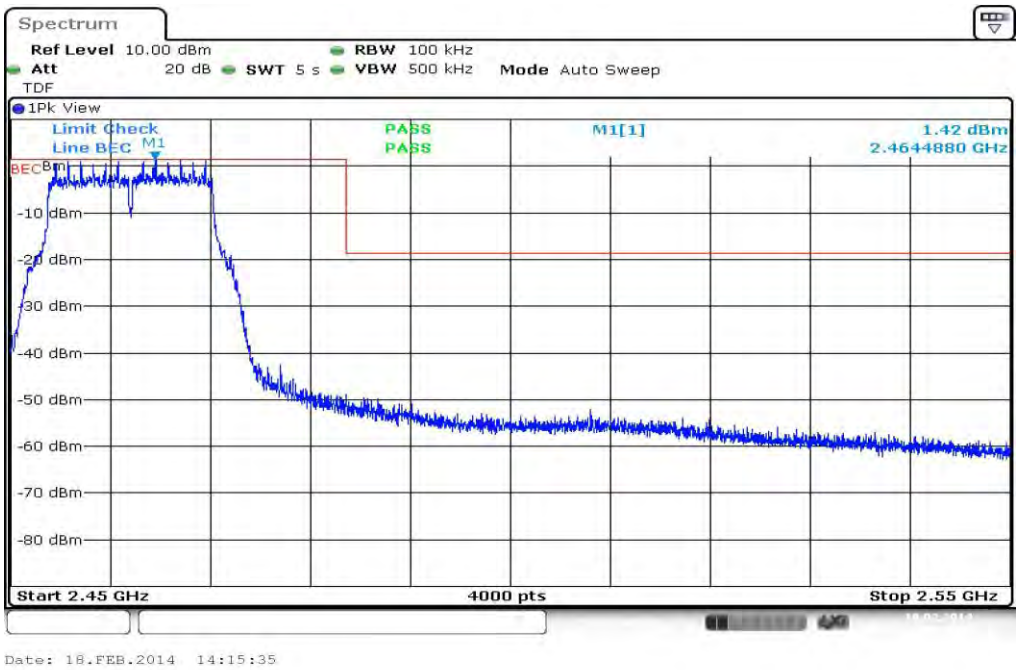


Plots: OFDM / g – mode

Plot 1: TX mode, lower band edge

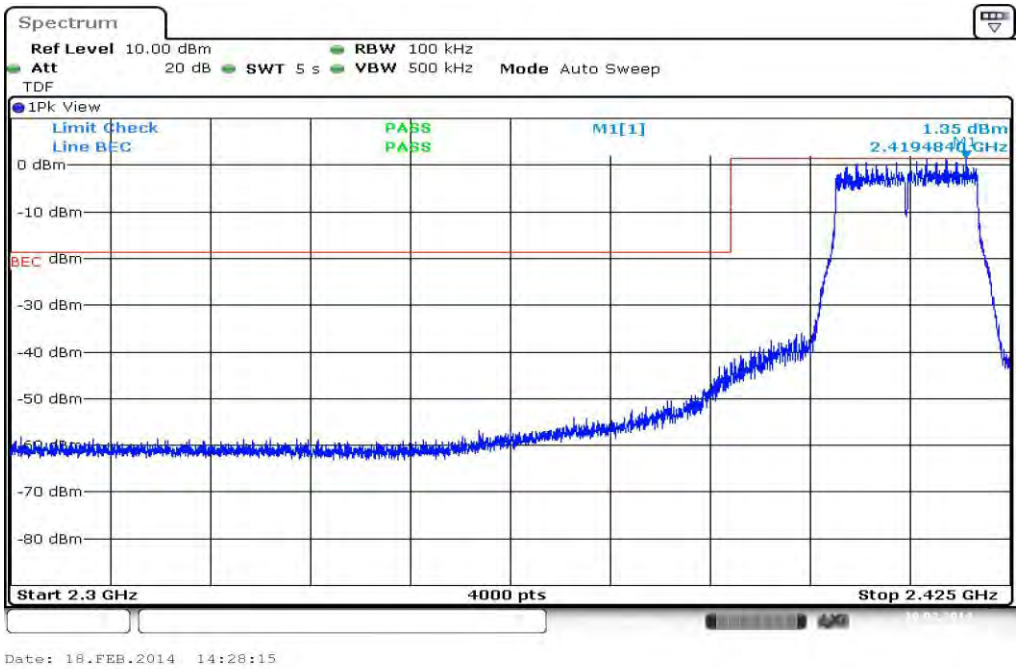


Plot 2: TX mode, upper band edge

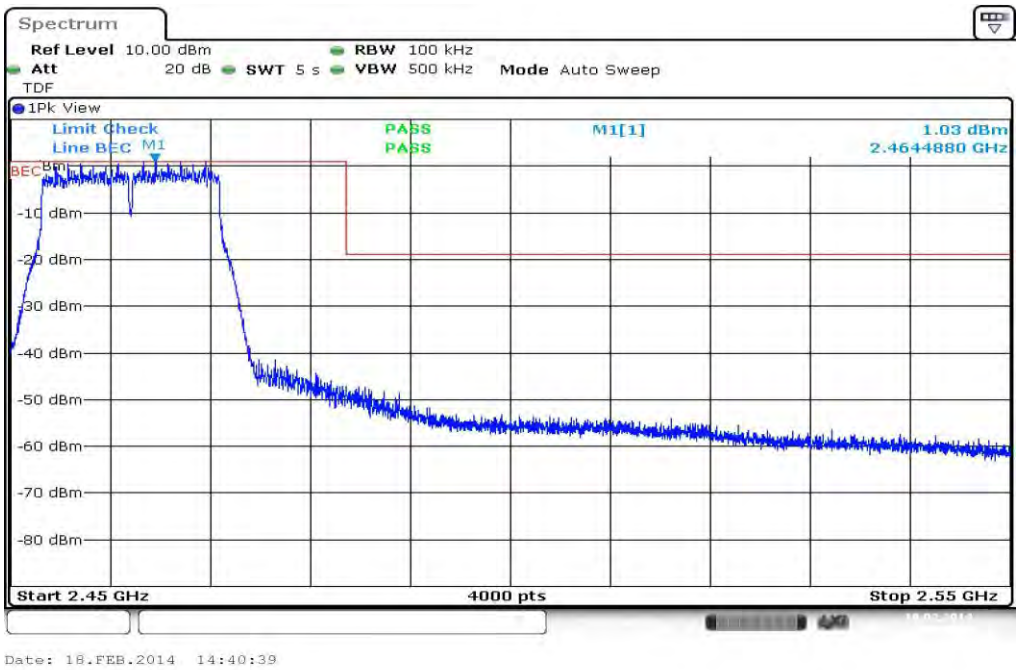


Plots: OFDM / n HT20 – mode

Plot 1: TX mode, lower band edge



Plot 2: TX mode, upper band edge



10.8 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
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)).
74 dBµV/m Peak 54 dBµV/m AVG

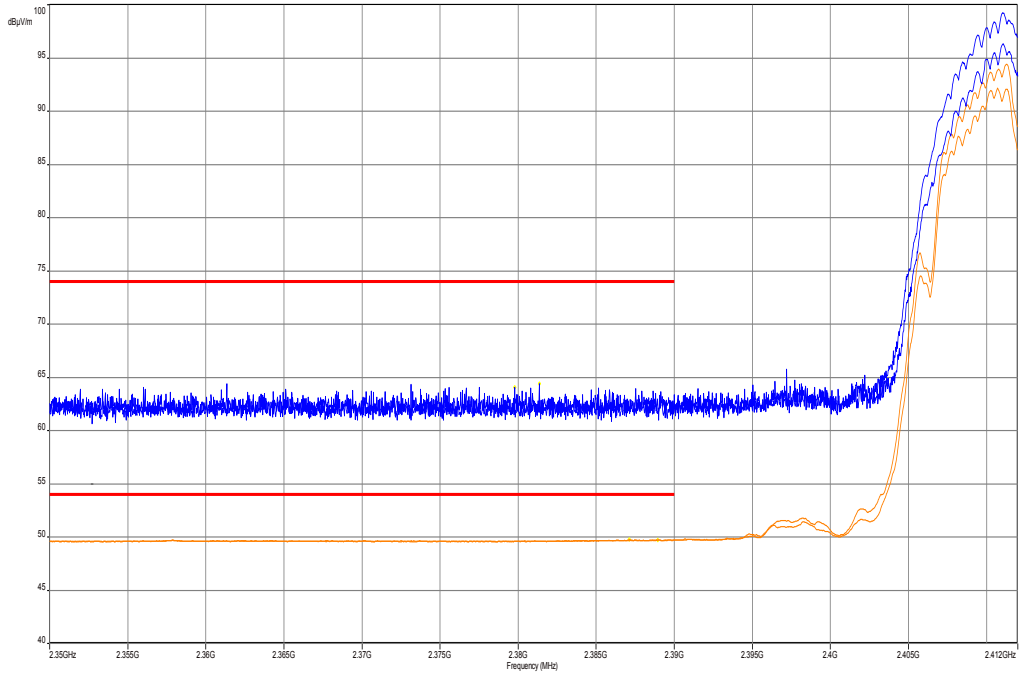
Results:

Scenario	Band Edge Compliance Conducted [dB]		
Modulation	DSSS / b – mode	OFDM / g – mode	OFDM / n HT20 – mode
Lower Band Edge – Channel 1	> 10 dB (Peak) > 10 dB (AVG)	> 10 dB (Peak) > 10 dB (AVG)	> 10 dB (Peak) > 10 dB (AVG)
Upper Band Edge – Channel 11	> 10 dB (Peak) > 10 dB (AVG)	> 10 dB (Peak) > 10 dB (AVG)	> 10 dB (Peak) > 10 dB (AVG)
Measurement uncertainty	± 3 dB		

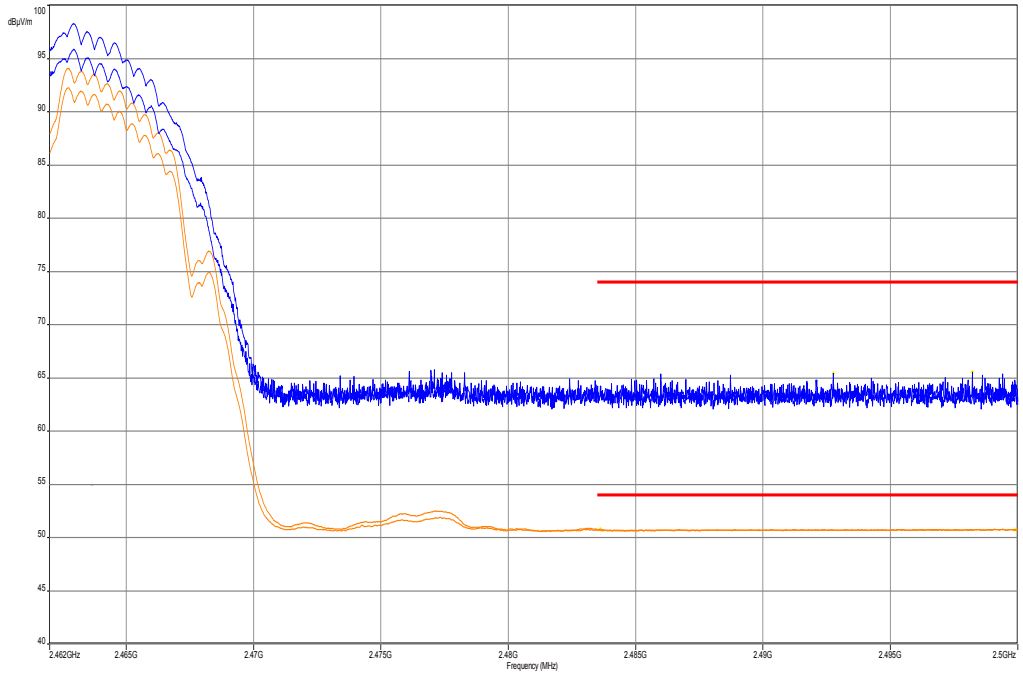
Result: Passed

Plots: DSSS/ b – mode peak / average

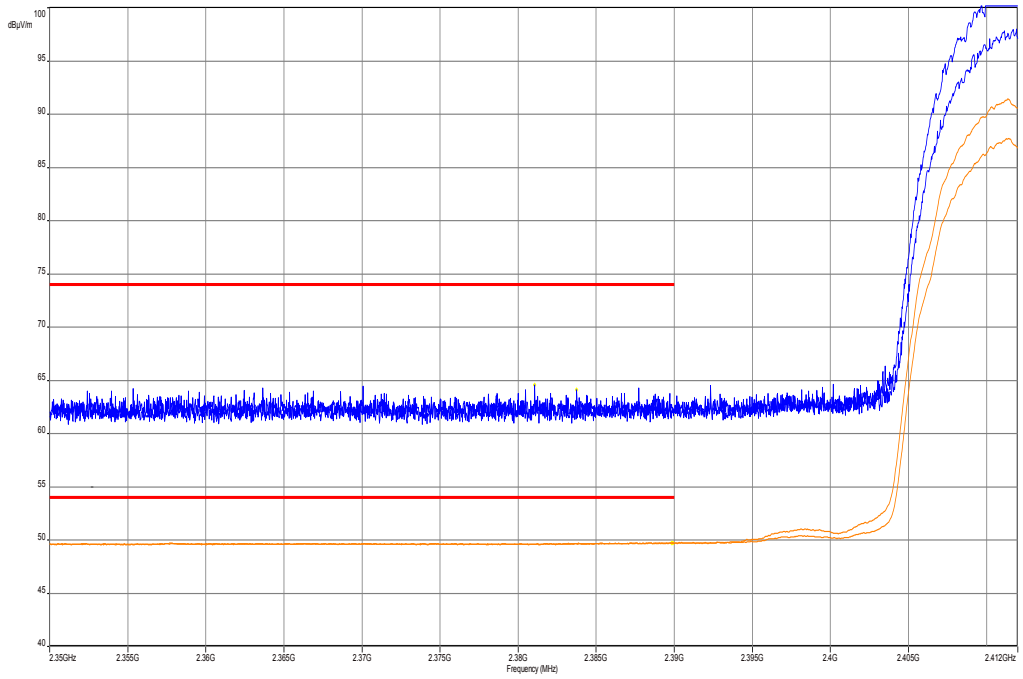
Plot 1: TX mode, lower band edge, vertical & horizontal polarization, low data rate



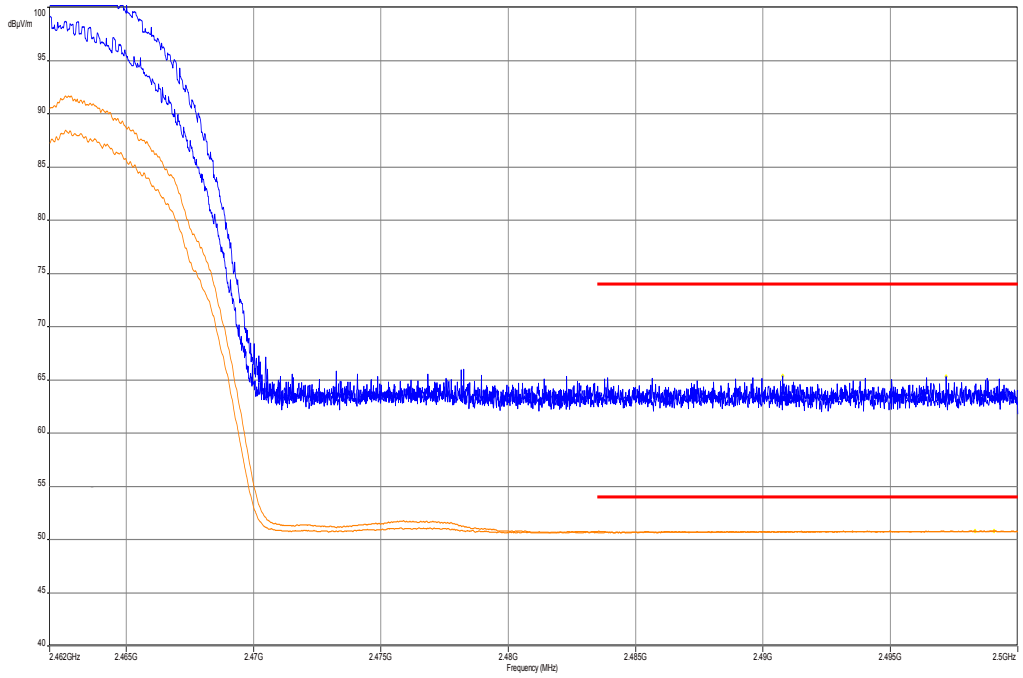
Plot 2: TX mode, upper band edge, vertical & horizontal polarization, low data rate



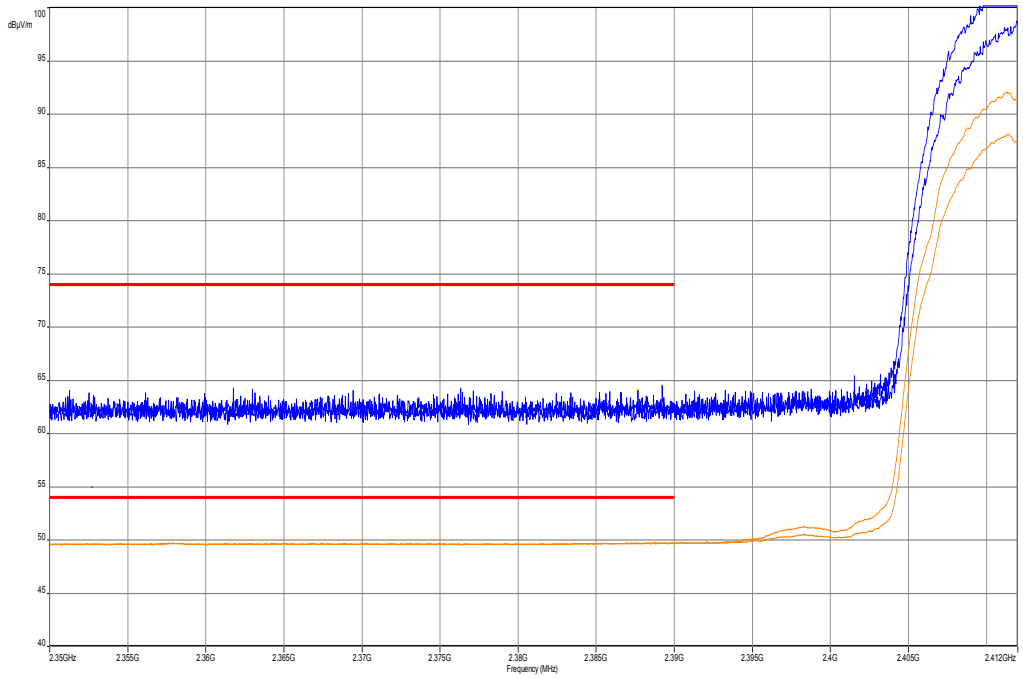
Plot 3: TX mode, lower band edge, vertical & horizontal polarization, high power data rate



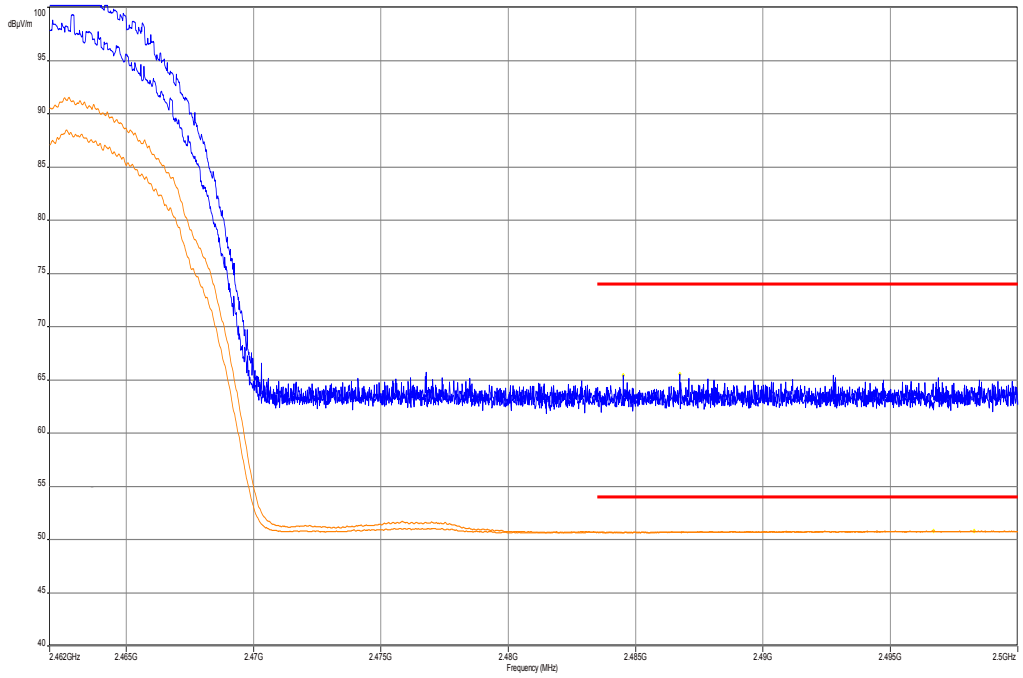
Plot 4: TX mode, upper band edge, vertical & horizontal polarization, high power data rate



Plot 5: TX mode, lower band edge, vertical & horizontal polarization, high data rate

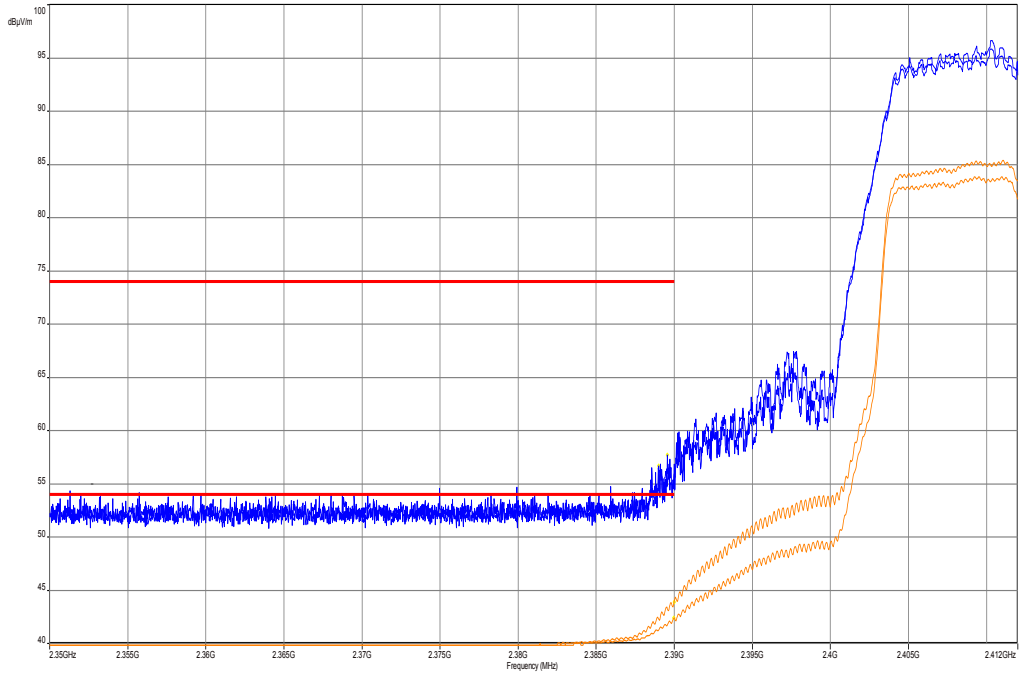


Plot 6: TX mode, upper band edge, vertical & horizontal polarization, high data rate

