

TEST REPORT

Test report no.: 1-5623/12-01-06-B



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

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Phone: +49 7131 617-155

Manufacturer

beyerdynamic GmbH & Co. KG
Theresienstraße 8
74072 Heilbronn / 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:	Discussion unit
Model name:	Quinta MU 31 and Quinta MU 33
FCC ID:	OSDQUINTAMU3X
IC:	3628A-QUINTAMU3X
Frequency:	DTS band 2400 MHz to 2483.5 MHz (lowest channel 2412, highest channel 2464 MHz)
Technology tested:	DSSS
Antenna:	2 integrated antennas
Power Supply:	110 / 10 V AC by external power supply / DC by internal battery
Temperature:	+22

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:



Stefan Bös
Senior Testing Manager

Test performed:



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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2.2 Application details

Date of receipt of order:	2013-02-26
Date of receipt of test item:	2013-05-13
Start of test:	2013-05-13
End of test:	2013-10-27
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	2012-10	Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices
RSS - 210 Issue 8	2010-12	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

3.1 Measurement guidance

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

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	-/- °C during high temperature tests
	T_{min}	-/- °C during low temperature tests
Relative humidity content:		46 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	110 / 10 V
		AC by external power supply / DC by internal battery
	V_{max}	121 V
	V_{min}	99 V

5 Test item

Kind of test item	:	Discussion unit
Type identification	:	Quinta MU 31 and Quinta MU 33
S/N serial number	:	Radiated unit: 00001 Conducted unit: 00006
HW hardware status	:	Rev. 1
SW software status	:	1.0.33
Frequency band [MHz]	:	DTS band 2400 MHz to 2483.5 MHz (lowest channel 2412 MHz; highest channel 2464 MHz)
Type of radio transmission	:	DSSS
Use of frequency spectrum	:	
Type of modulation	:	BPSK, QPSK
Number of channels	:	3 (test mode)
Antenna	:	2 integrated antennas
Power supply	:	110 / 10 V AC by external power supply / DC by internal battery
Temperature range	:	No range needed!

5.1 Additional information

Test setup - and EUT - photos are included in the following test reports:

External EUT photos: 1-5623/12-01-01_AnnexA
 Internal EUT photos: 1-5623/12-01-01_AnnexB
 Test setup: 1-5623/12-01-01_AnnexD

6 Test laboratories sub-contracted

None

7 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	2013-10-28	-/-

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	☒	☐	☐	☐	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth – 6 dB bandwidth	KDB 558074 DTS clause: 8.2	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
RSS Gen clause 4.6.1	Occupied bandwidth	-/-	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.247(b)(3) RSS-210 / A8.4(4)	Maximum output power	KDB 558074 DTS clause: 9.1.2	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted	KDB 558074 DTS clause: 13.2.1	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.205 RSS-210 / A8.5	Band edge compliance radiated	-/-	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	KDB 558074 DTS clause: 11.1 & 11.2	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	-/-	Nominal	Nominal	DSSS	☒	☐	☐	☐	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	☒	☐	☐	☐	complies
§15.107(a)	Conducted emissions < 30 MHz	-/-	Nominal	Nominal	DSSS	☒	☐	☐	☐	complies