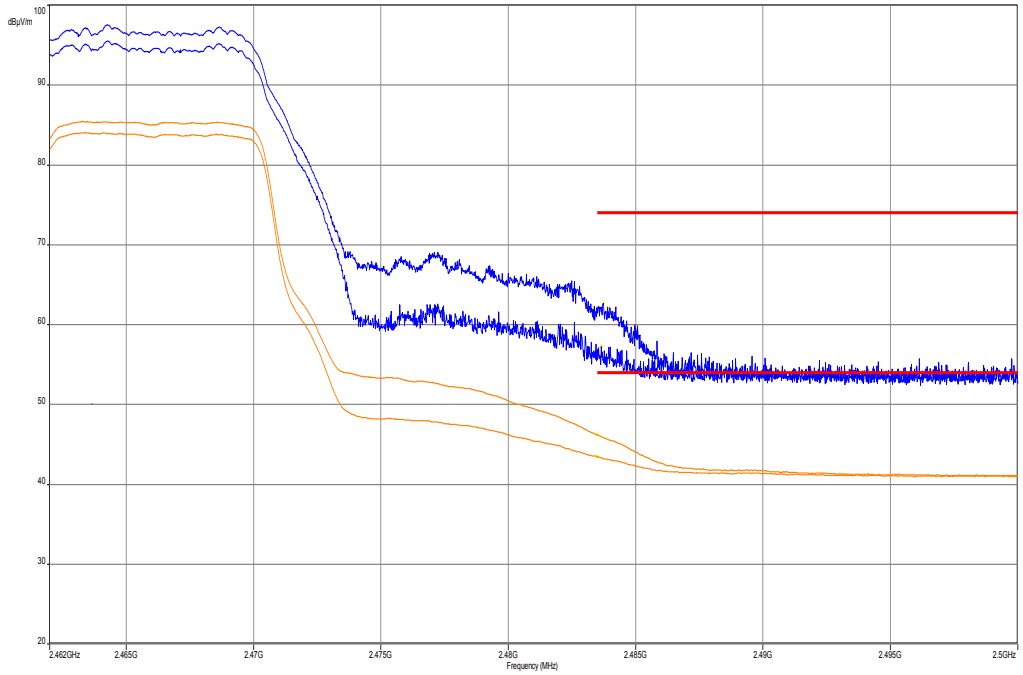


Plots: OFDM / g – mode peak / average

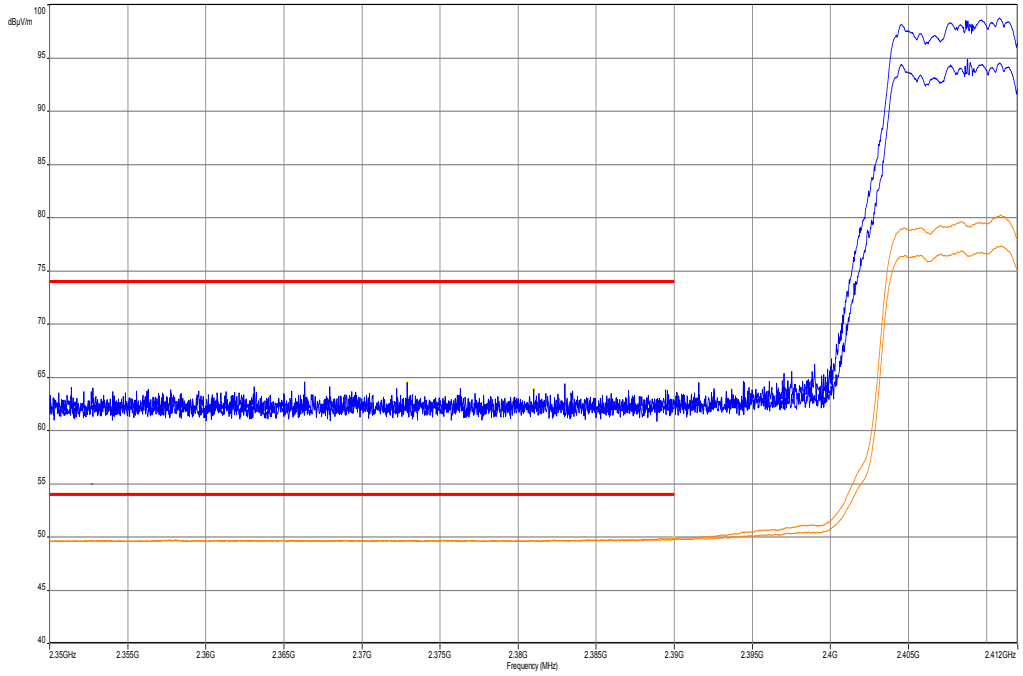
Plot 1: TX mode, lower band edge, vertical & horizontal polarization, low data rate



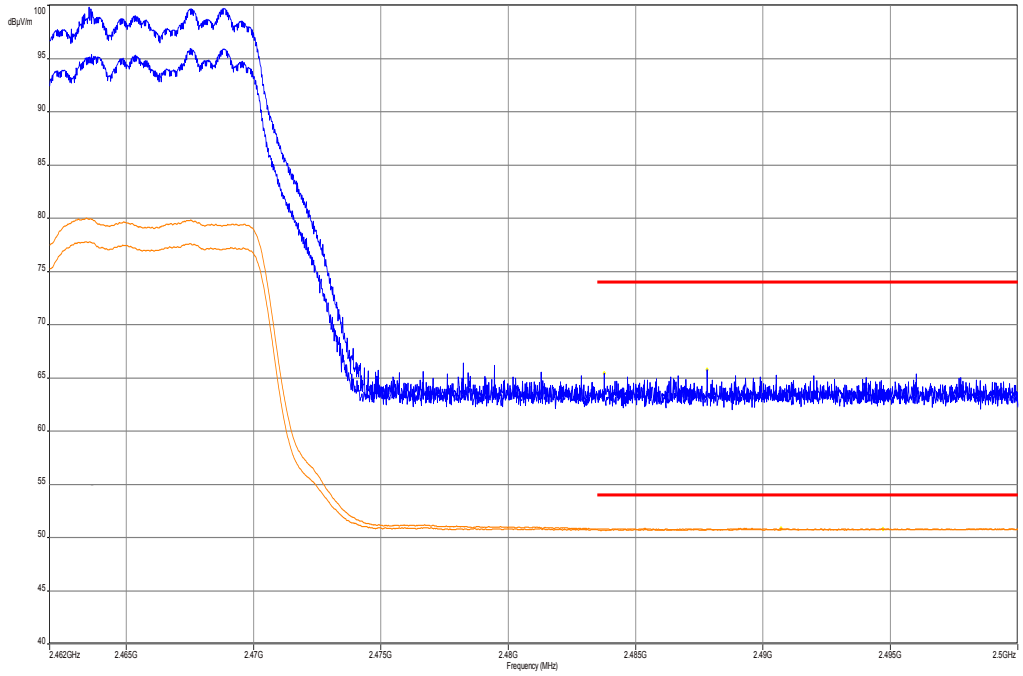
Plot 2: TX mode, upper band edge, vertical & horizontal polarization, low data rate



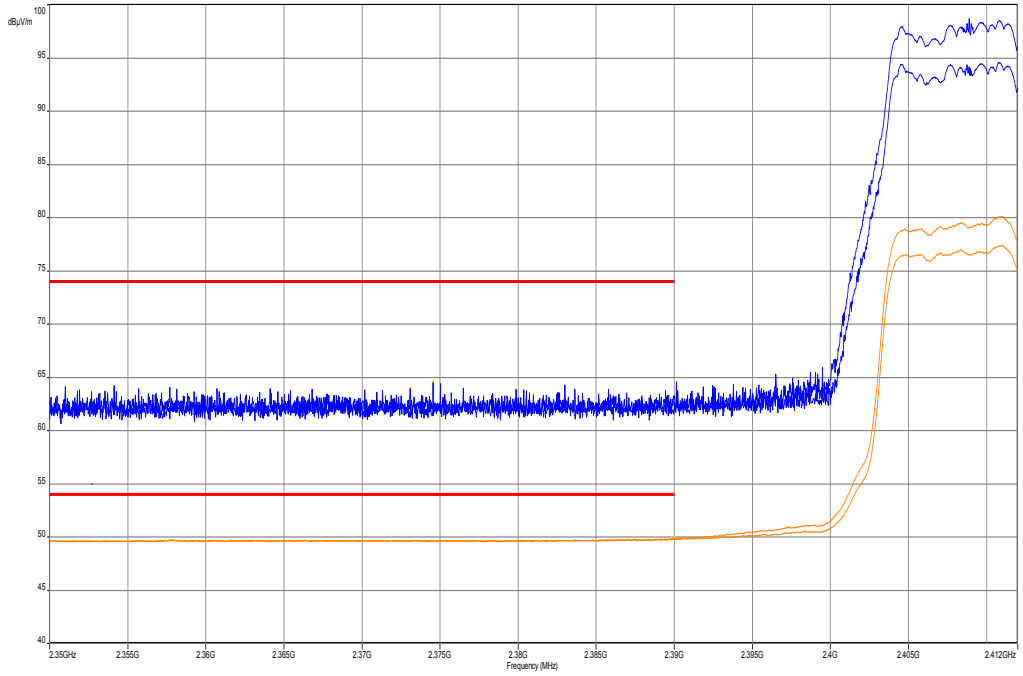
Plot 3: TX mode, lower band edge, vertical & horizontal polarization, high power data rate



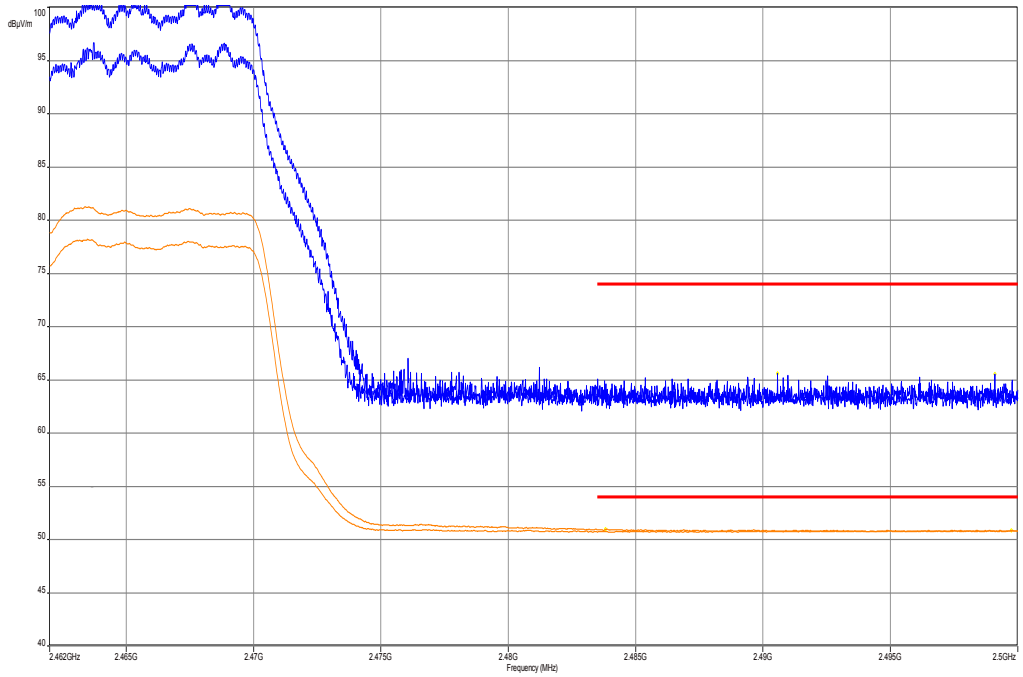
Plot 4: TX mode, upper band edge, vertical & horizontal polarization, high power data rate



Plot 5: TX mode, lower band edge, vertical & horizontal polarization, high data rate

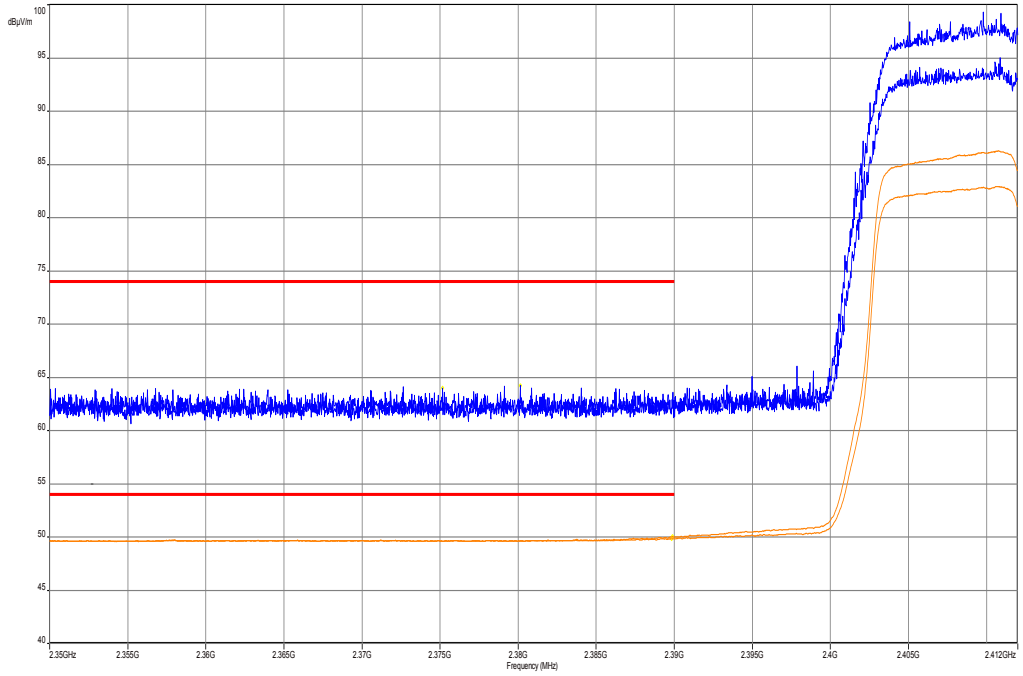


Plot 6: TX mode, upper band edge, vertical & horizontal polarization, high data rate

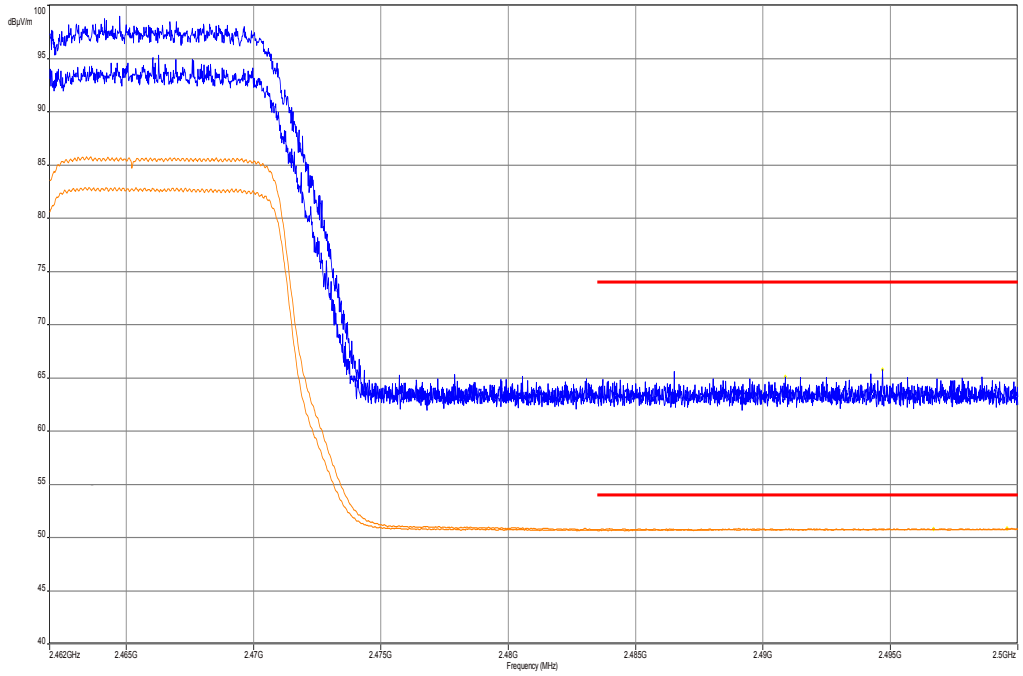


Plots: OFDM / n HT20 – mode peak / average

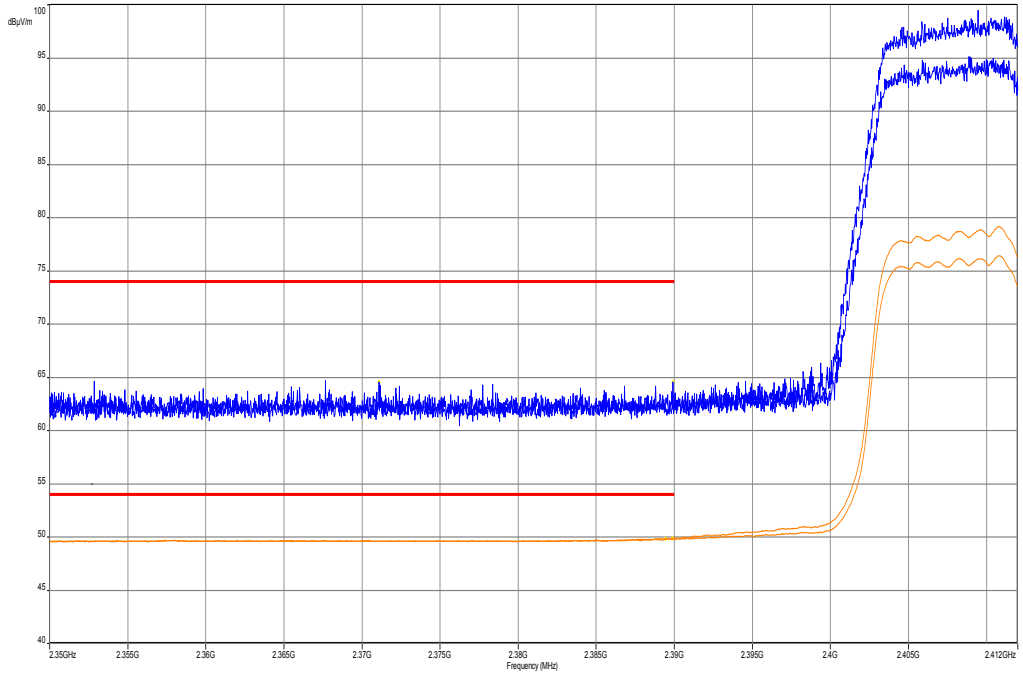
Plot 1: TX mode, lower band edge, vertical & horizontal polarization, low data rate



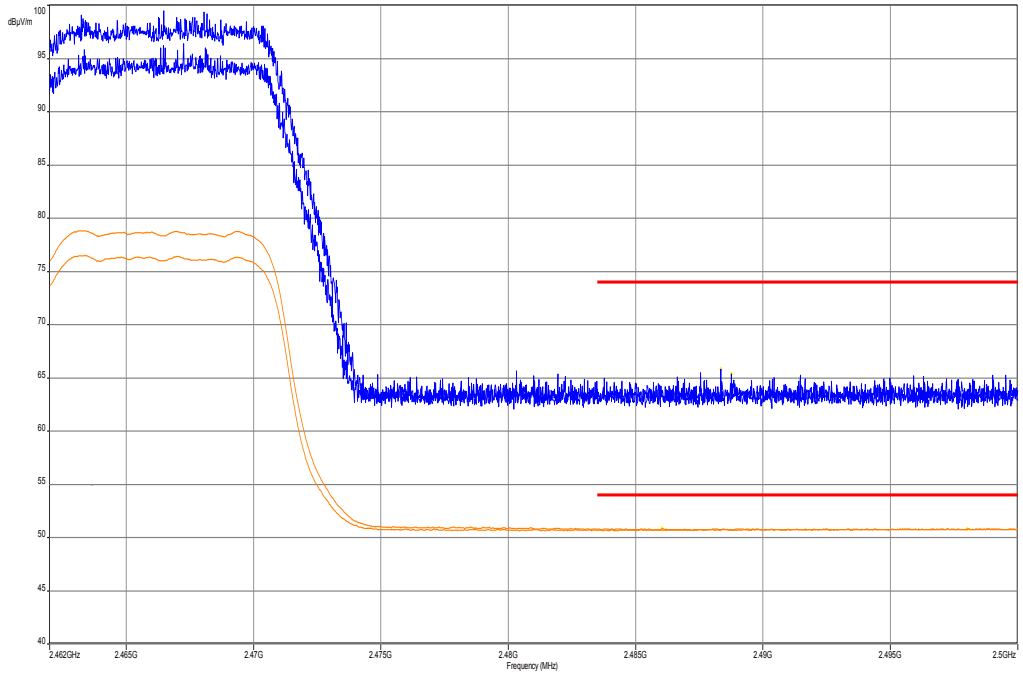
Plot 2: TX mode, upper band edge, vertical & horizontal polarization, low data rate



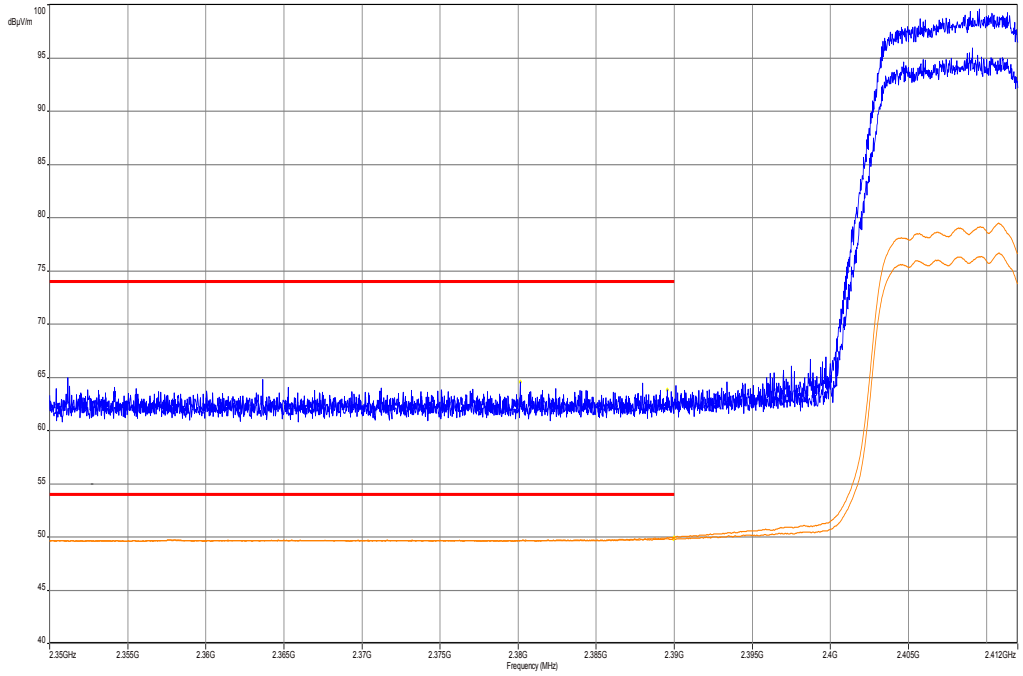
Plot 3: TX mode, lower band edge, vertical & horizontal polarization, high power data rate