Note: NA = Not Applicable; NP = Not Performed

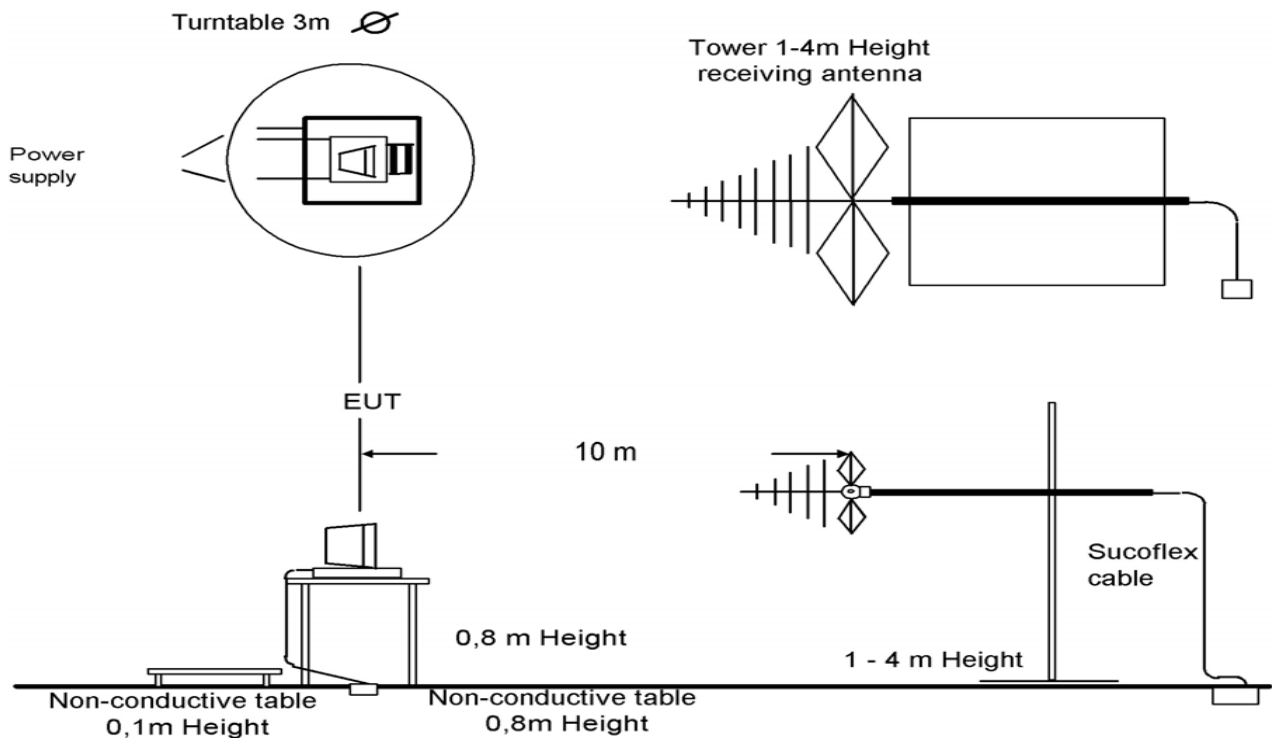
8 RF measurements

8.1 Description of test setup

8.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 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. 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. Antennas are confirmed with ANSI C63.

Semi anechoic chamber



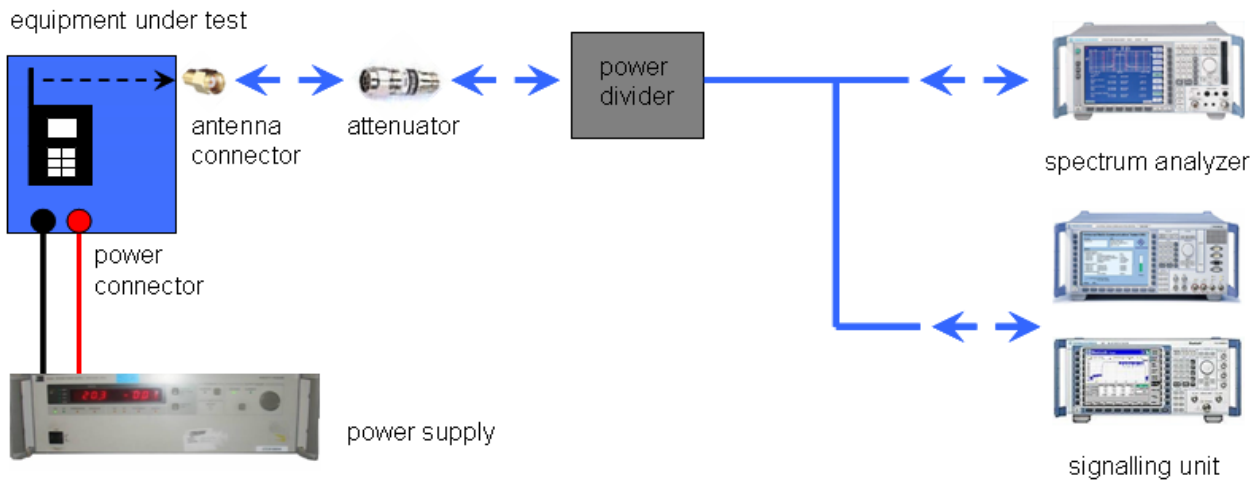
Picture 1: Diagram radiated measurements