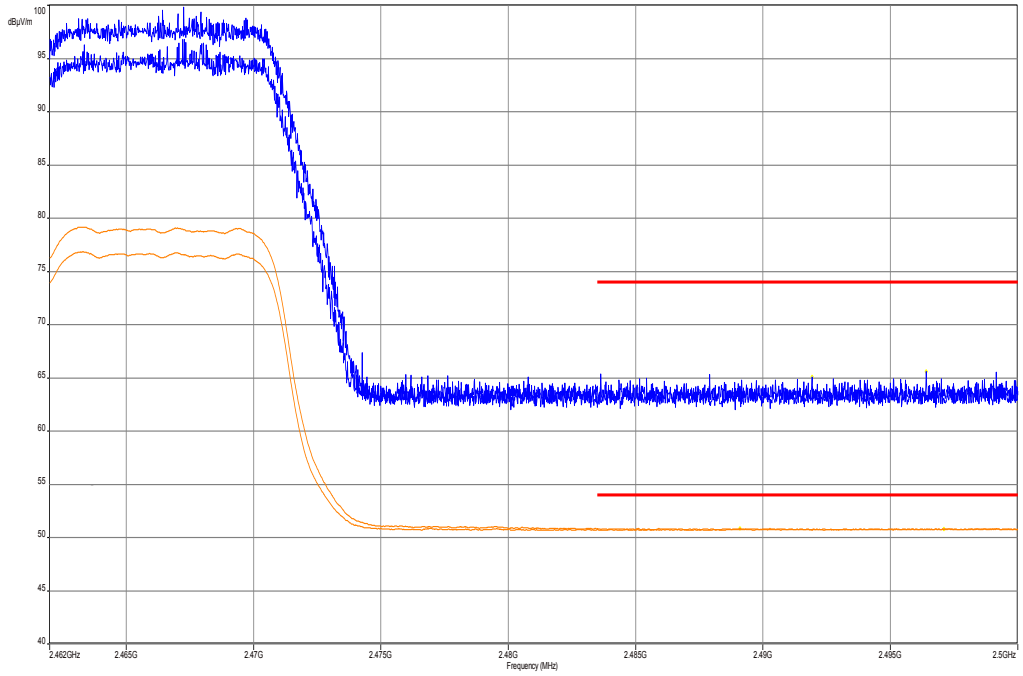
Plot 4: TX mode, upper band edge, vertical & horizontal polarization, high power data rate



Plot 5: TX mode, lower band edge, vertical & horizontal polarization, high data rate



Plot 6: TX mode, upper band edge, vertical & horizontal polarization, high data rate



10.9 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
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		4.46	30 dBm		Operating frequency
No peaks detected.			-20 dBc (peak) -30 dBc (average)		complies
2437		7.09	30 dBm		Operating frequency
No peaks detected.			-20 dBc (peak) -30 dBc (average)		complies
2462		5.69	30 dBm		Operating frequency
No peaks detected.			-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		1.72	30 dBm		Operating frequency
No peaks detected.			-20 dBc (peak) -30 dBc (average)		complies
2437		2.77	30 dBm		Operating frequency
No peaks detected.			-20 dBc (peak) -30 dBc (average)		complies
2462		1.37	30 dBm		Operating frequency
No peaks detected.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: Passed

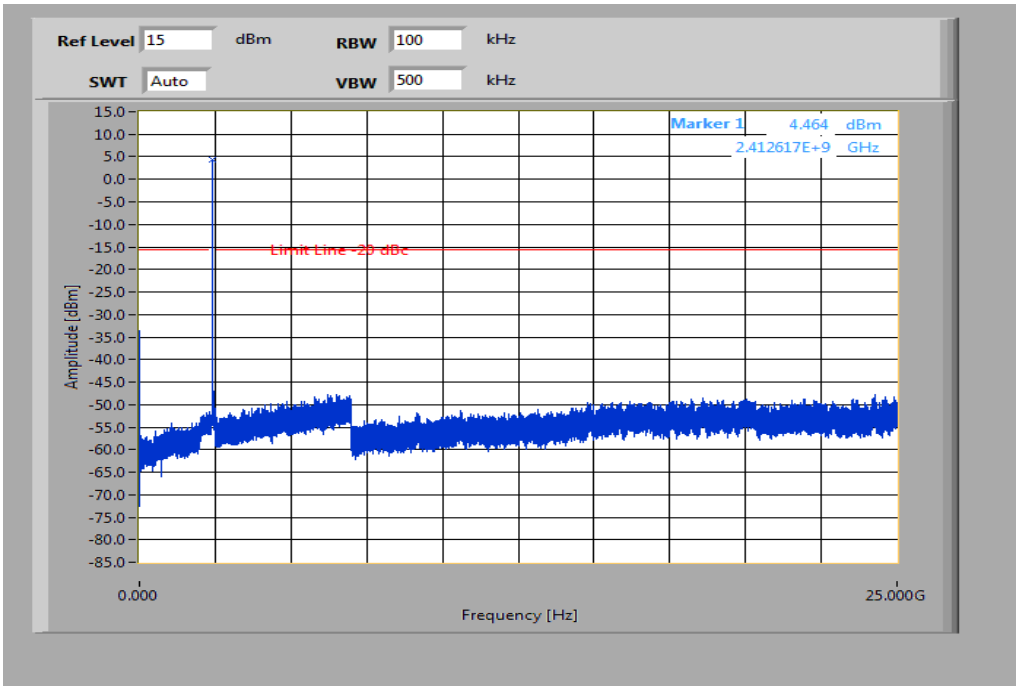
Results: OFDM / n HT20 – mode

TX Spurious Emissions Conducted					
OFDM / n HT20 – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		1.45	30 dBm		Operating frequency
No peaks detected.			-20 dBc (peak) -30 dBc (average)		complies
2437		2.88	30 dBm		Operating frequency
No peaks detected.			-20 dBc (peak) -30 dBc (average)		complies
2462		1.00	30 dBm		Operating frequency
No peaks detected.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty			± 3 dB		

Result: Passed

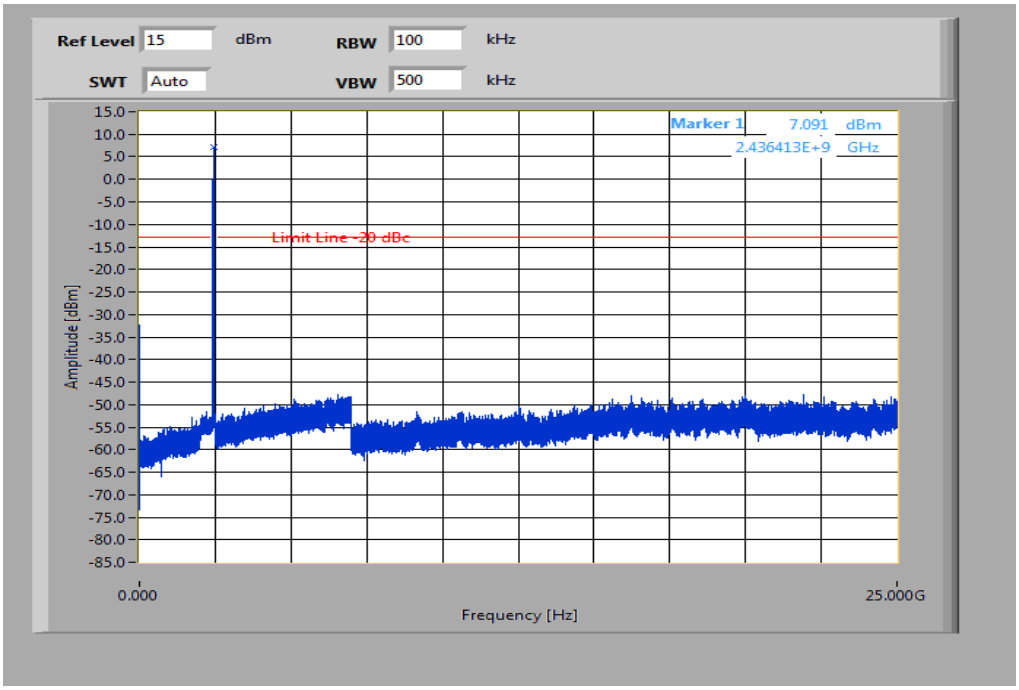
Plots: DSSS / b – mode

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



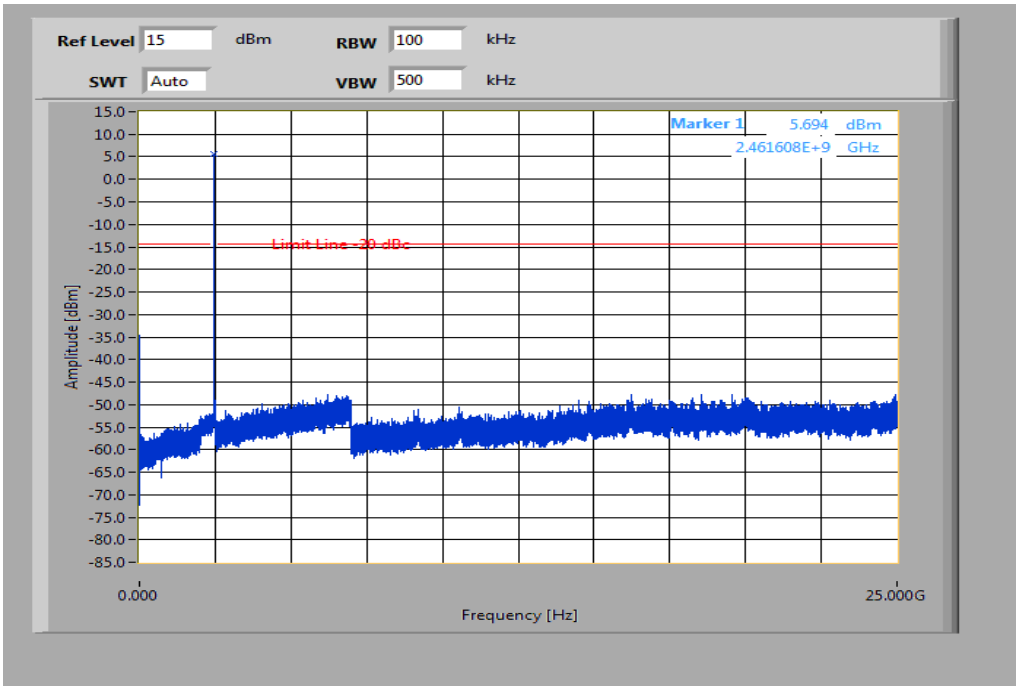
The peak at the beginning of the plot is the LO from the SA.

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



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

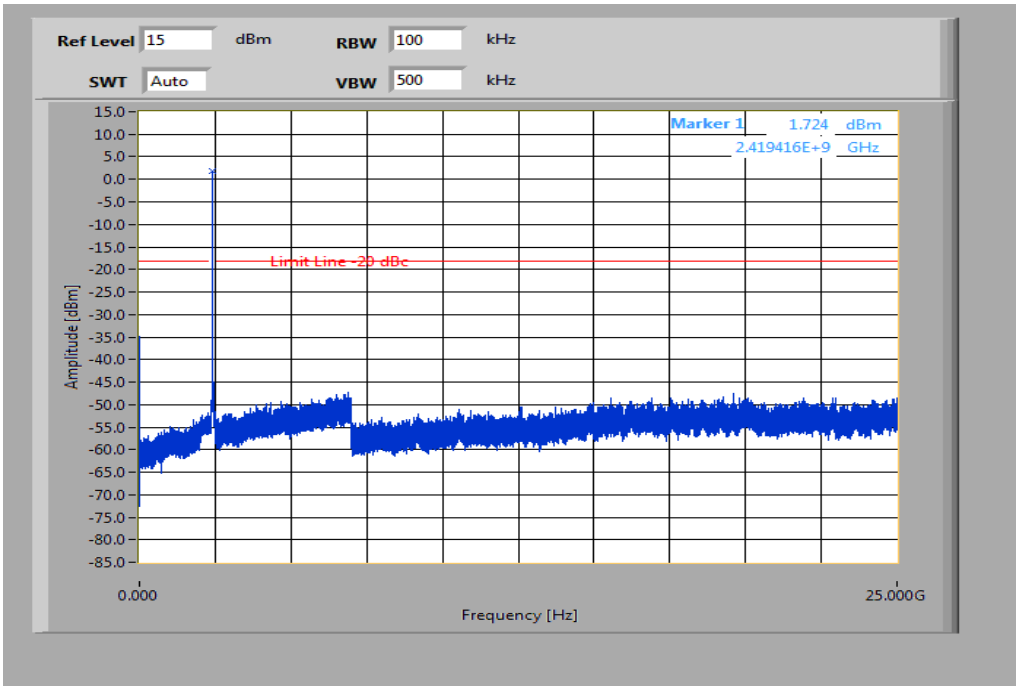
Plot 3: TX mode, highest channel, up to 25 GHz



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

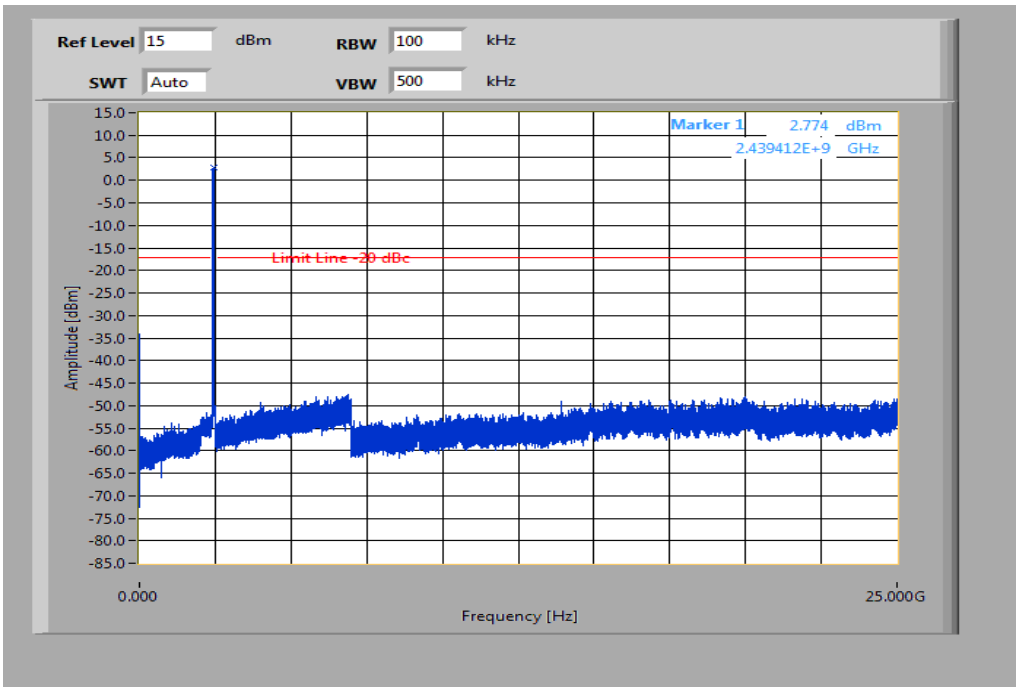
Plots: OFDM / g – mode

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



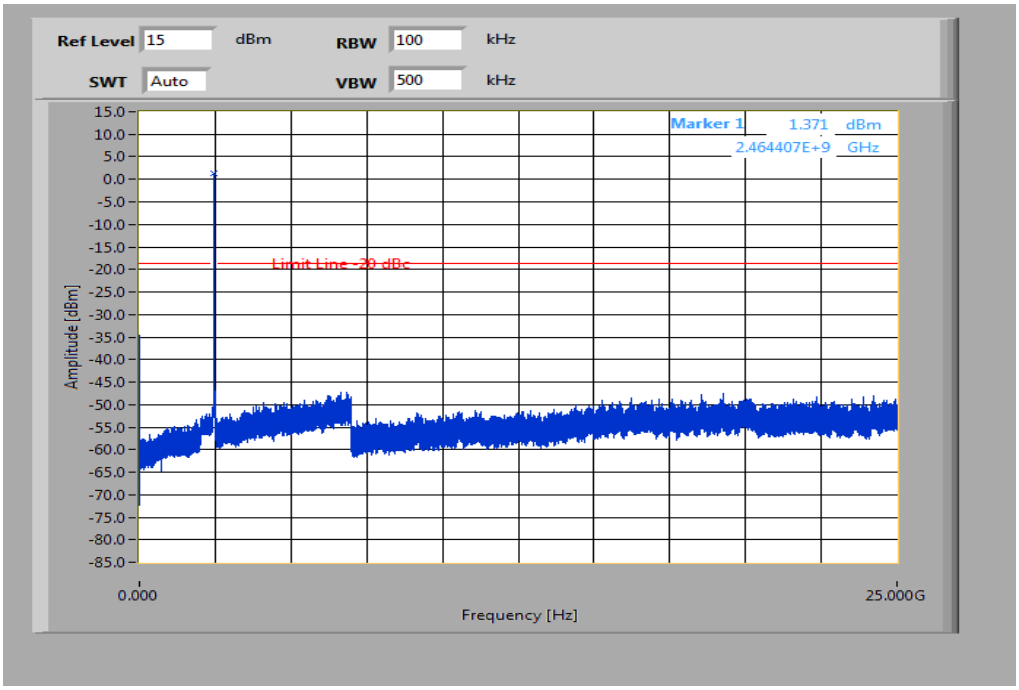
The peak at the beginning of the plot is the LO from the SA.

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



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

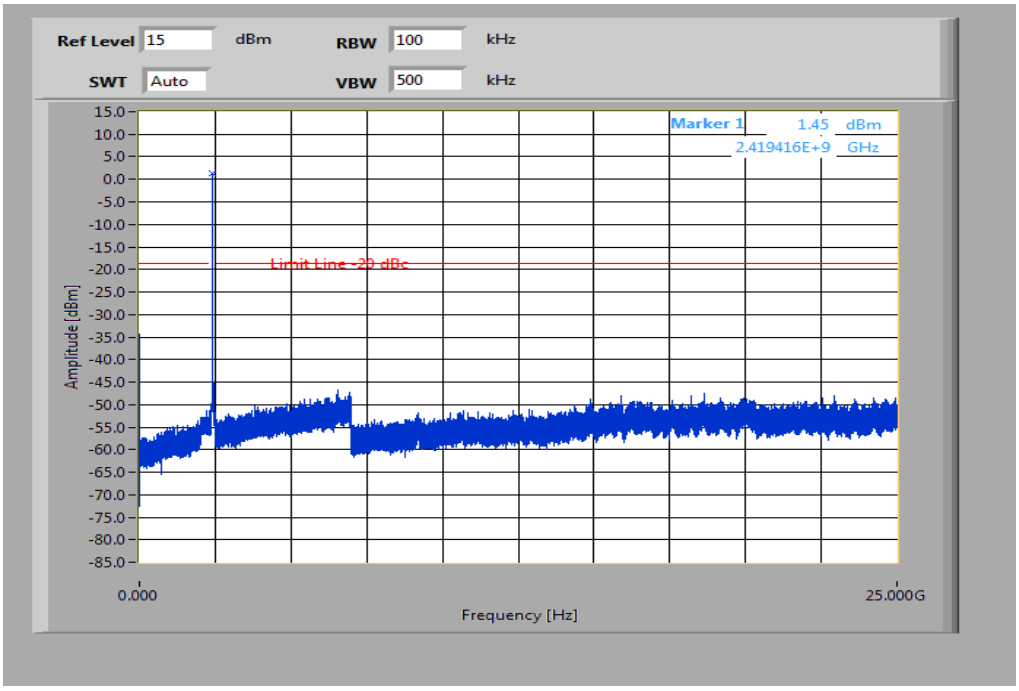
Plot 3: TX mode, highest channel, up to 25 GHz



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

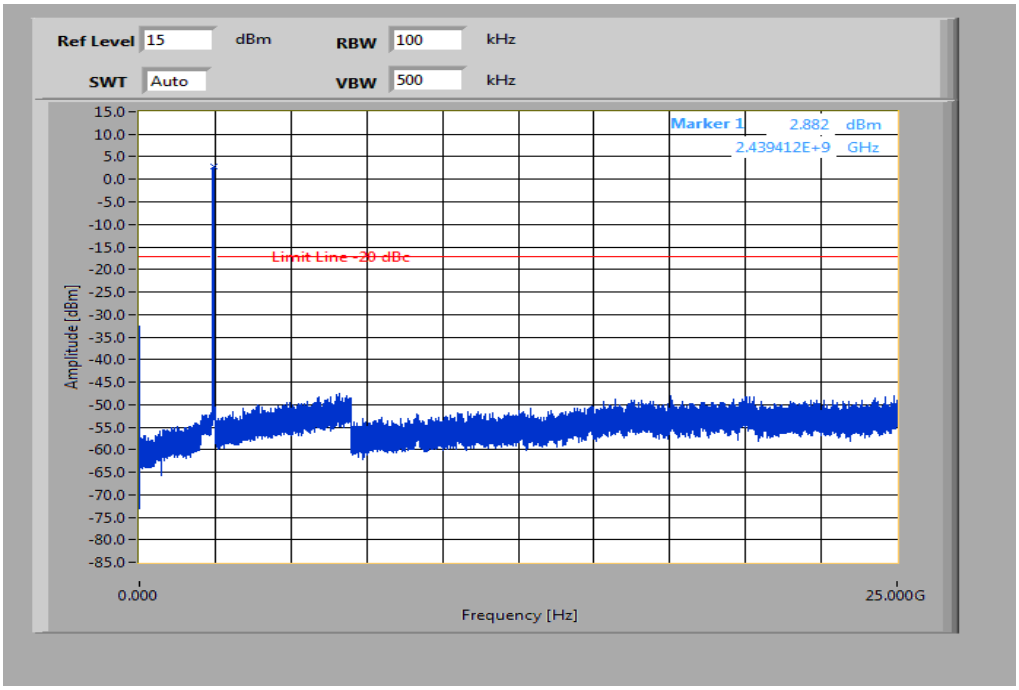
Plots: OFDM / n – mode

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



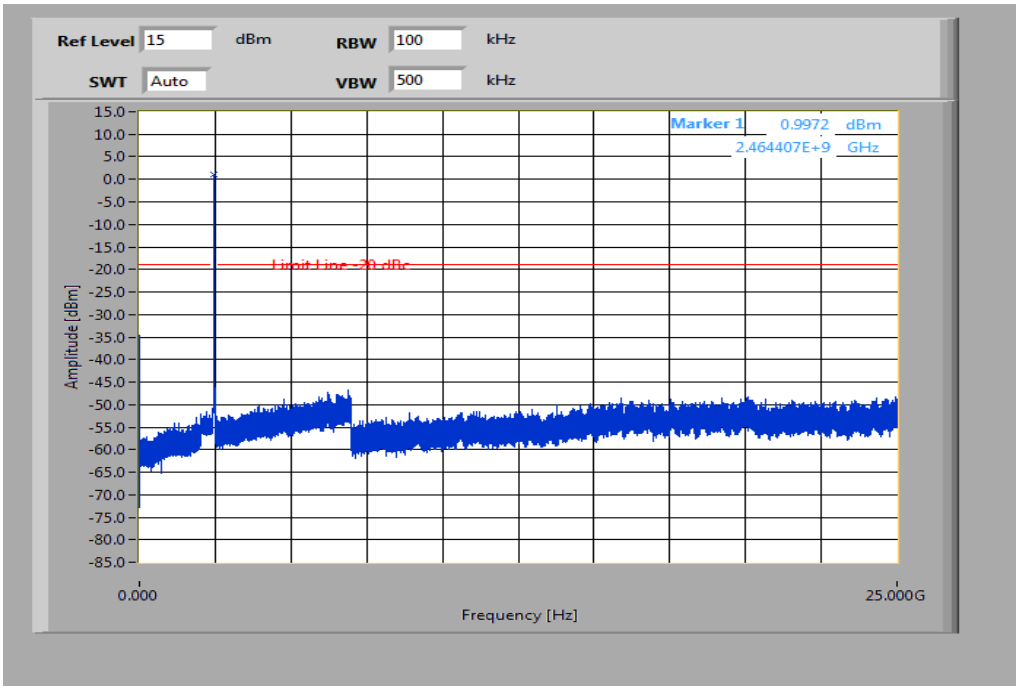
The peak at the beginning of the plot is the LO from the SA.

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.

10.10 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:	3 x RBW Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 26 GHz
Trace-Mode:	Max Hold
Measured Modulation	☒ DSSS b – mode ☒ OFDM g – mode ☒ OFDM n HT20 – 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		
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.		
No emissions detected above 1 GHz.			No emissions detected above 1 GHz.			No emissions detected above 1 GHz.		
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 emissions detected above 1 GHz.			No emissions detected above 1 GHz.			No emissions detected above 1 GHz.		
Measurement uncertainty			± 3 dB					

Result: **Passed**

Results: OFDM / n HT20 – mode

TX Spurious Emissions Radiated [dBµV/m]								
OFDM / n HT20 – 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 emissions detected above 1 GHz.			No emissions detected above 1 GHz.			No emissions detected above 1 GHz.		
Measurement uncertainty			± 3 dB					

Result: **Passed**

Note: The limit was recalculated with 20 dB / decade (Part 15.31) for all radiated spurious emissions 30 MHz to 1 GHz from 3 meter limit to a 10 meter distance. (40dB/decade for emissions < 30MHz)

Plots: DSSS / b – mode

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

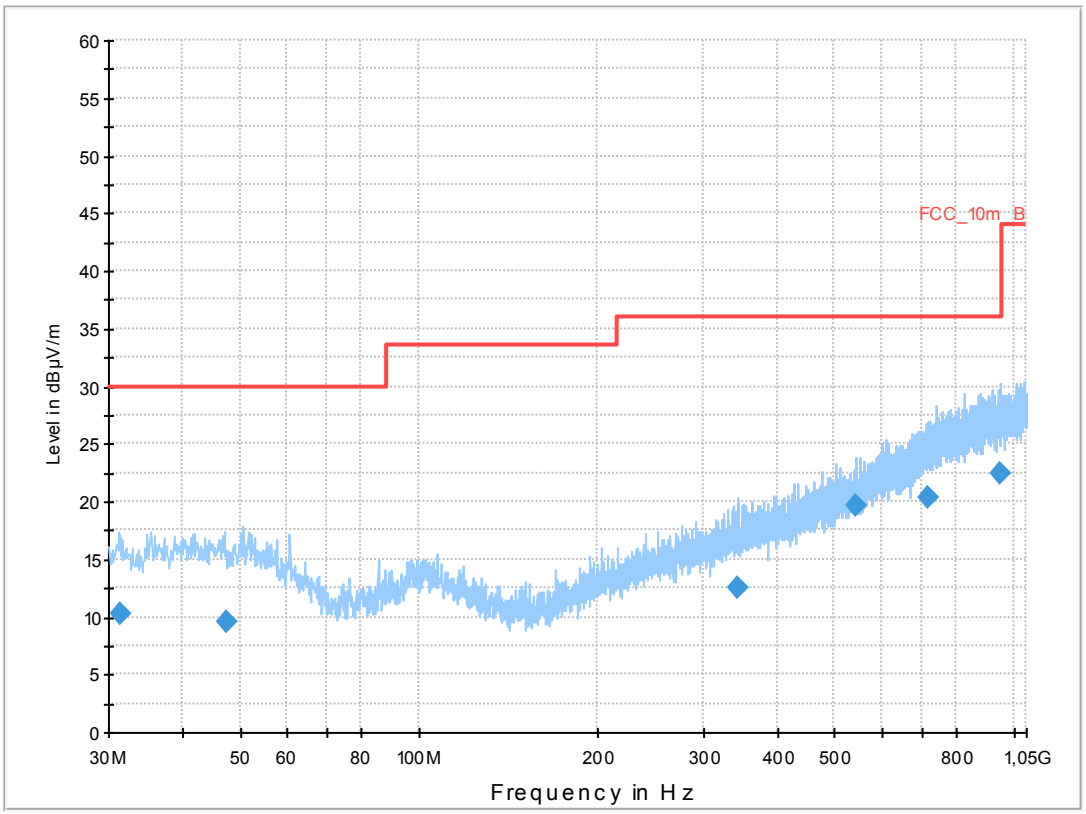
Common Information

Serial Number:	CB5A1X9G4T
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	w-lan b-mode tx ch0
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

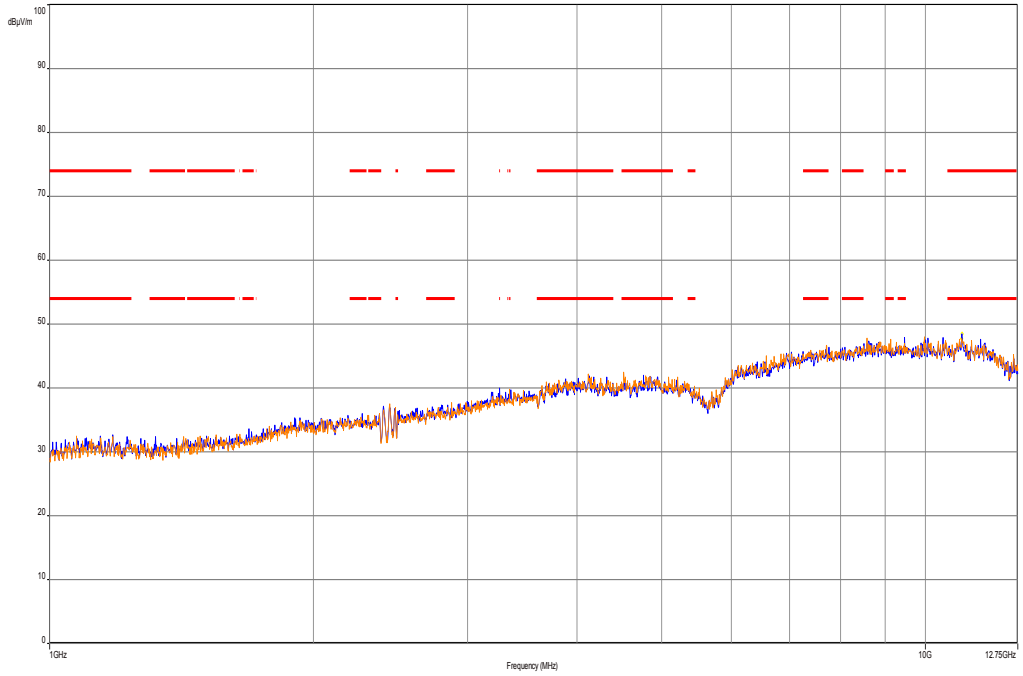
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

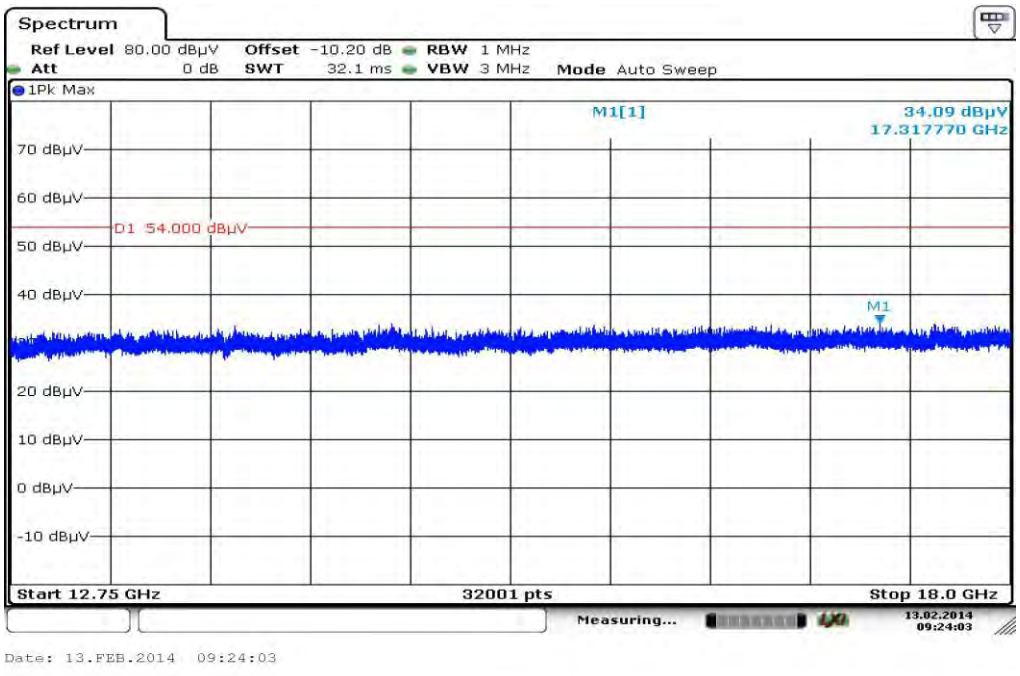
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.415250	10.3	1000.0	120.000	134.0	H	260.0	12.7	19.7	30.0	
47.329350	9.6	1000.0	120.000	170.0	H	190.0	13.3	20.4	30.0	
343.672500	12.5	1000.0	120.000	170.0	V	272.0	15.9	23.5	36.0	
544.034100	19.6	1000.0	120.000	98.0	H	272.0	19.3	16.4	36.0	
718.678500	20.3	1000.0	120.000	170.0	V	171.0	22.9	15.7	36.0	
951.819900	22.5	1000.0	120.000	170.0	V	268.0	25.4	13.5	36.0	

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

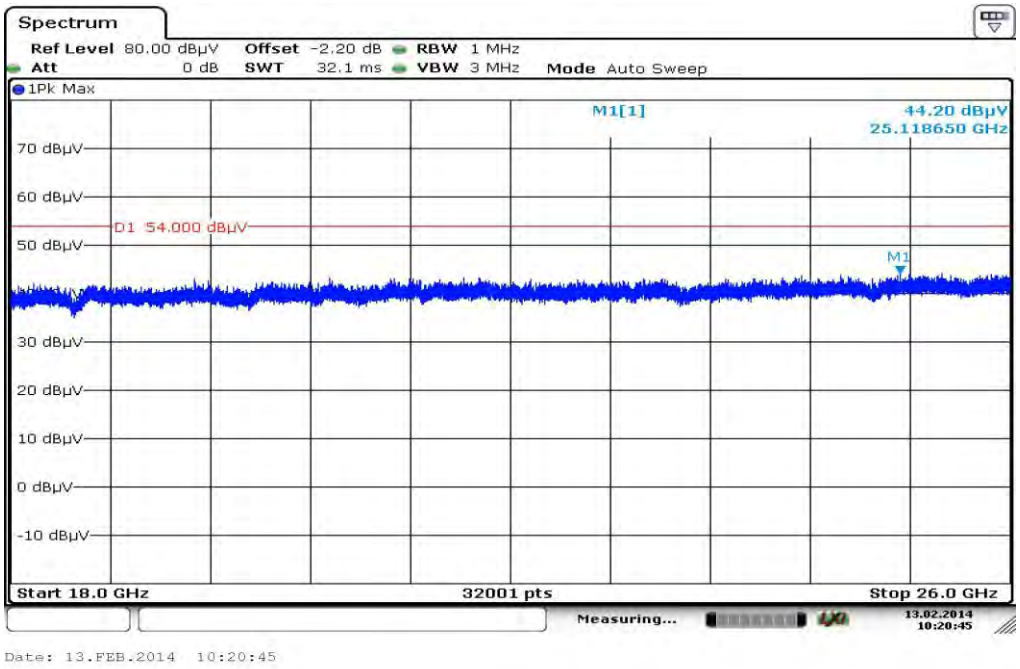


The carrier signal is notched with a 2.4 GHz band rejection filter.

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

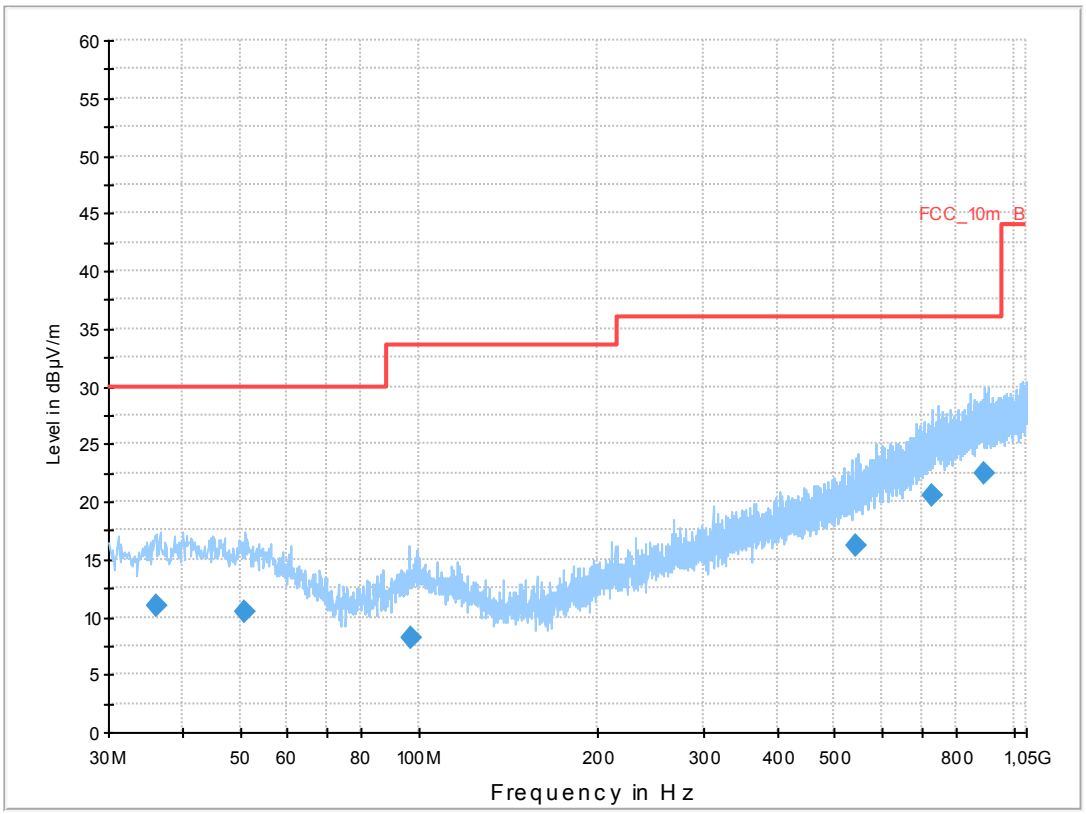
Common Information

Serial Number:	CB5A1X9G4T
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	w-lan b-mode tx ch6
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

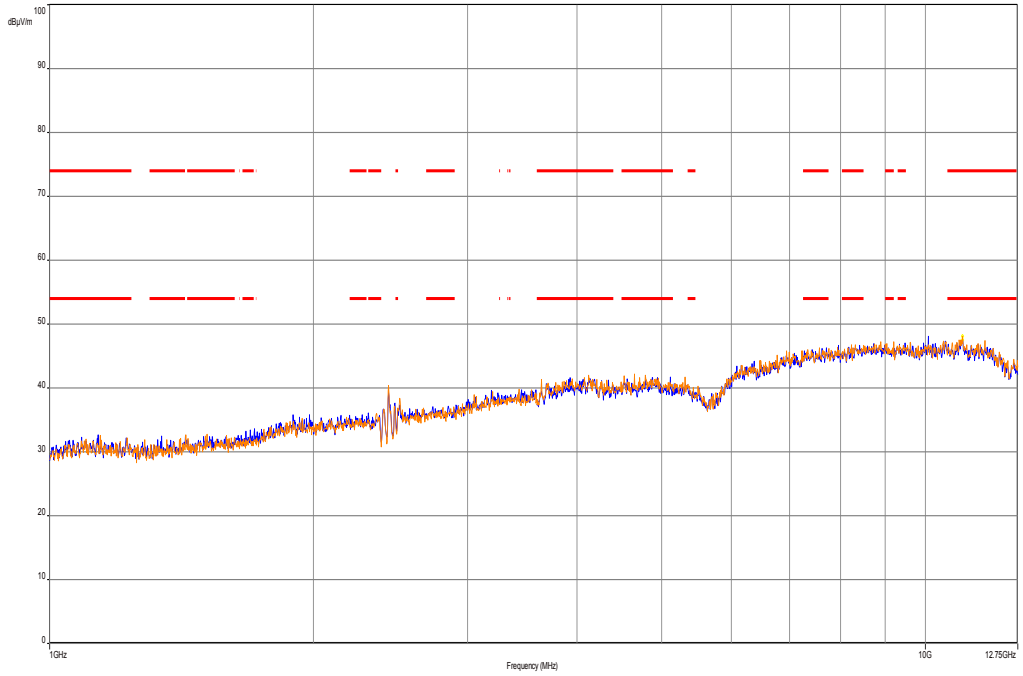
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

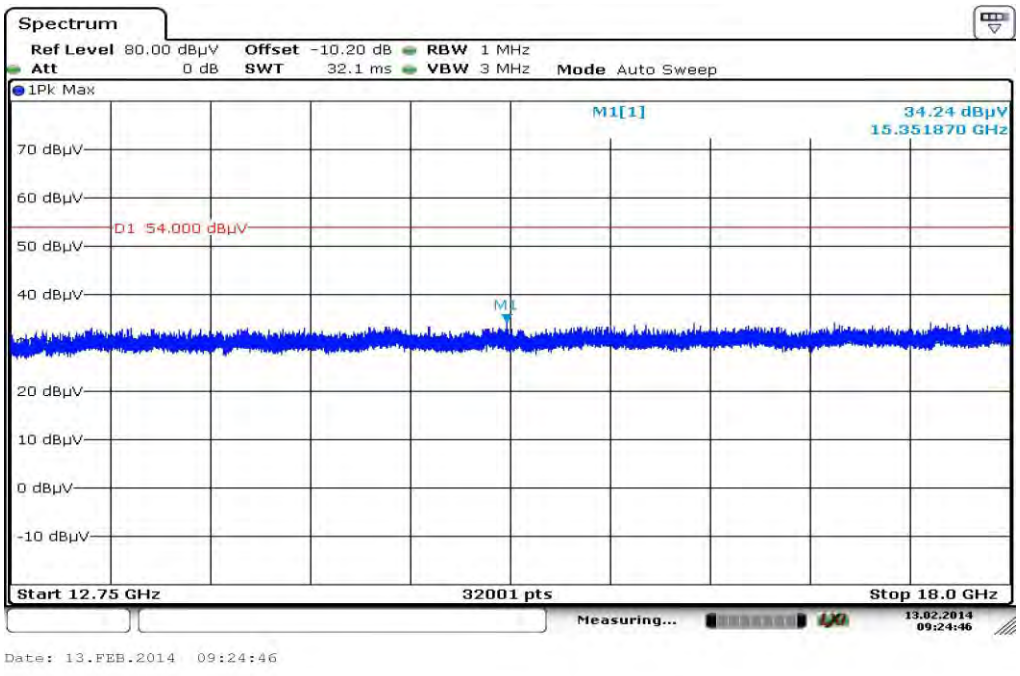
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
36.045150	10.9	1000.0	120.000	170.0	V	261.0	13.1	19.1	30.0	
50.835450	10.5	1000.0	120.000	170.0	V	-4.0	13.3	19.5	30.0	
96.581250	8.2	1000.0	120.000	133.0	V	86.0	11.5	25.3	33.5	
541.233150	16.2	1000.0	120.000	144.0	V	265.0	19.2	19.8	36.0	
730.389750	20.5	1000.0	120.000	111.0	V	273.0	23.2	15.5	36.0	
892.414950	22.4	1000.0	120.000	154.0	V	80.0	25.1	13.6	36.0	

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

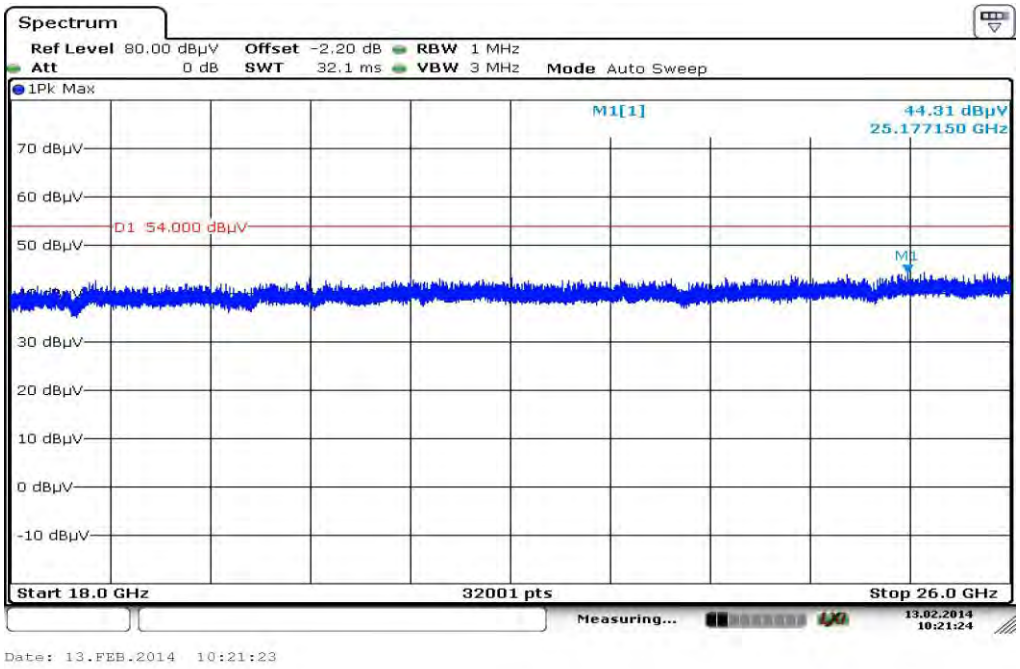


The carrier signal is notched with a 2.4 GHz band rejection filter.