9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

The EUT is powered by an external power supply with nominal voltage. The signalling is performed from outside the chamber with a signalling unit (CMU200 or other) by air link using signalling antenna.

8.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch). One of the signal paths is connected to the communication base Station (CMU200 or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm.



Picture 2: Diagram conducted measurements

8.2 Additional comments

Reference documents:



beyerdynamic GmbH & Co. KG, Postfach 1320, 74003 Heilbronn - Germany

Federal Communication Commission
Equipment Authorization Division, Application Processing Branch
7435 Oakland Mills Road
Columbia, MD 21048

Certification and Engineering Bureau
Industry Canada
Spectrum Engineering Branch
3701 Carling Avenue, Building 94
Ottawa, Ontario K2H 8S2

March 11th, 2013

Declaration on Electrically Identical Models

TO WHOM IT MAY CONCERN

We, beyerdynamic GmbH & Co. KG, declare on our sole responsibility that the new model

Quinta MU 31

with FCC ID: OSDQUINTAMU3X and IC: 3628A-QUINTAMU3X

is identical in hardware and software to the certified model

Quinta MU 33 under FCC ID: OSDQUINTAMU3X and IC: 3628A-QUINTAMU3X

The only differences between the new models and the original model are:
Model Quinta MU 31 uses one button and model Quinta MU 33 three control buttons.

We attest that above changing are not relevant for any RF behaviour subject to regulatory items. Additional Spurious Emissions measurements on representative configurations have been performed to justify.

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BIC DEUTDE 33 620
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Therefore all test reports remains applicable.

If you have any questions, please feel free to contact us at the address shown below

Sincerely,

Signature:

A handwritten signature in black ink, appearing to read 'Ulrich Roth'.

Contact Name: i.V. Ulrich Roth, Director of R&D
Address: Theresienstrasse 8
74072 Heilbronn
Germany
Telephone No: +49 7131 617 155
Fax No: +49 7131 617 215
Email: roth@beyerdynamic.de

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

8.3 RSP100 test report cover sheet / performance test data

Test report number	:	1-5623/12-01-06-B				
Equipment model number:		Quinta MU 31 and Quinta MU 33				
Certification number	:	3628A-QUINTAMU3X				
Manufacturer (complete address)	:	beyerdynamic GmbH & Co. KG Theresienstraße 8 74072 Heilbronn / 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	DSSS port A	DSSS port B	-/-	-/-
		2412 – 2464 MHz, BPSK	26.18 mW	25.41 mW	-/-	
		2412 – 2464 MHz, QPSK	51.76 mW	48.31 mW	-/-	
		2422 – 2462 MHz				-/-
		Radiated values:				
		Band	DSSS port A	DSSS port B	-/-	-/-
		2412 – 2464 MHz, BPSK	65.77 mW	44.77 mW	-/-	
		2412 – 2464 MHz, QPSK	124.17 mW	69.82 mW	-/-	
		2422 – 2462 MHz				-/-
Occupied bandwidth (99%-BW)	:	Band	DSSS port A	DSSS port B	-/-	-/-
		2412 – 2464 MHz, BPSK	13.95 MHz	13.96 MHz	-/-	
		2412 – 2464 MHz, QPSK	13.95 MHz	13.95 MHz	-/-	
		2422 – 2462 MHz				-/-
Necessary bandwidth (calculated)	:	Band	DSSS port A	DSSS port B	-/-	-/-
		2412 – 2464 MHz, BPSK	12.80 MHz	12.80 MHz	-/-	
		2412 – 2464 MHz, QPSK	12.80 MHz	12.80 MHz	-/-	
		2422 – 2462 MHz				-/-
Emission classification	:	(according TRC-43)	G1D	G1D	-/-	-/-
Type of modulation	:	DSSS technology with BPSK and QPSK modulation.				
Antenna information	:	2 integrated antennas				
Transmitter spurious [dBuV/m @ 3m]	:	52.97 @ 4928 MHz (Peak)				

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:

2013-10-28

Tobias Wittenmeier

Date

Name

Signature

9 Measurement results

9.1 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: DSSS, antenna port A

T _{nom}	V _{nom}	lowest channel 2412 MHz	middle channel 2438 MHz	highest channel 2464 MHz
Conducted power [dBm] Measured with DSSS modulation		12.17	11.43	10.21
Radiated power [dBm] Measured with DSSS modulation		13.97	15.23	16.10
Gain [dBi] Calculated		+1.80	+3.80	+5.89
Measurement uncertainty			± 1.5 dB (cond.) / ± 3 dB (rad.)	

Result: **Passed**

Results: DSSS, antenna port B

T _{nom}	V _{nom}	lowest channel 2412 MHz	middle channel 2438 MHz	highest channel 2464 MHz
Conducted power [dBm] Measured with DSSS modulation		11.65	12.00	10.98
Radiated power [dBm] Measured with DSSS modulation		11.20	13.06	14.10
Gain [dBi] Calculated		-0.45	+1.06	+3.12
Measurement uncertainty			± 1.5 dB (cond.) / ± 3 dB (rad.)	

Result: **Passed**

9.2 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, antenna port A, BPSK

DSSS Frequency	Maximum Output Power [dBm]		
	2412 MHz	2438 MHz	2464 MHz
Peak output power conducted	14.18	13.51	12.29
Output Power Radiated – EIRP*) Worst case	15.98	17.31	18.18
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: Passed**Results: DSSS, antenna port B, BPSK**

DSSS Frequency	Maximum Output Power [dBm]		
	2412 MHz	2438 MHz	2464 MHz
Peak output power conducted	13.69	14.05	13.39
Output Power Radiated – EIRP*) Worst case	13.24	15.11	16.51
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: Passed

Results: DSSS, antenna port A, QPSK

DSSS Frequency	Maximum Output Power [dBm]		
	2412 MHz	2438 MHz	2464 MHz
Peak output power conducted	16.70	17.14	14.99
Output Power Radiated – EIRP*) Worst case	18.50	20.94	20.88
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