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

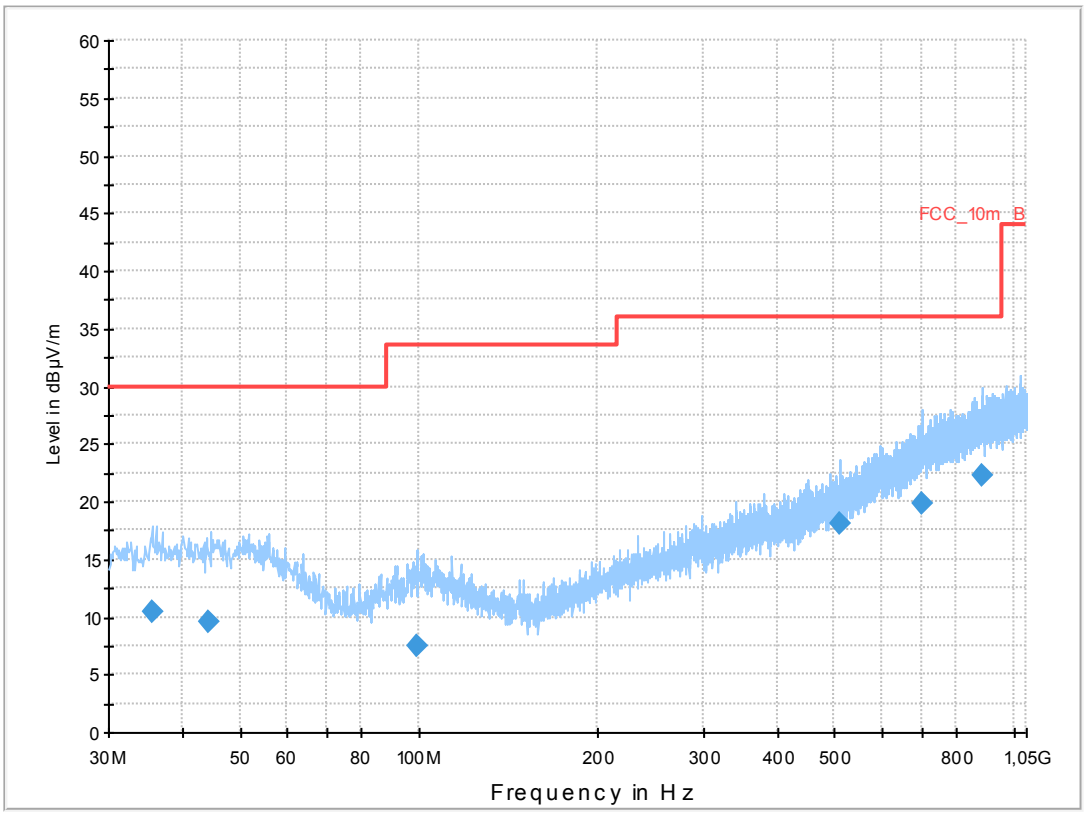
Common Information

Serial Number:	CB5A1X9G4T
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	w-lan b-mode tx ch11
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

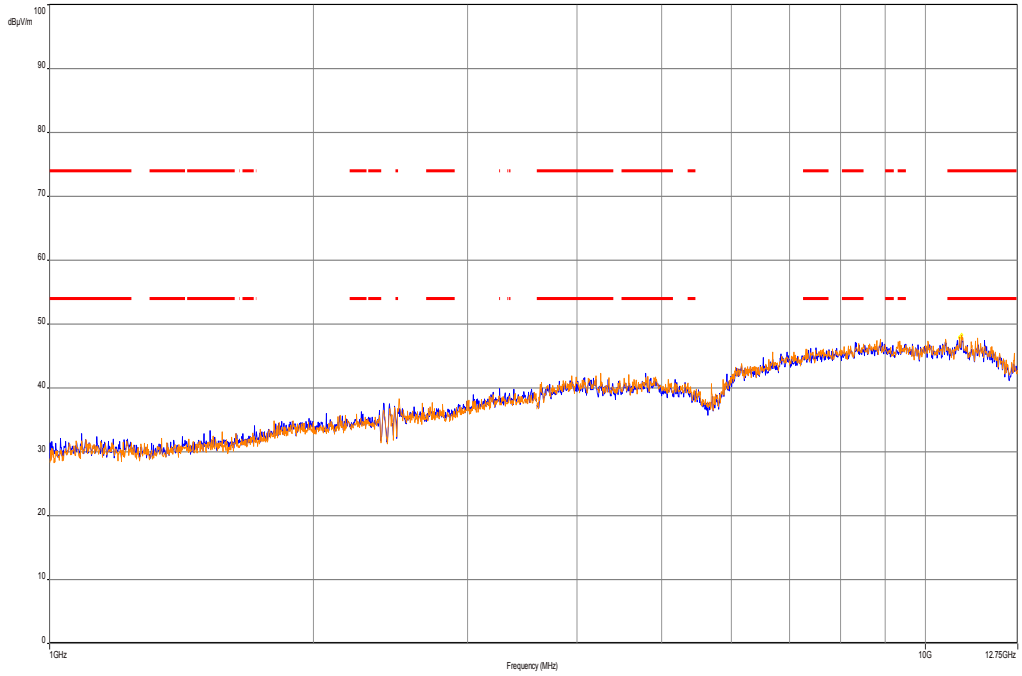
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

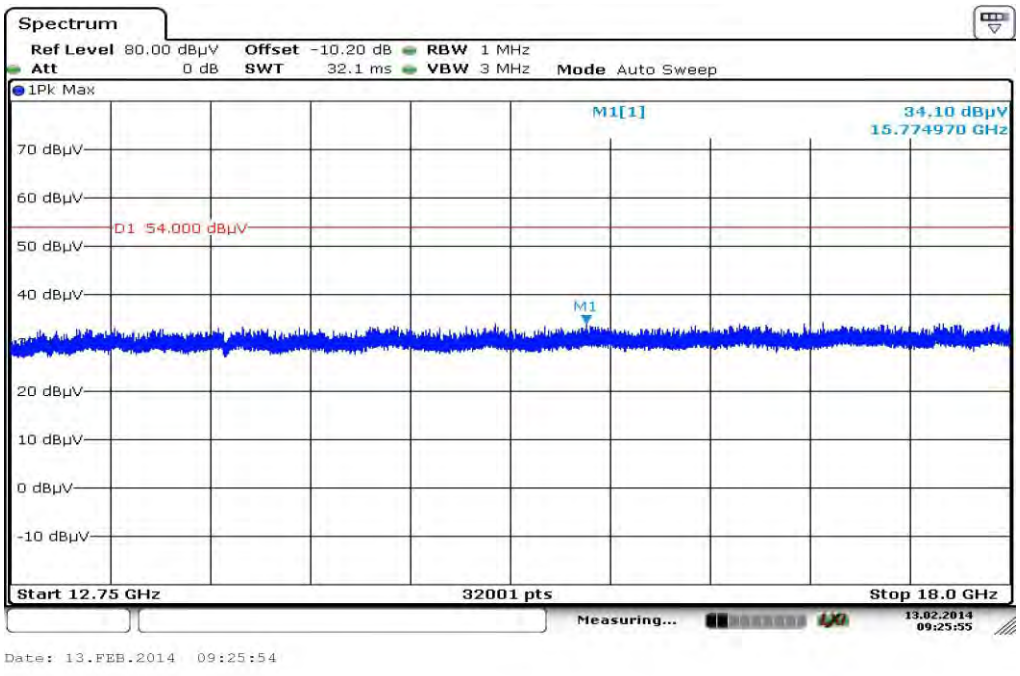
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.683350	10.4	1000.0	120.000	104.0	H	86.0	13.1	19.6	30.0	
44.238000	9.5	1000.0	120.000	170.0	H	190.0	13.3	20.5	30.0	
99.104400	7.4	1000.0	120.000	170.0	H	280.0	11.8	26.1	33.5	
509.979750	18.1	1000.0	120.000	132.0	V	272.0	18.8	15.9	36.0	
698.585250	19.9	1000.0	120.000	170.0	H	272.0	22.5	16.1	36.0	
883.381950	22.3	1000.0	120.000	170.0	V	179.0	25.0	13.7	36.0	

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

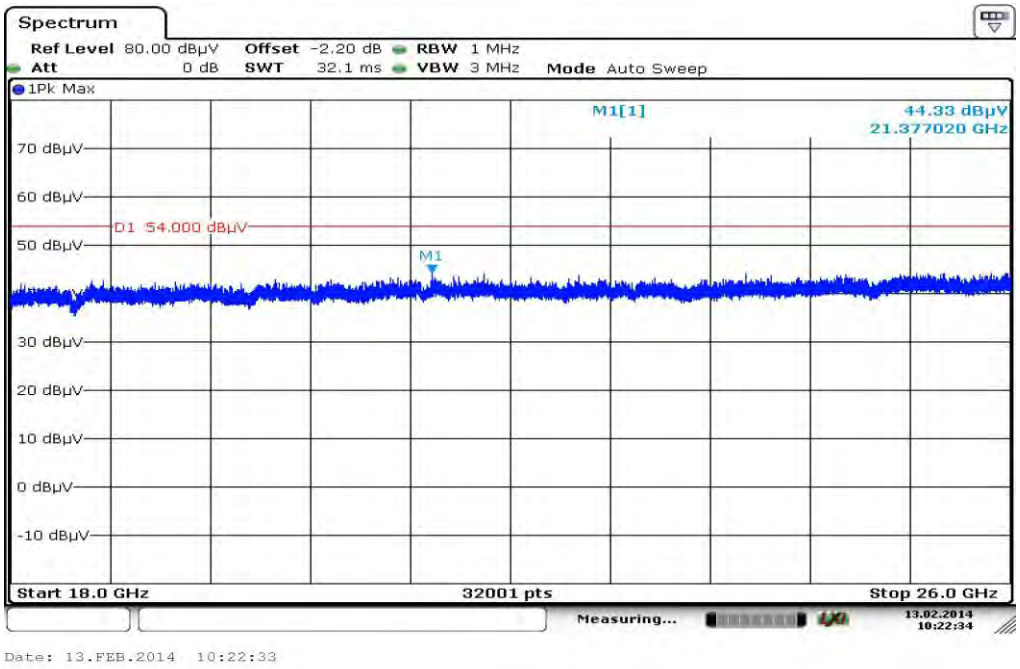


The carrier signal is notched with a 2.4 GHz band rejection filter.

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

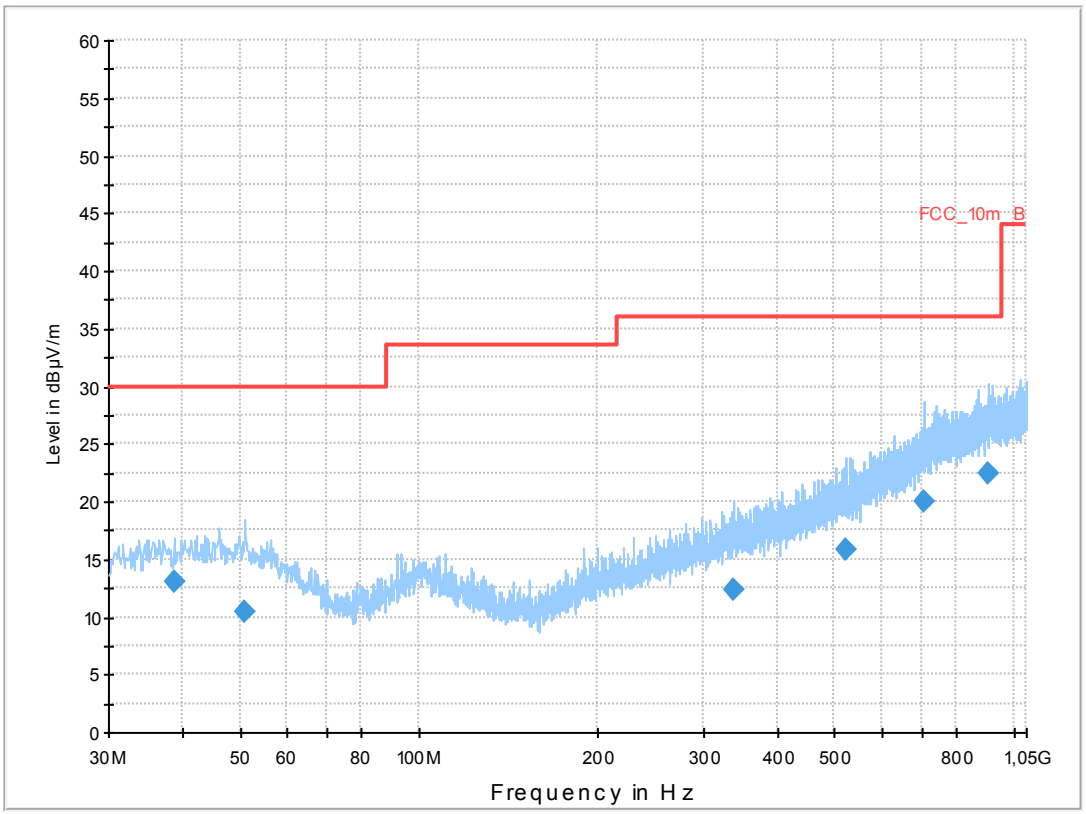
Common Information

Serial Number:	CB5A1X9G4T
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	w-lan g-mode tx ch1
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

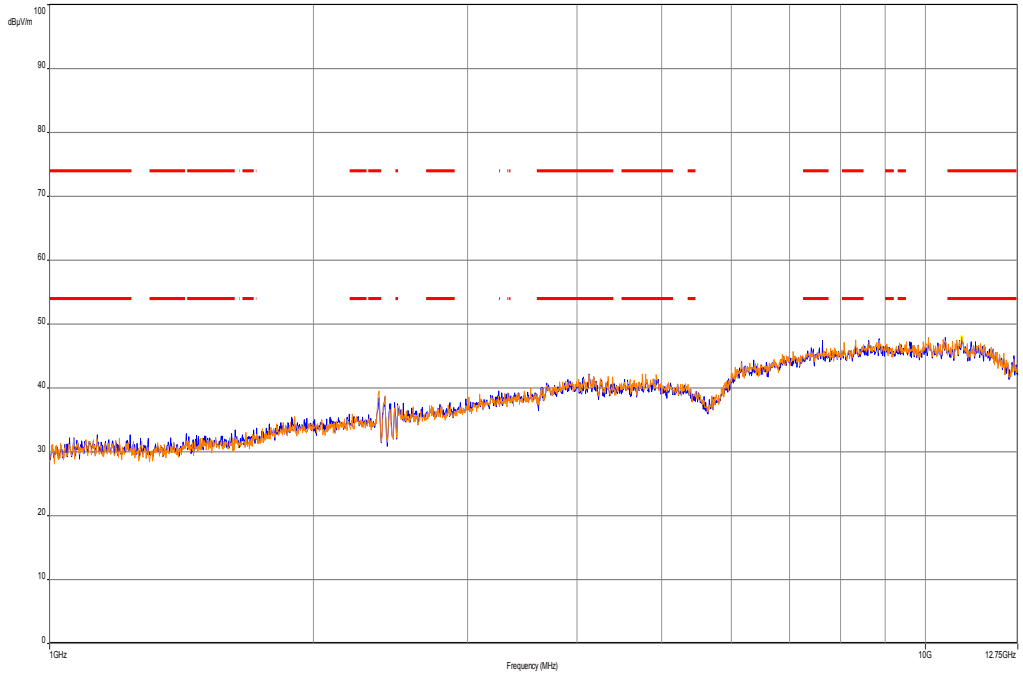
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

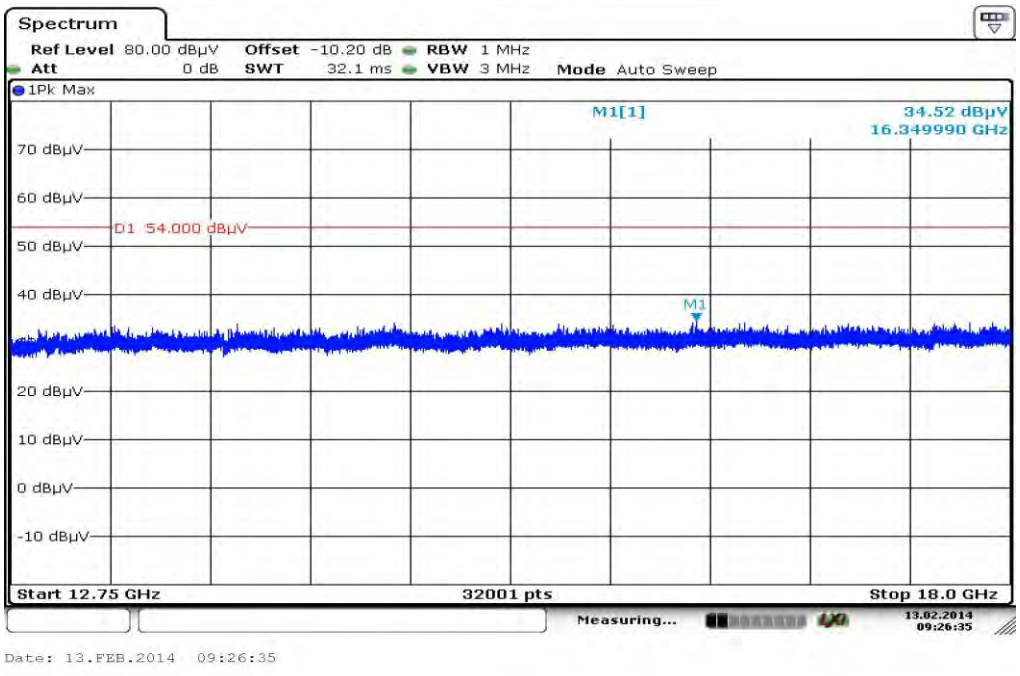
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
38.703750	13.0	1000.0	120.000	170.0	V	92.0	13.3	17.0	30.0	
50.765100	10.3	1000.0	120.000	170.0	H	180.0	13.3	19.7	30.0	
338.720550	12.3	1000.0	120.000	170.0	H	265.0	15.7	23.7	36.0	
522.271950	15.8	1000.0	120.000	132.0	V	88.0	19.0	20.2	36.0	
705.569700	20.0	1000.0	120.000	98.0	H	92.0	22.6	16.0	36.0	
909.493950	22.4	1000.0	120.000	104.0	V	280.0	25.2	13.6	36.0	

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

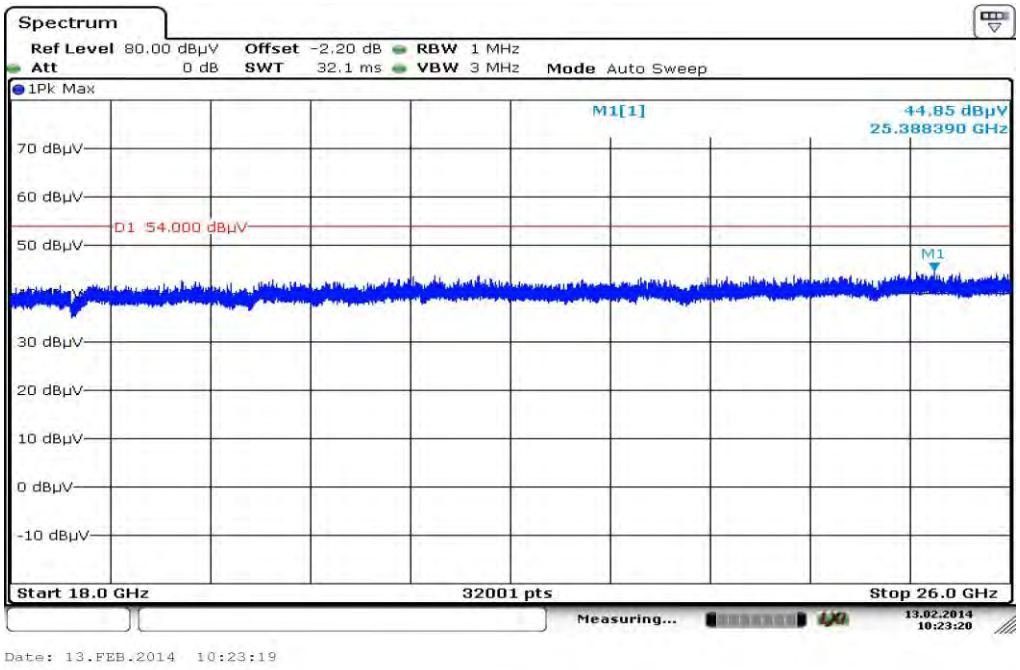


The carrier signal is notched with a 2.4 GHz band rejection filter.

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

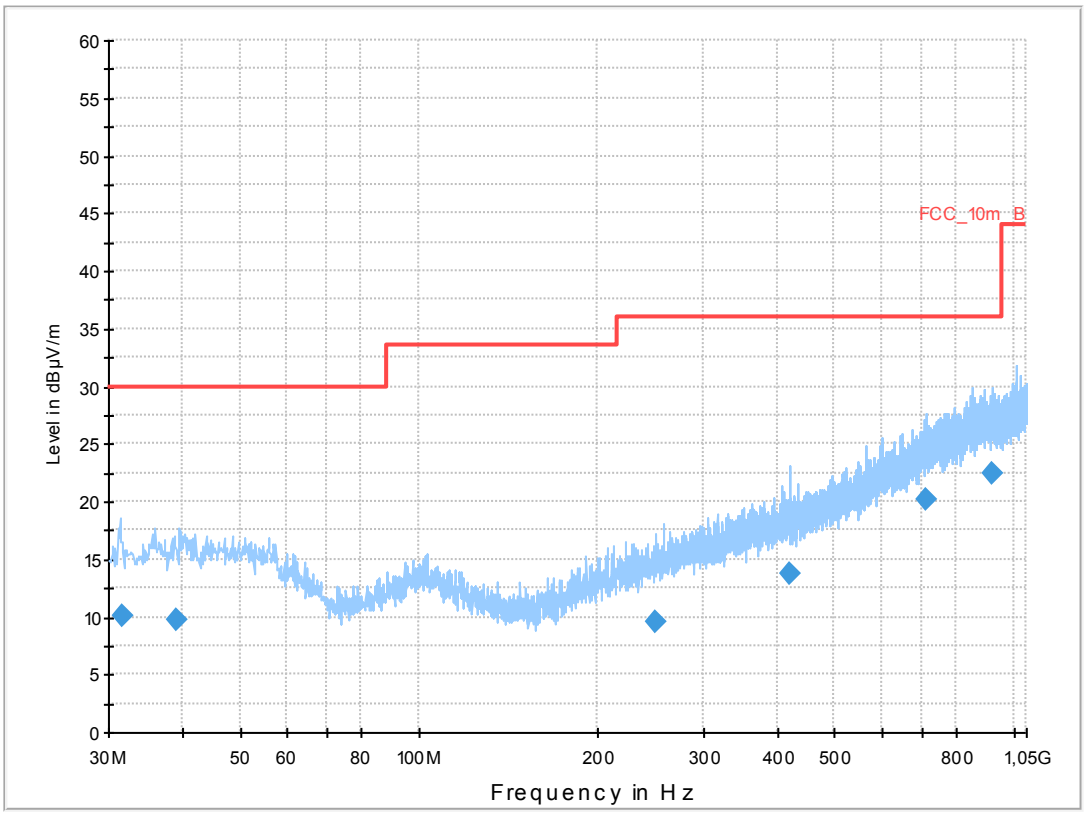
Common Information

Serial Number:	CB5A1X9G4T
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	w-lan g-mode tx ch6
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

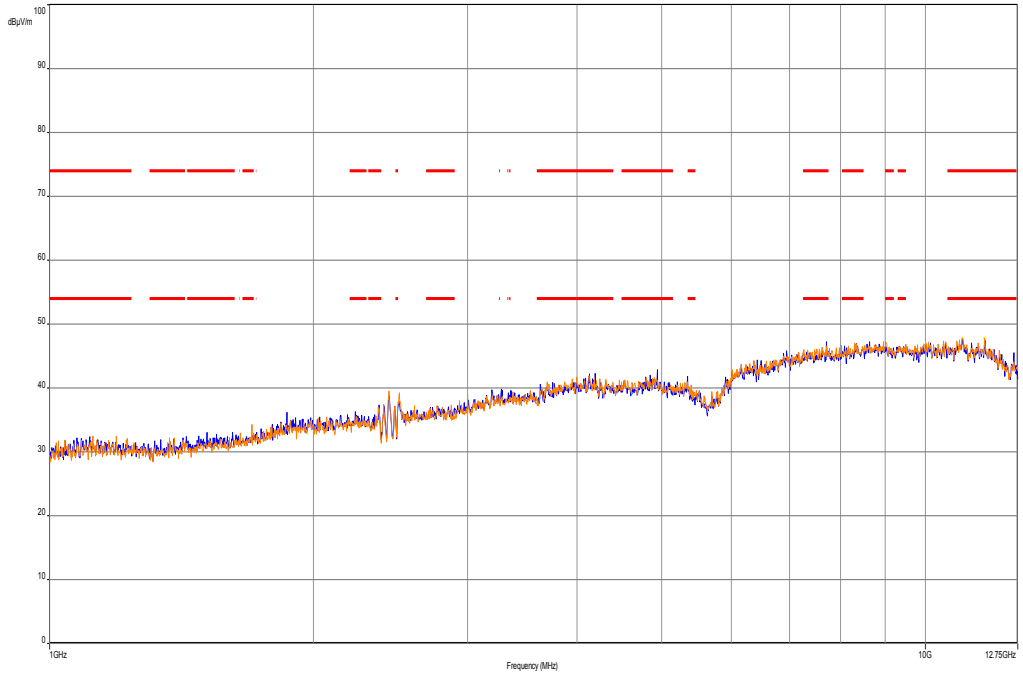
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