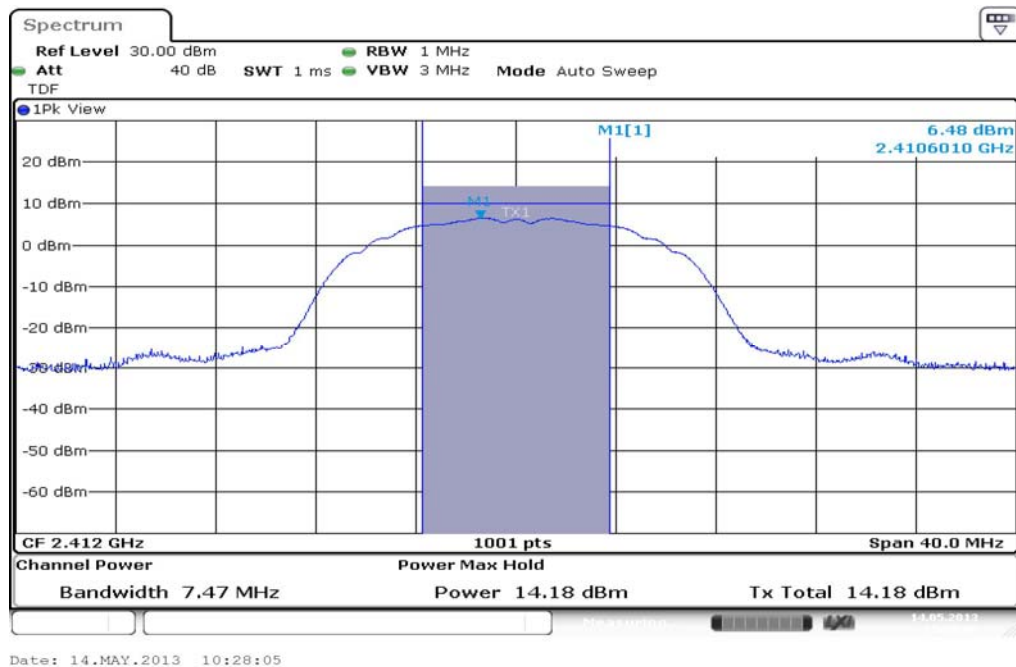
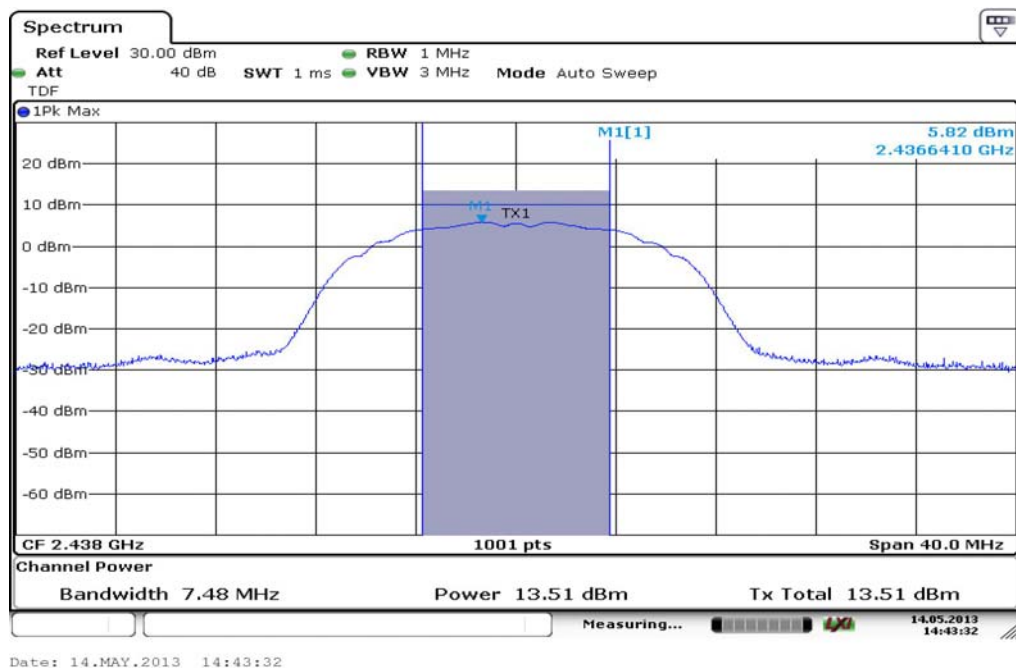
*) calculated with Antenna gain