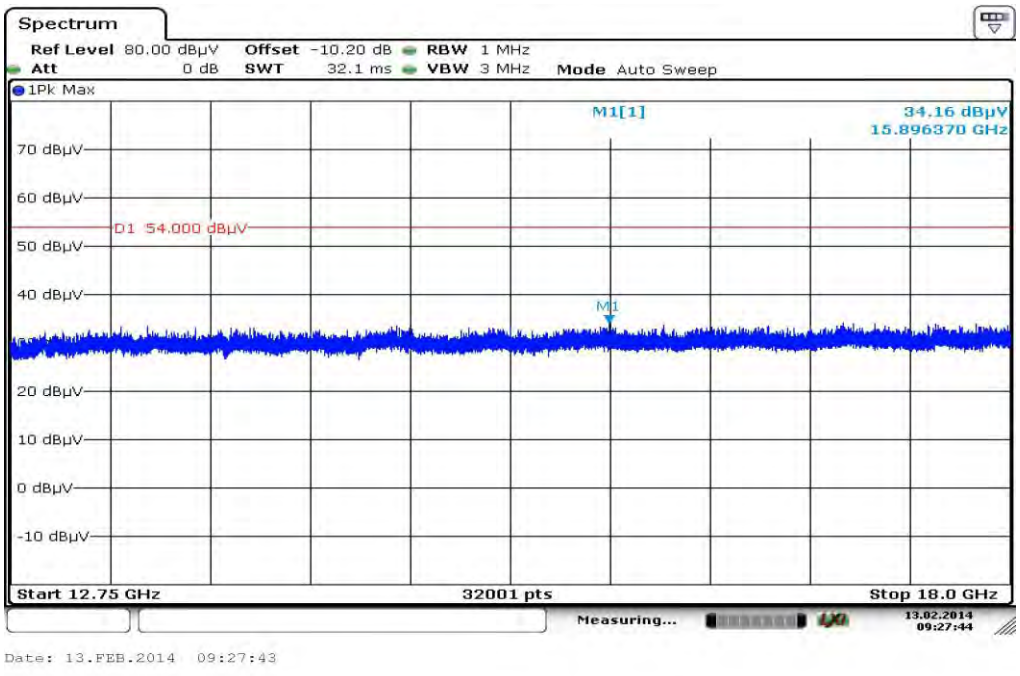
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.680600	10.1	1000.0	120.000	145.0	H	180.0	12.7	19.9	30.0	
38.981850	9.7	1000.0	120.000	145.0	V	180.0	13.4	20.3	30.0	
250.656900	9.6	1000.0	120.000	145.0	V	180.0	13.3	26.4	36.0	
419.639550	13.7	1000.0	120.000	145.0	V	270.0	17.2	22.3	36.0	
710.225100	20.1	1000.0	120.000	145.0	V	90.0	22.7	15.9	36.0	
916.906650	22.4	1000.0	120.000	145.0	H	180.0	25.3	13.6	36.0	

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

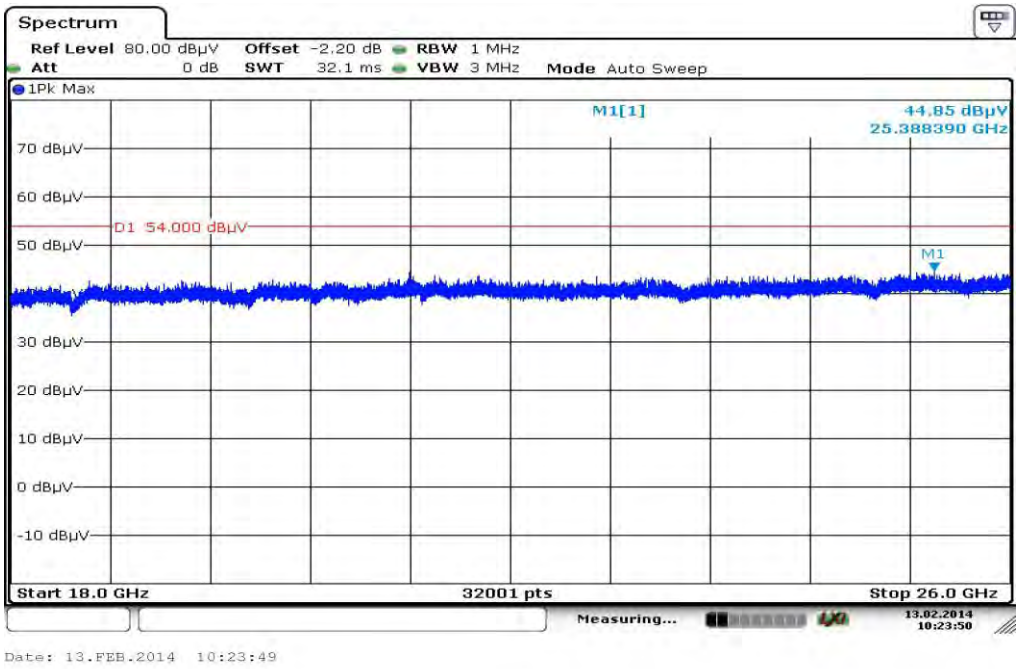


The carrier signal is notched with a 2.4 GHz band rejection filter.

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

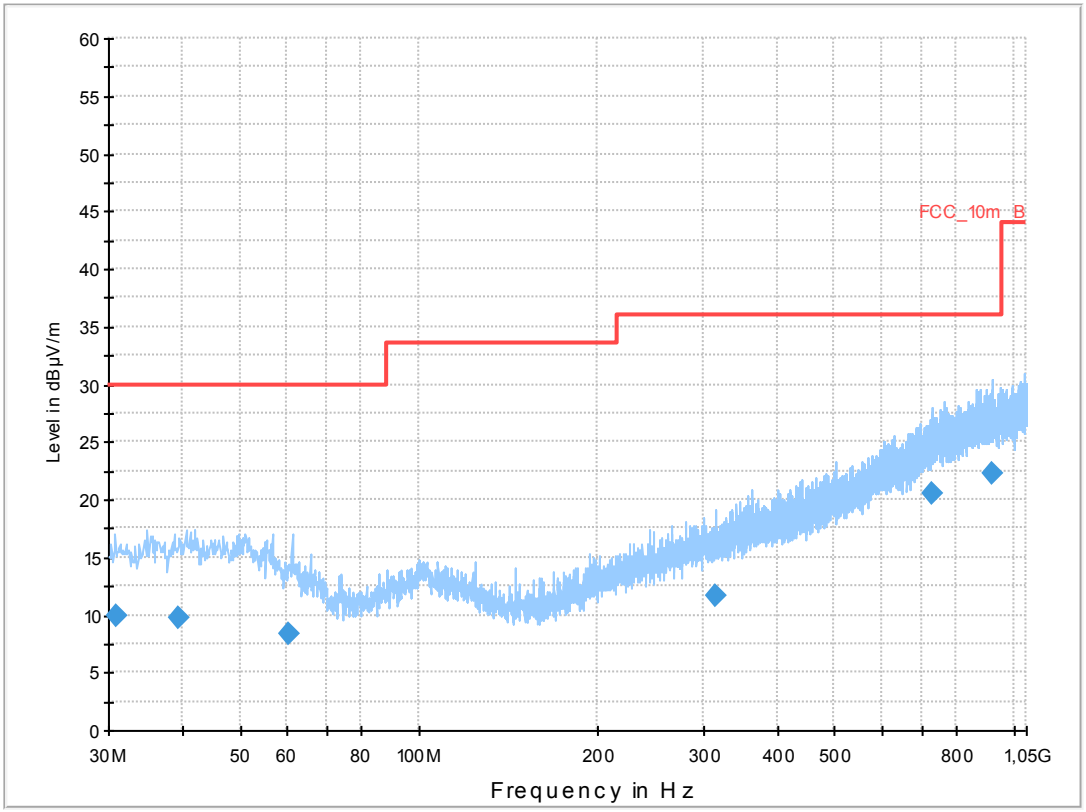
Common Information

Serial Number:	CB5A1X9G4T
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	w-lan g-mode tx ch11
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

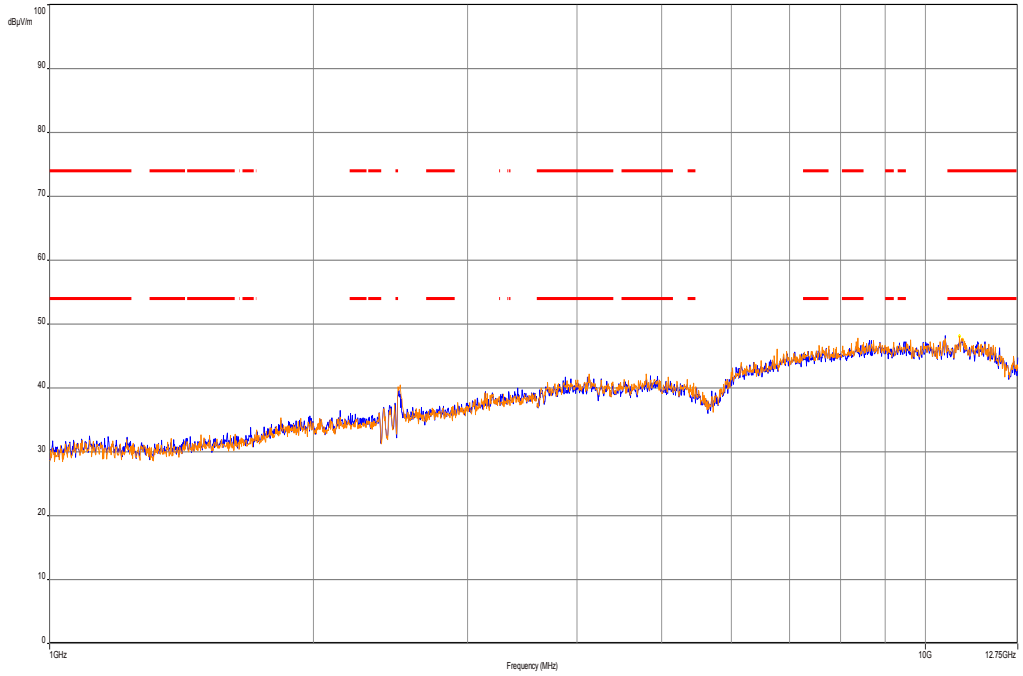
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

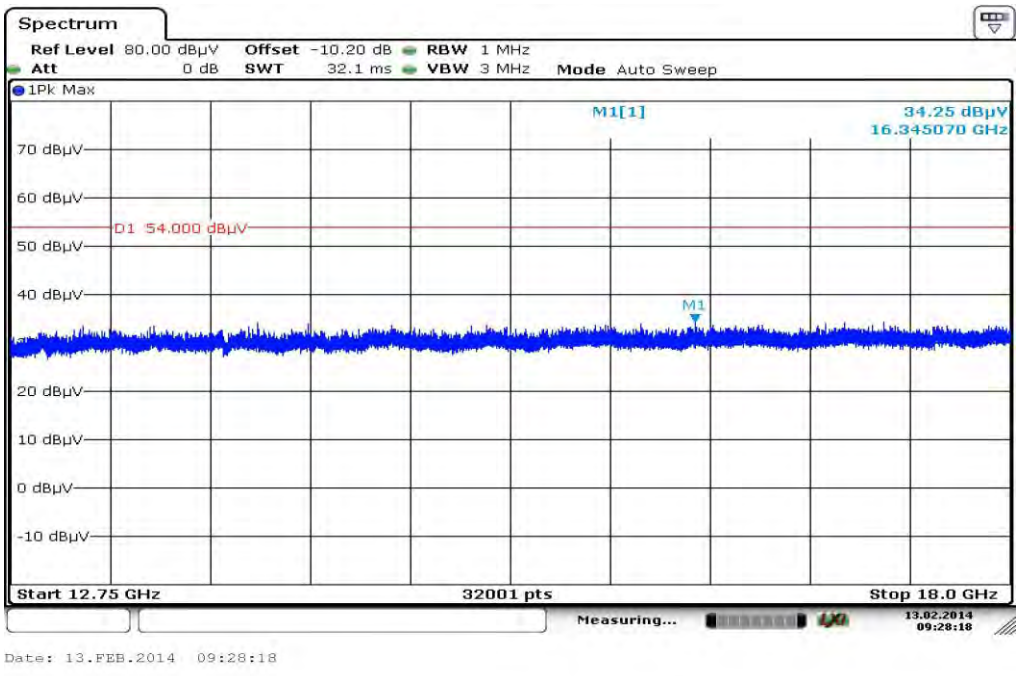
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
30.990600	10.0	1000.0	120.000	145.0	H	0.0	12.6	20.0	30.0	
39.269250	9.8	1000.0	120.000	145.0	V	0.0	13.4	20.2	30.0	
60.544950	8.3	1000.0	120.000	145.0	H	0.0	11.5	21.7	30.0	
314.764500	11.6	1000.0	120.000	145.0	V	90.0	15.0	24.4	36.0	
730.057650	20.4	1000.0	120.000	98.0	H	90.0	23.2	15.6	36.0	
918.317700	22.3	1000.0	120.000	145.0	H	0.0	25.3	13.7	36.0	

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

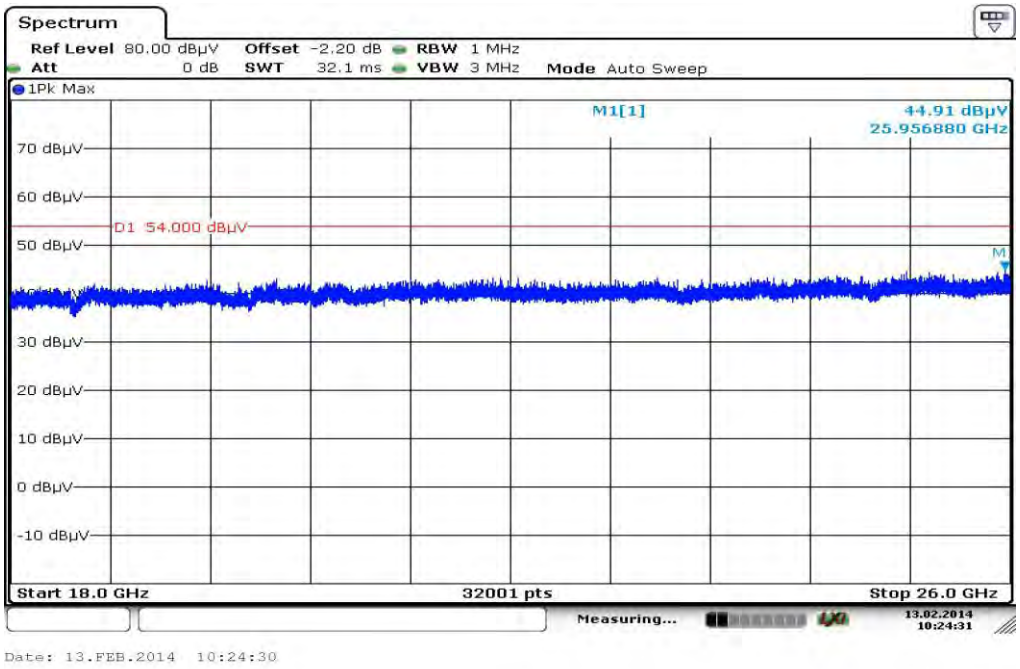


The carrier signal is notched with a 2.4 GHz band rejection filter.

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 / n HT20 – mode

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

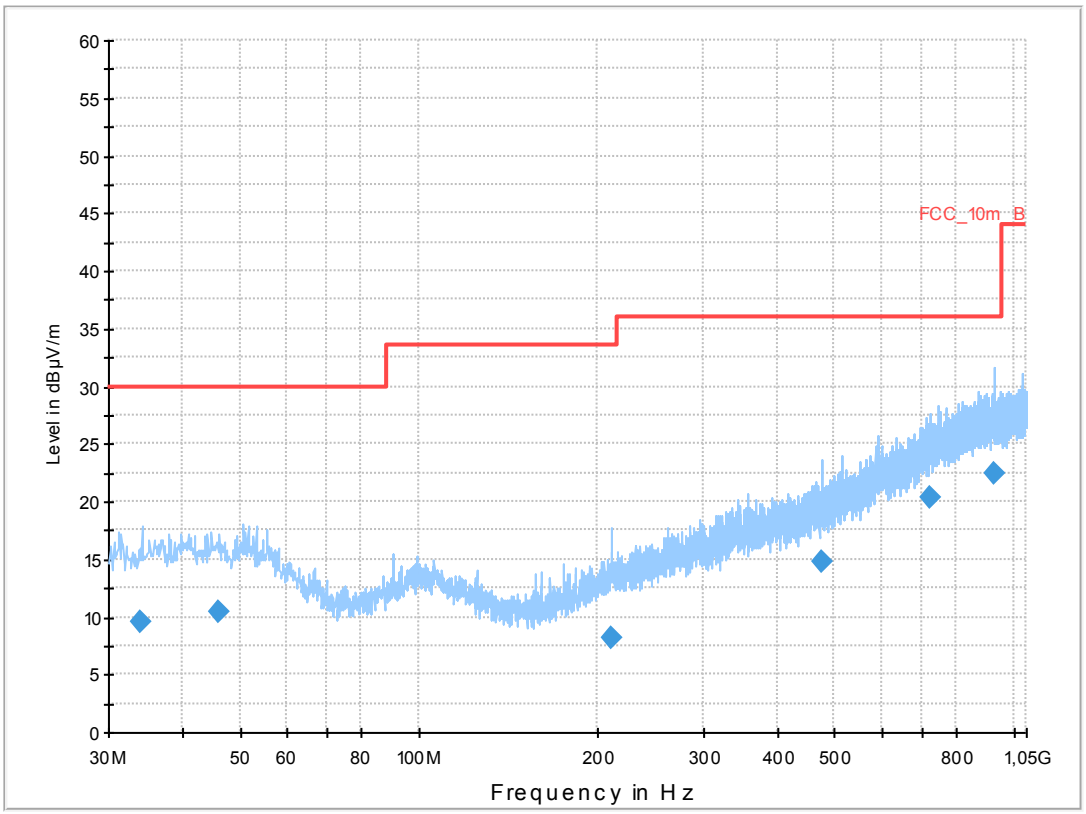
Common Information

Serial Number:	CB5A1X9G4T
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	w-lan n-mode tx ch1
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

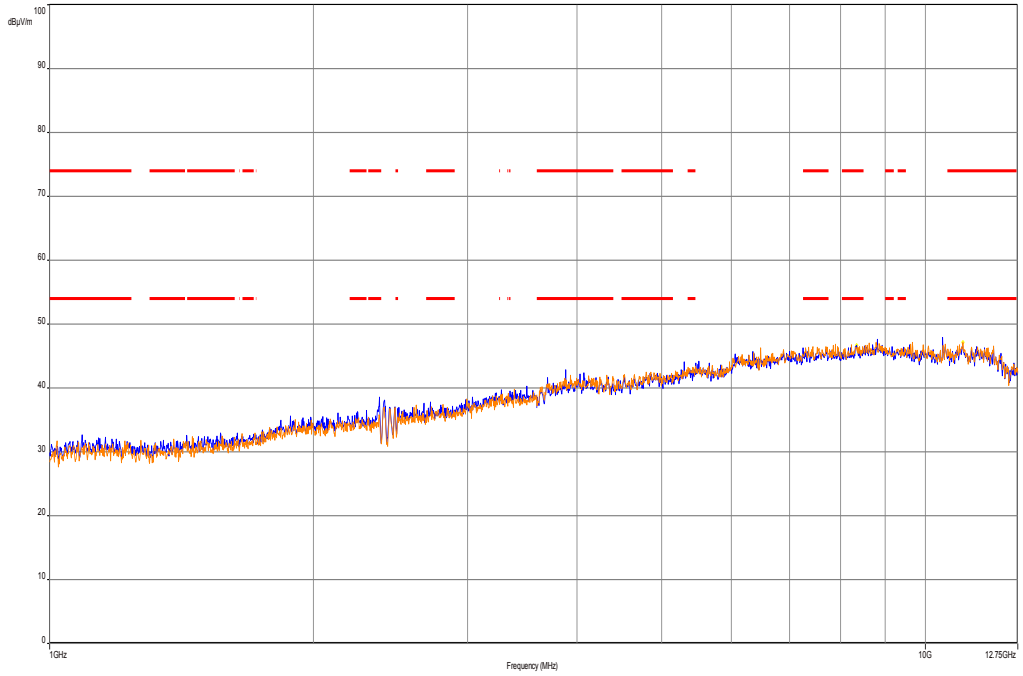
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

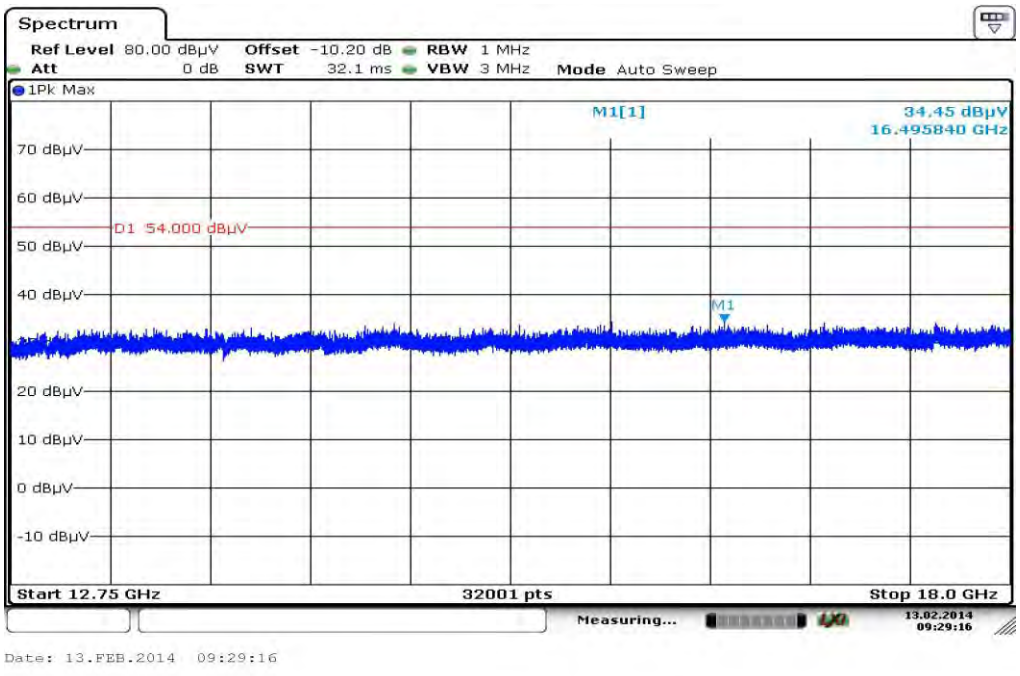
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
34.031250	9.6	1000.0	120.000	112.0	V	180.0	12.9	20.4	30.0	
45.946800	10.4	1000.0	120.000	120.0	H	270.0	13.3	19.6	30.0	
210.613500	8.1	1000.0	120.000	145.0	V	270.0	12.1	25.4	33.5	
473.965650	14.8	1000.0	120.000	145.0	V	0.0	18.2	21.2	36.0	
723.969600	20.3	1000.0	120.000	145.0	V	180.0	23.1	15.7	36.0	
924.989850	22.4	1000.0	120.000	145.0	H	270.0	25.3	13.6	36.0	

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

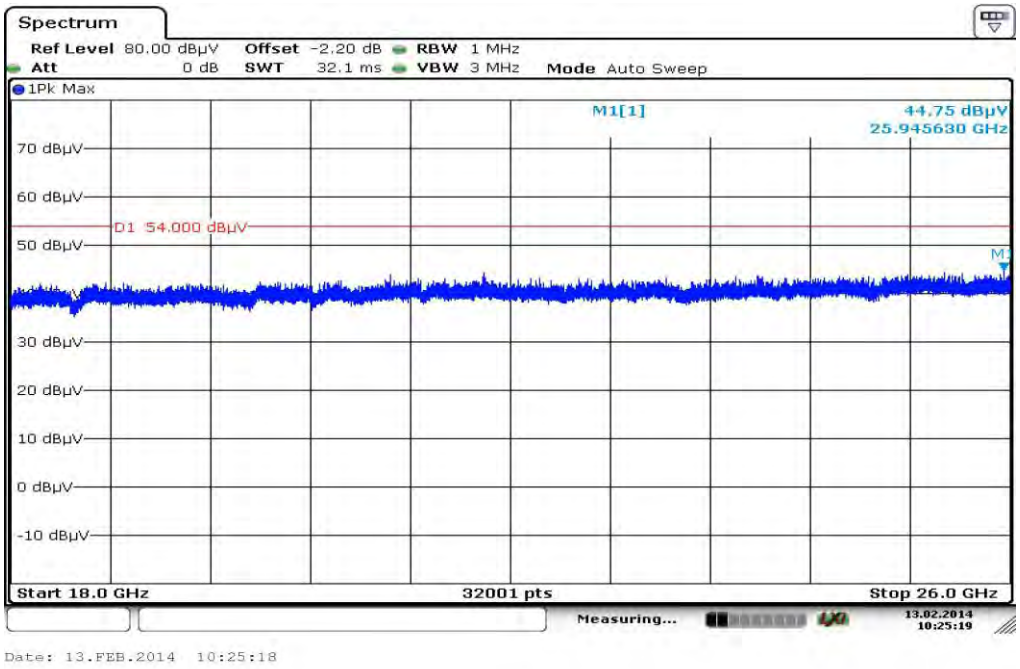


The carrier signal is notched with a 2.4 GHz band rejection filter.

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

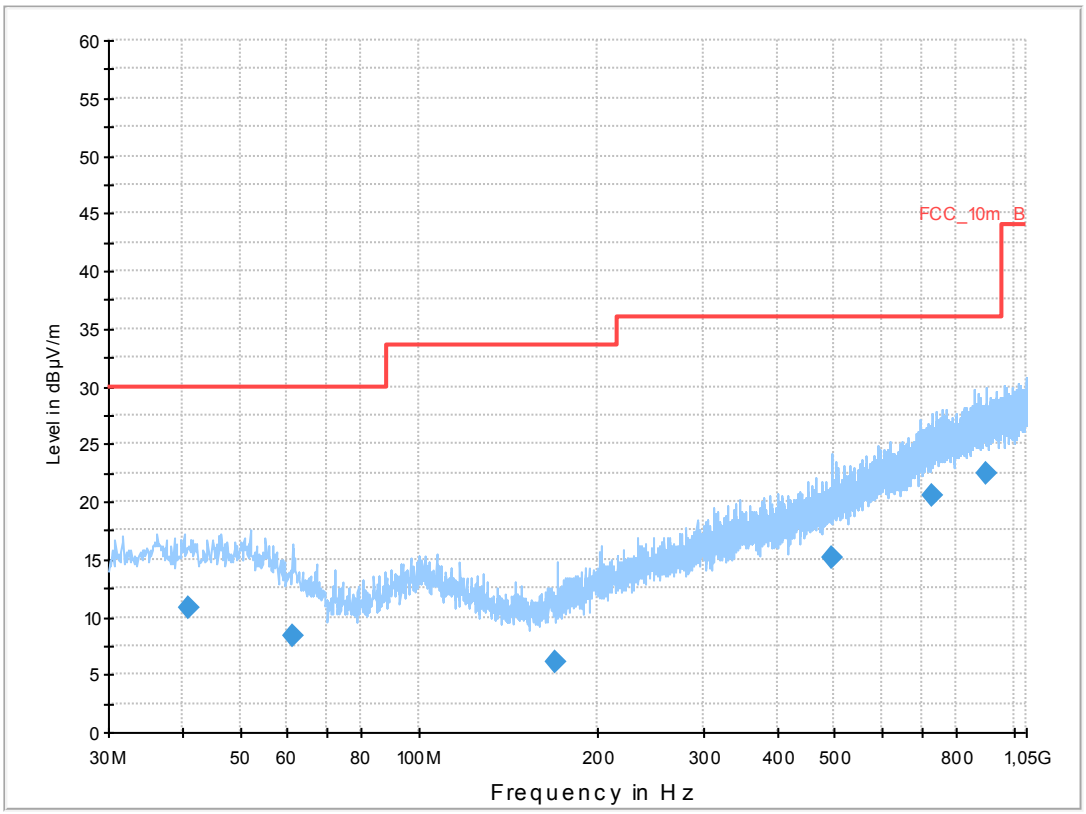
Common Information

Serial Number:	CB5A1X9G4T
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	w-lan n-mode tx ch6
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

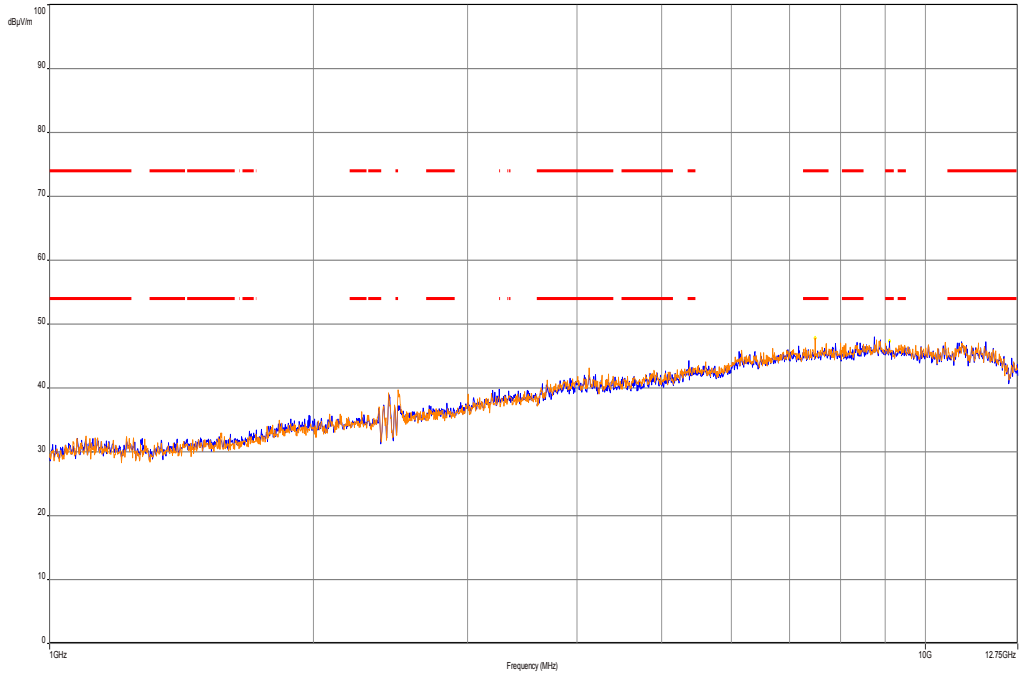
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

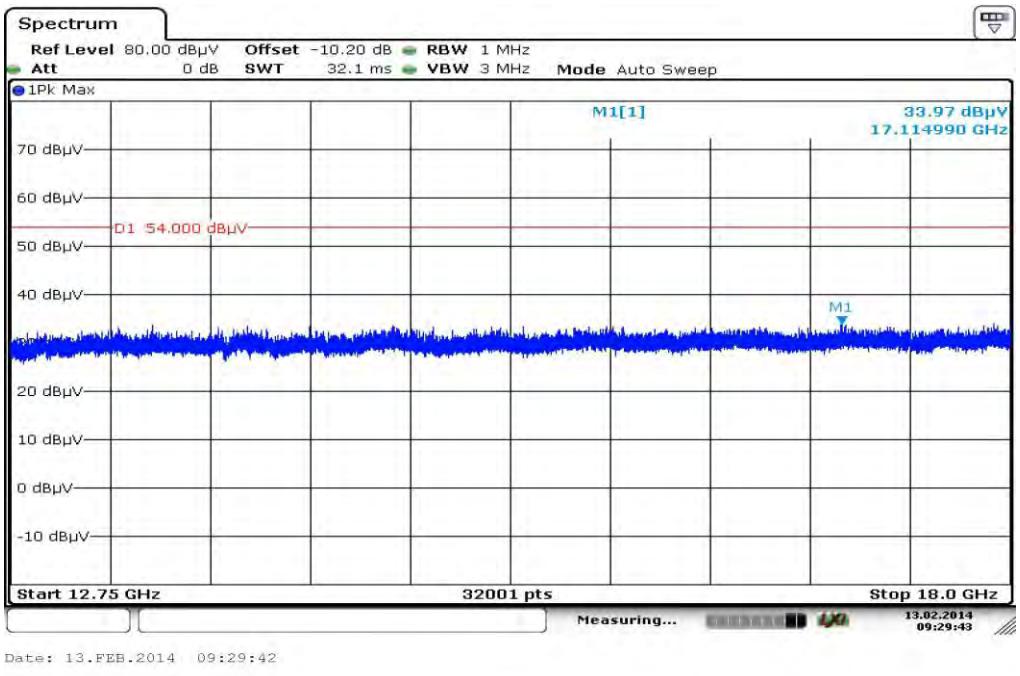
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
40.806450	10.8	1000.0	120.000	145.0	V	180.0	13.4	19.2	30.0	
61.157250	8.4	1000.0	120.000	98.0	V	180.0	11.3	21.6	30.0	
170.041500	6.1	1000.0	120.000	145.0	H	0.0	9.8	27.4	33.5	
494.075400	15.2	1000.0	120.000	145.0	V	90.0	18.6	20.8	36.0	
730.612650	20.5	1000.0	120.000	145.0	V	90.0	23.2	15.5	36.0	
901.961700	22.4	1000.0	120.000	145.0	H	270.0	25.2	13.6	36.0	

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

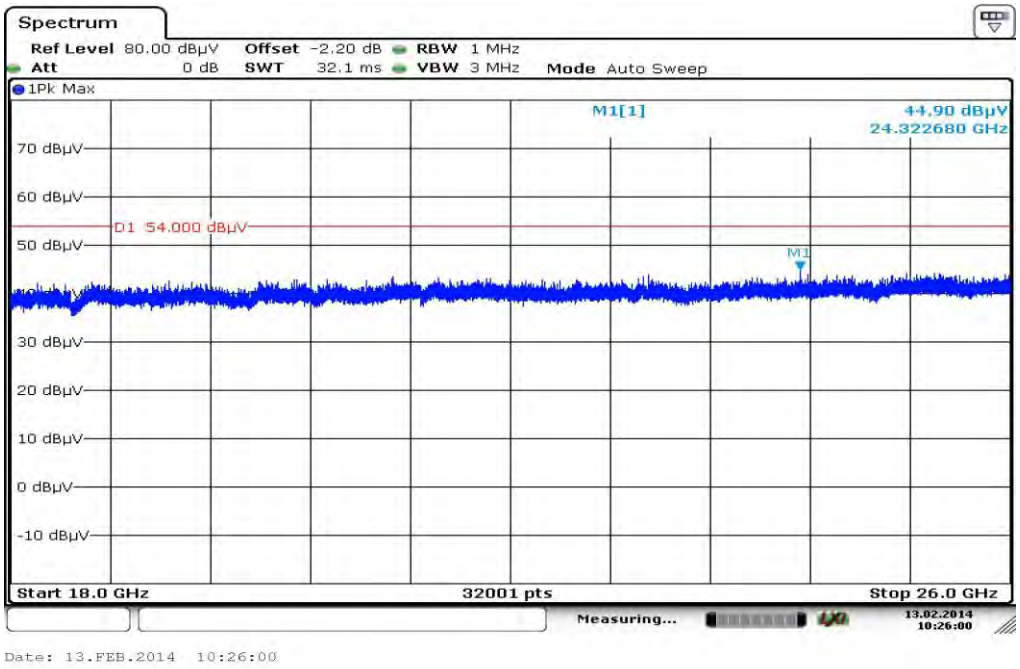


The carrier signal is notched with a 2.4 GHz band rejection filter.

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

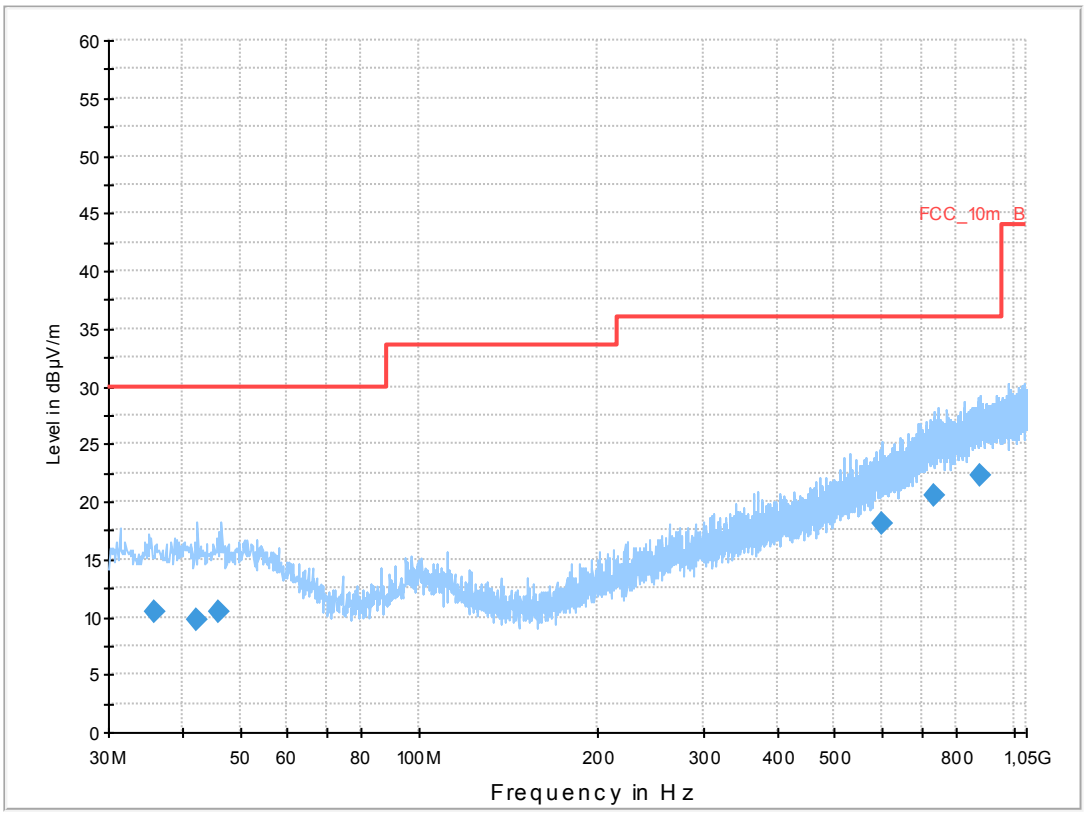
Common Information

Serial Number:	CB5A1X9G4T
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	w-lan n-mode tx ch11
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

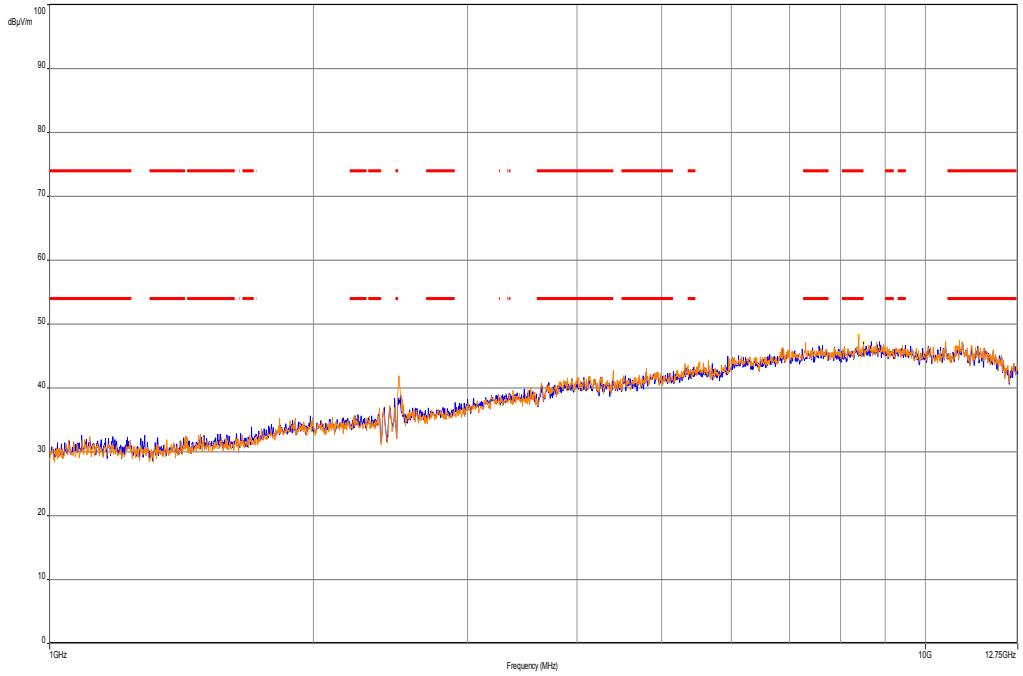
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

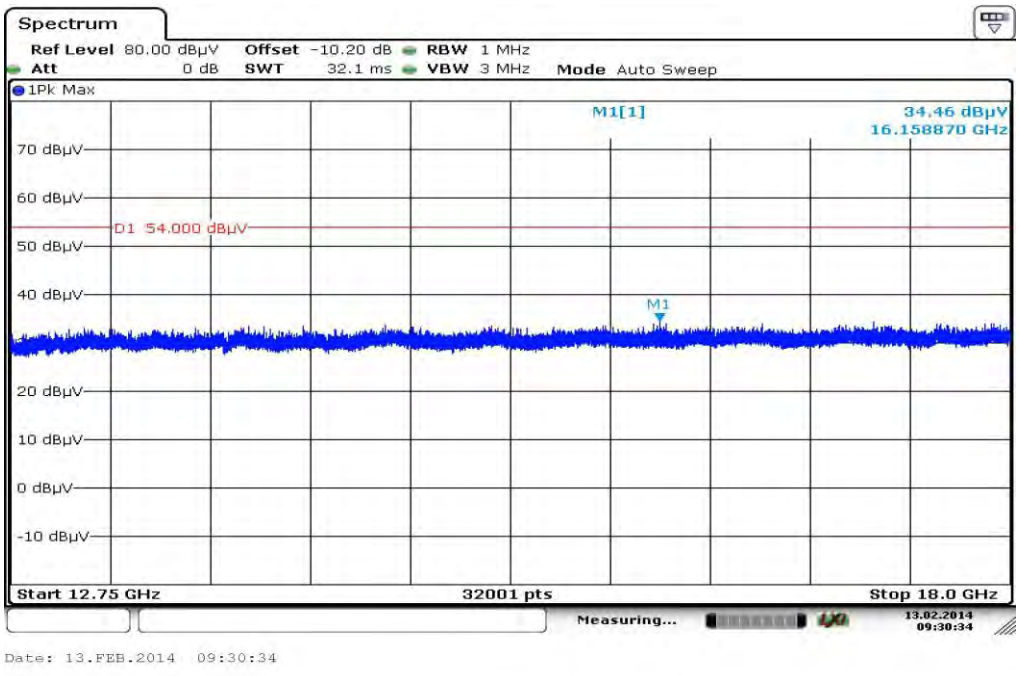
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.731200	10.4	1000.0	120.000	145.0	H	180.0	13.1	19.6	30.0	
42.085350	9.8	1000.0	120.000	139.0	V	180.0	13.4	20.2	30.0	
45.963000	10.4	1000.0	120.000	145.0	H	90.0	13.3	19.6	30.0	
600.350850	18.1	1000.0	120.000	123.0	H	90.0	20.8	17.9	36.0	
732.350700	20.6	1000.0	120.000	131.0	V	270.0	23.3	15.4	36.0	
879.006900	22.3	1000.0	120.000	123.0	V	180.0	24.9	13.7	36.0	

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

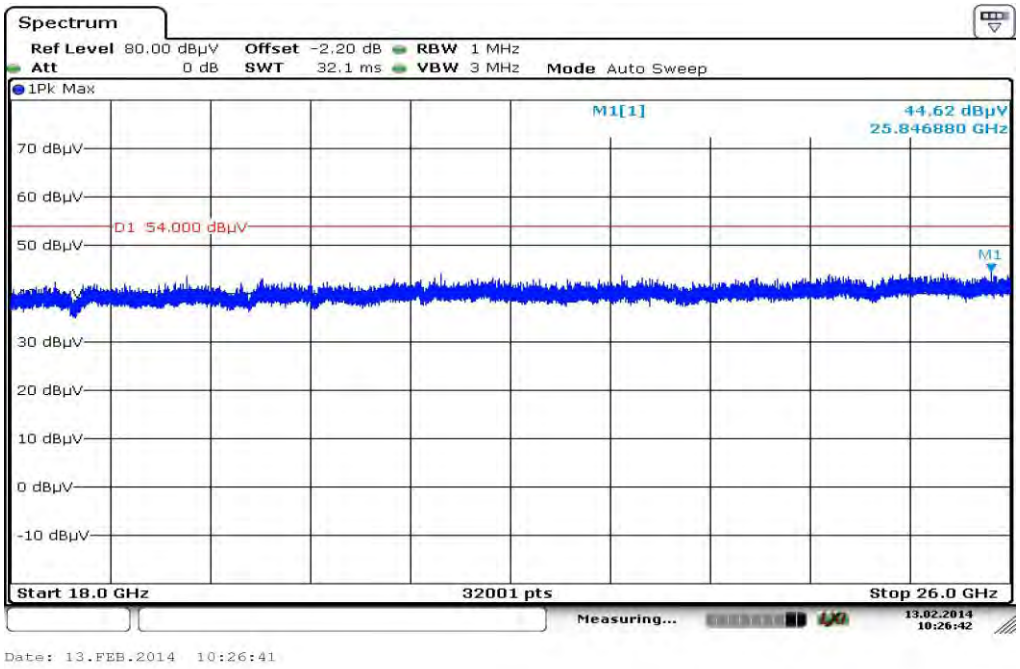


The carrier signal is notched with a 2.4 GHz band rejection filter.

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



10.11 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:	3 x RBW Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 26 GHz
Trace-Mode:	Max Hold

Limits:

FCC		
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.		
No emissions detected above 1 GHz.		
Measurement uncertainty	± 3 dB	

Result: Passed.

Note: The limit was recalculated with 20 dB / decade (Part 15.31) for all radiated spurious emissions 30 MHz to 1 GHz from 3 meter limit to a 10 meter distance. (40dB/decade for emissions < 30MHz)

Plots: RX / Idle – mode

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

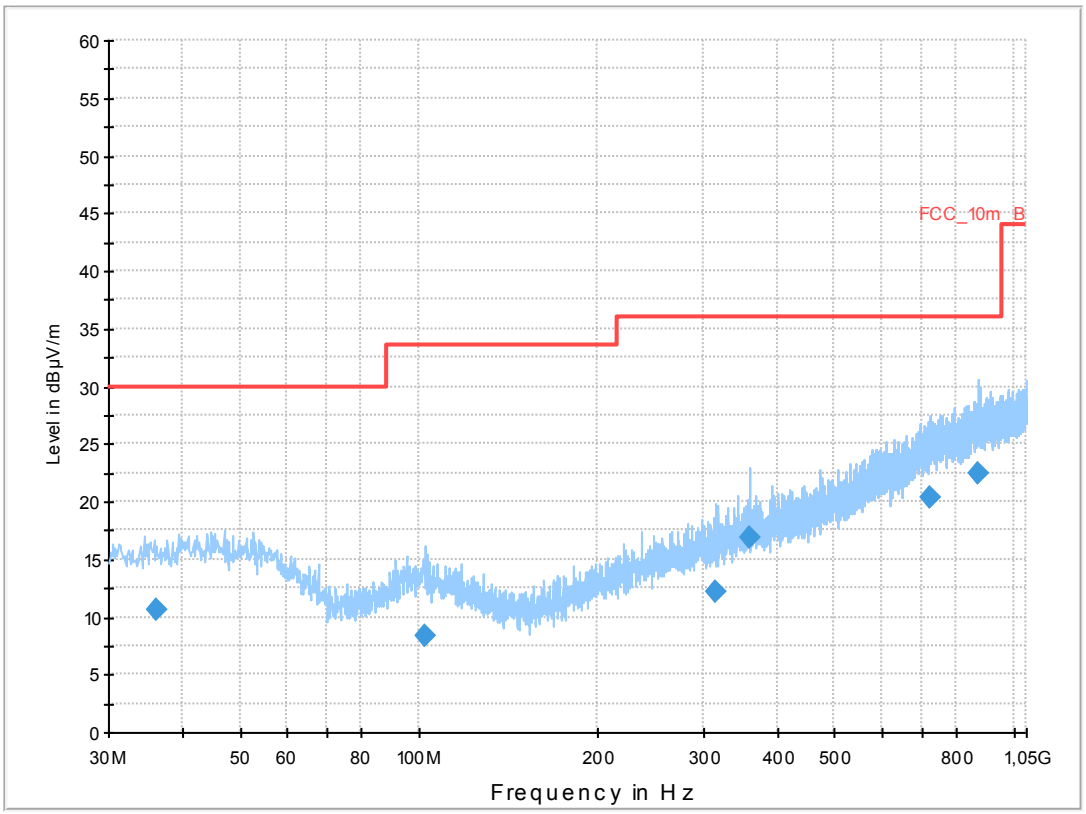
Common Information

Serial Number:	CB5A1X9G4T
Test Description:	FCC part 15 class B @ 10 m
Operating Conditions:	w-lan idle
Operator Name:	Wolsdorfer
Comment:	battery powered

Scan Setup: STAN_Fin [EMI radiated]

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

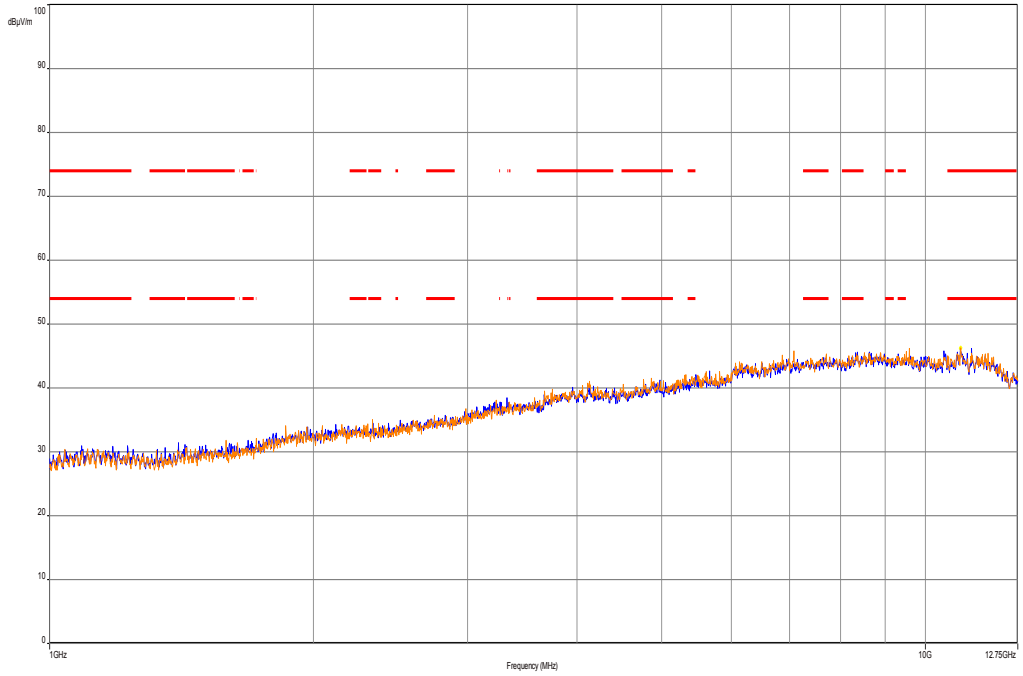
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



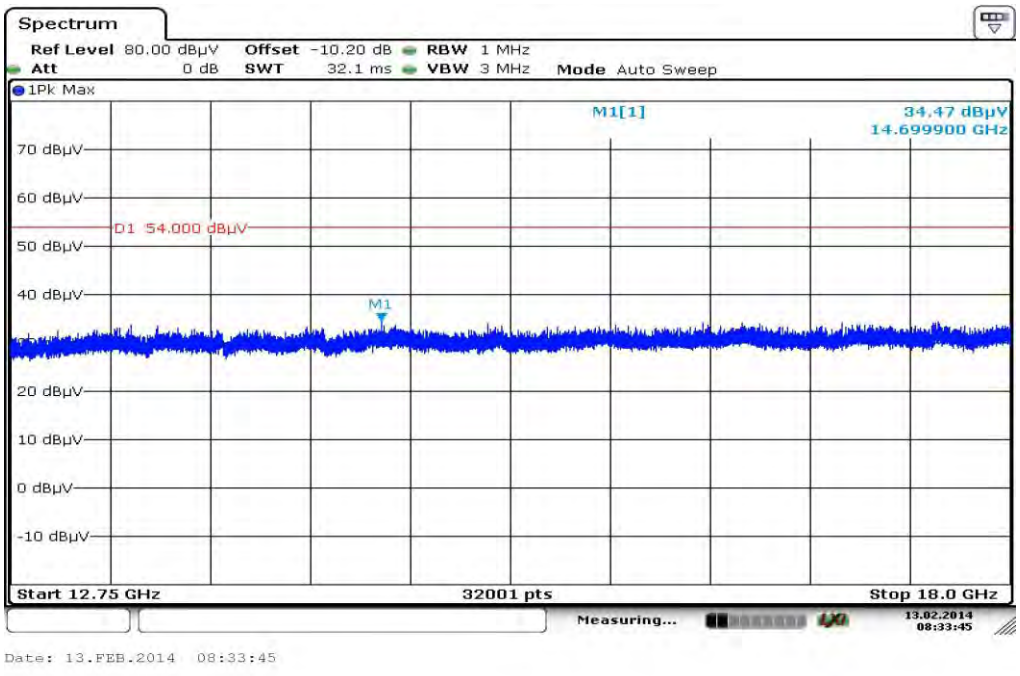
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
36.010950	10.6	1000.0	120.000	170.0	H	90.0	13.1	19.4	30.0	
102.360750	8.3	1000.0	120.000	170.0	H	183.0	11.7	25.2	33.5	
314.983800	12.1	1000.0	120.000	111.0	V	-10.0	15.0	23.9	36.0	
359.976300	16.9	1000.0	120.000	170.0	V	100.0	16.2	19.1	36.0	
723.804300	20.4	1000.0	120.000	98.0	H	190.0	23.1	15.6	36.0	
873.219600	22.4	1000.0	120.000	170.0	H	0.0	24.9	13.6	36.0	

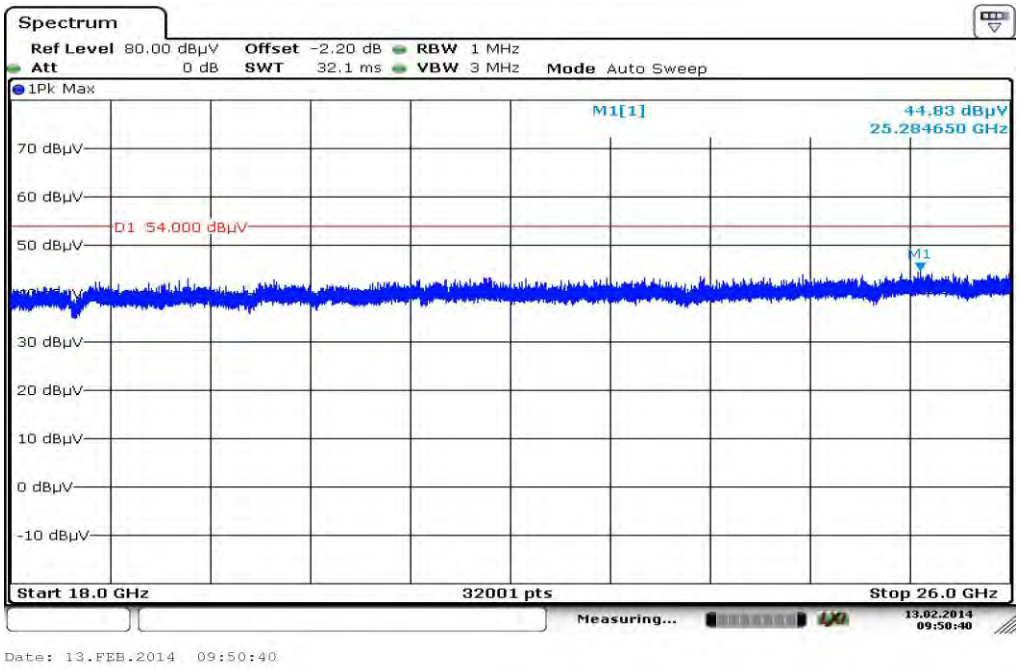
Plot 2: 1 GHz to 12.75 GHz, vertical & horizontal polarization



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



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



10.12 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		
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

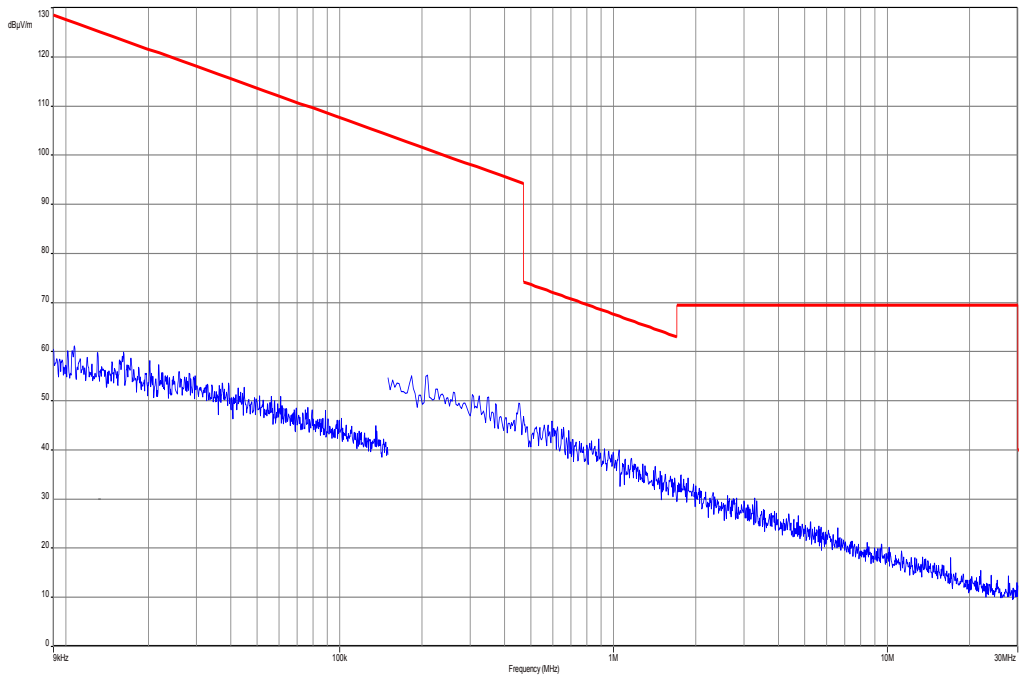
Results:

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

Result: Passed

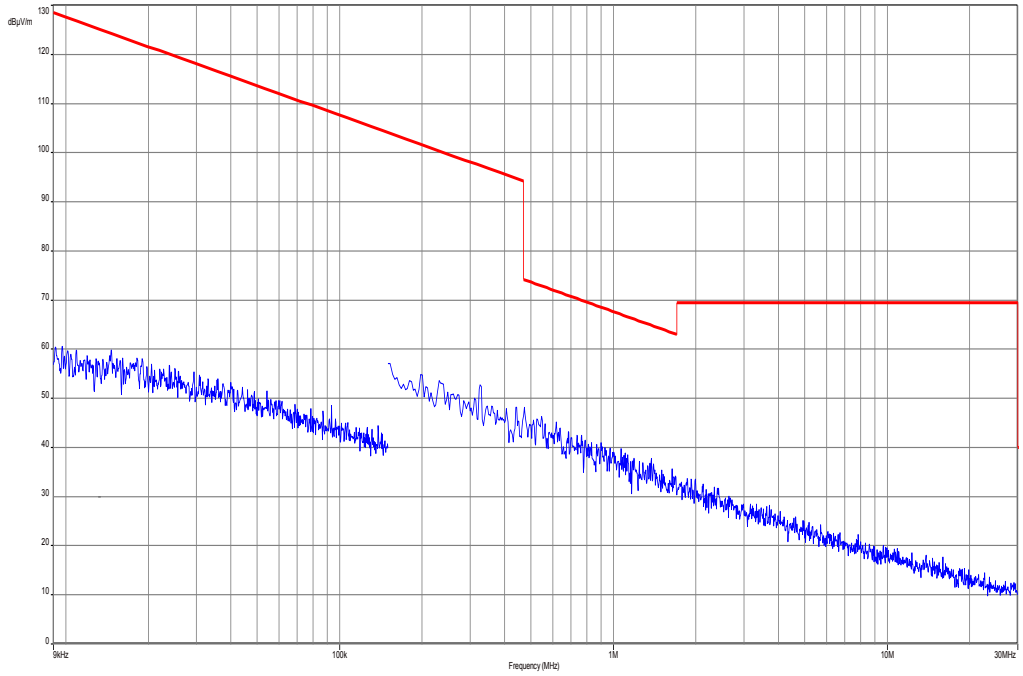
Plots: TX mode

Plot 1: 9 kHz to 30 MHz



Plots: RX / Idle – mode

Plot 1: 9 kHz to 30 MHz



10.13 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 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

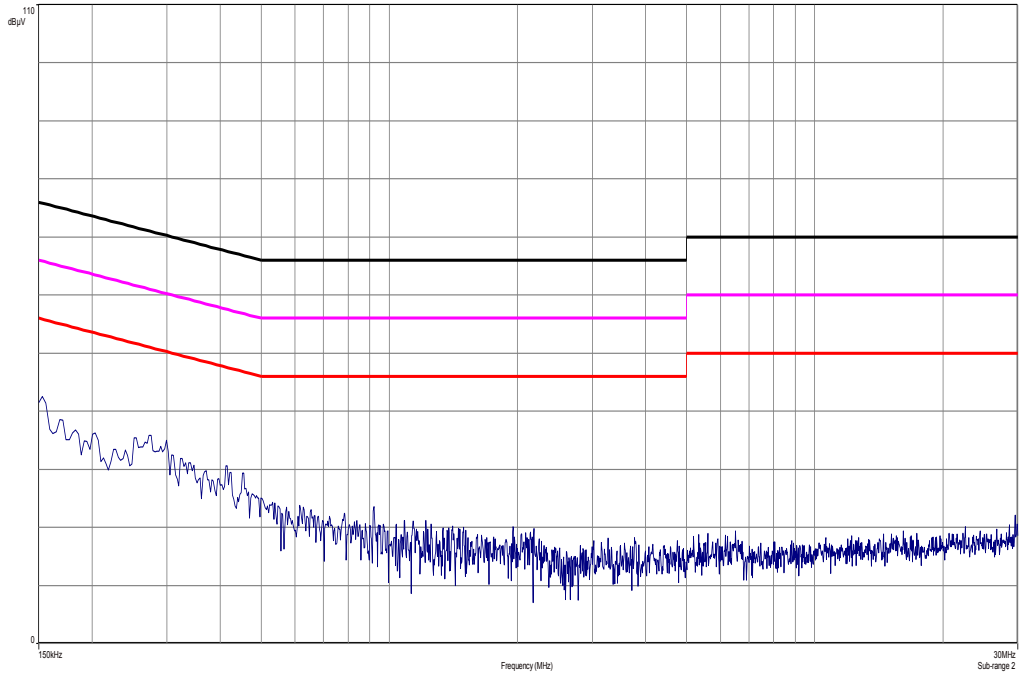
Results:

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

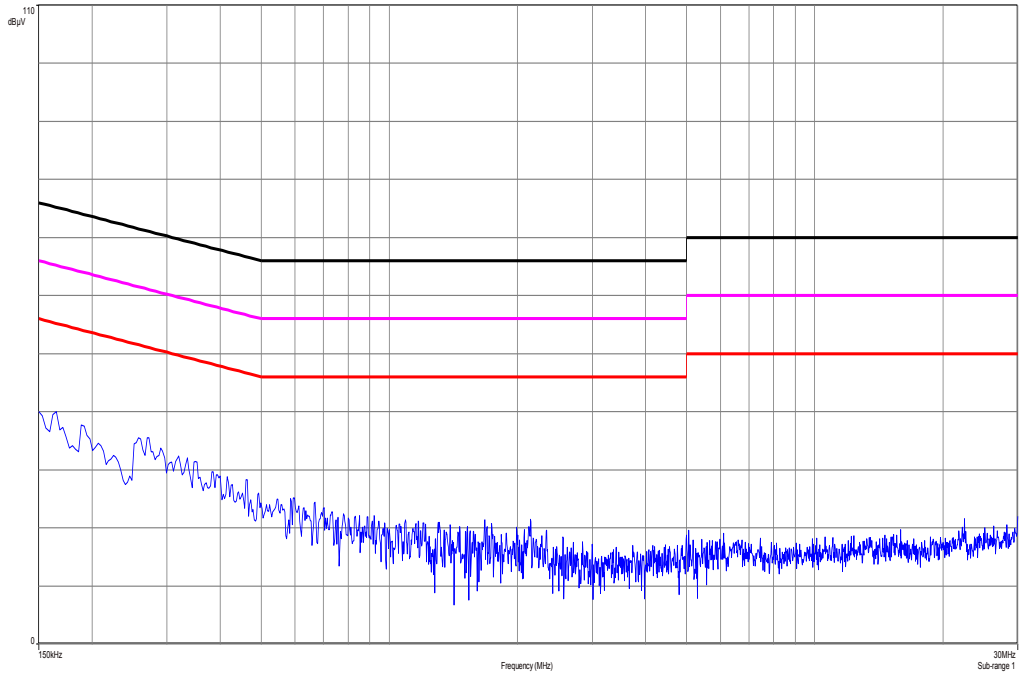
Result: Passed

Plots:

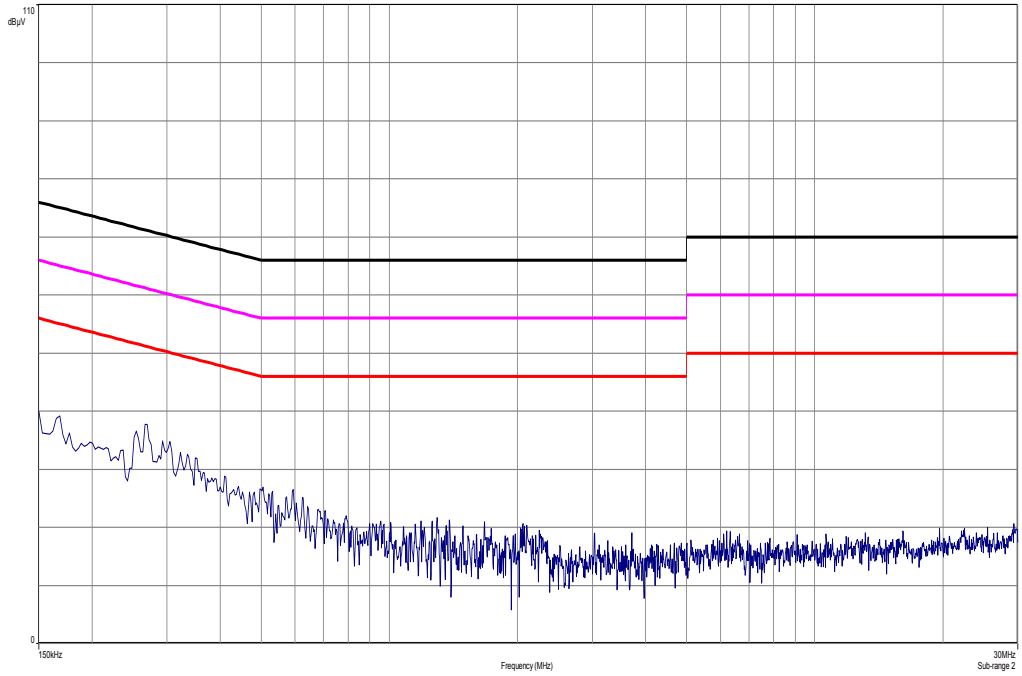
Plot 1: TX mode, 150 kHz to 30 MHz, phase line



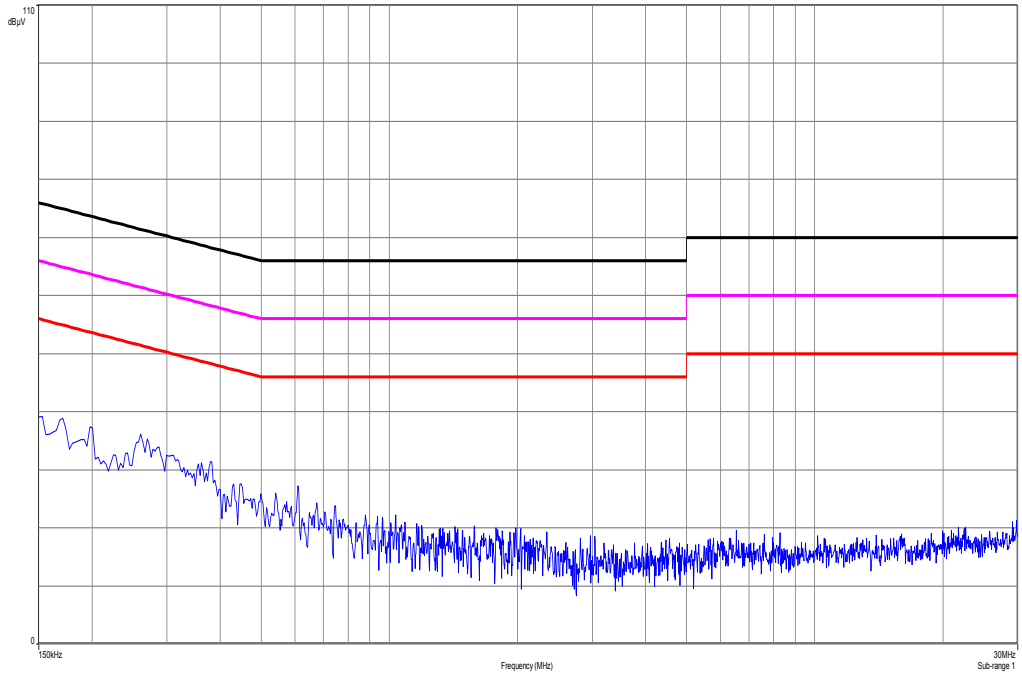
Plot 2: TX mode, 150 kHz to 30 MHz, neutral line



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



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



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 (Lab/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.	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	27.01.2014	27.01.2015
4	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
5	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
6	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
7	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	12.04.2012	12.04.2014
8	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKl!	08.05.2013	08.05.2015
9	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
10	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
11	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
12	9	Isolating Transformer	MPL IEC625 Bus Regeltrennt ravo	Erfi	91350	300001155	ne		
13	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
14	90	Active Loop Antenna 10 kHz to 30 MHz	6502	Kontron Psychotech	8905-2342	300000256	k	13.06.2013	13.06.2015
15	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
16	n. a.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
17	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKl!	14.10.2011	14.10.2014
18	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014
19	n. a.	Isolating Transformer	RT5A	Grundig	12780	300001166	ev		
20	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	21.01.2014	21.01.2015
21	n. a.	Power Supply 0-20V, 0-5A	6632B	Agilent Technologies	GB42110541	400000562	vlKl!	10.01.2013	10.01.2016
22	n. a.	PC-WLAN Tester	Intel Core i3 3220/3,3 GHz, Prozessor		2V2403033A 4523	300004589	ne		

23	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
24	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000787	k	22.07.2013	22.07.2015
25	A029	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8205	300002442	k	19.07.2013	19.07.2015
26	A031	Std. Gain Horn Antenna 26.5 to 40.0 GHz	637	Narda		300000510	k	19.07.2013	19.07.2015
27	n. a.	Broadband Low Noise Amplifier 18-50 GHz	CBL18503 070-XX	CERNEX	19338	300004273	ne		

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

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
	Initial release	2014-03-05

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
IC - Industry Canada
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

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
Dipl.-Ing. (FH) Arti 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
Bundesallee 100
38116 Braunschweig

Die auszugsweise Veröffentlichung der Akkreditierungsurkunde bedarf der vorherigen schriftlichen Zustimmung der Deutsche Akkreditierungsstelle GmbH (DAkkS). Ausgenommen davon ist die separate Weiterverbreitung des Deckblattes 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. 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