Result: Passed**Results: DSSS, antenna port B, QPSK**

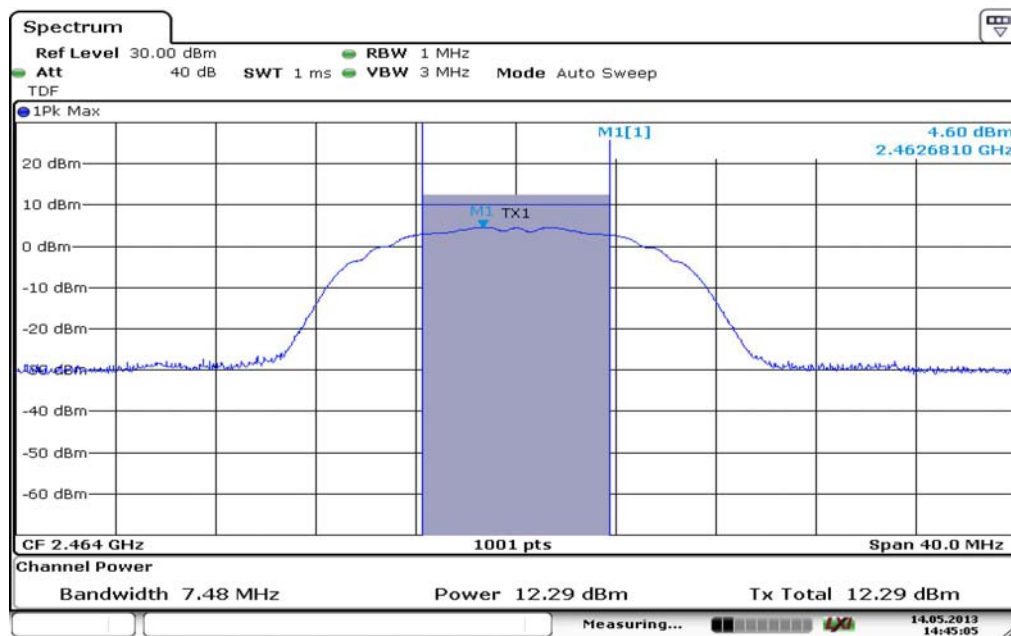
DSSS Frequency	Maximum Output Power [dBm]		
	2412 MHz	2438 MHz	2464 MHz
Peak output power conducted	15.85	16.84	15.32
Output Power Radiated – EIRP*) Worst case	15.40	17.90	18.44
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

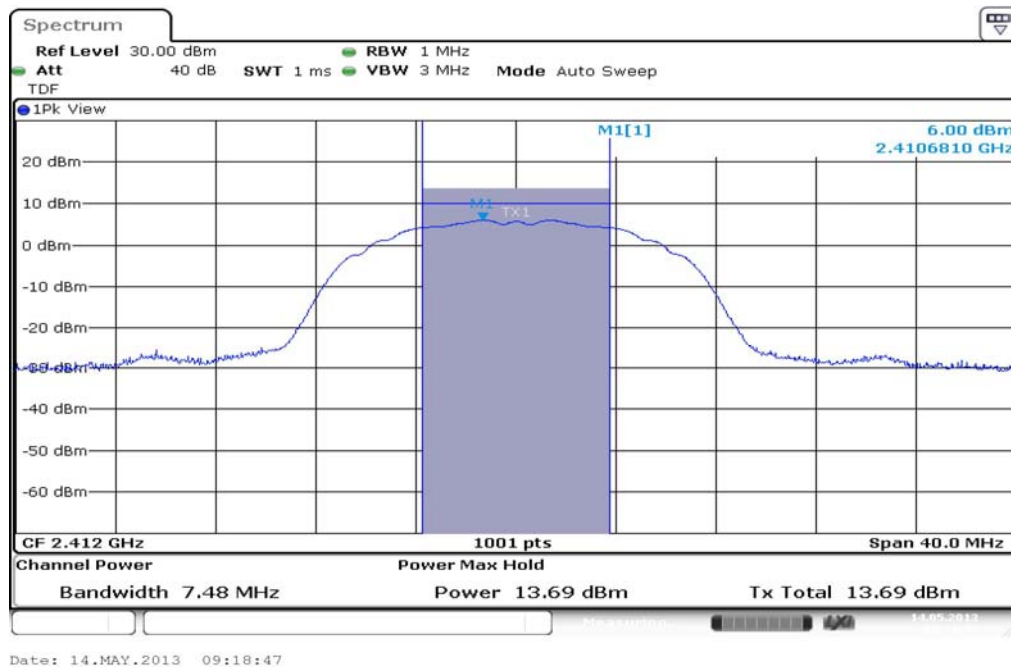
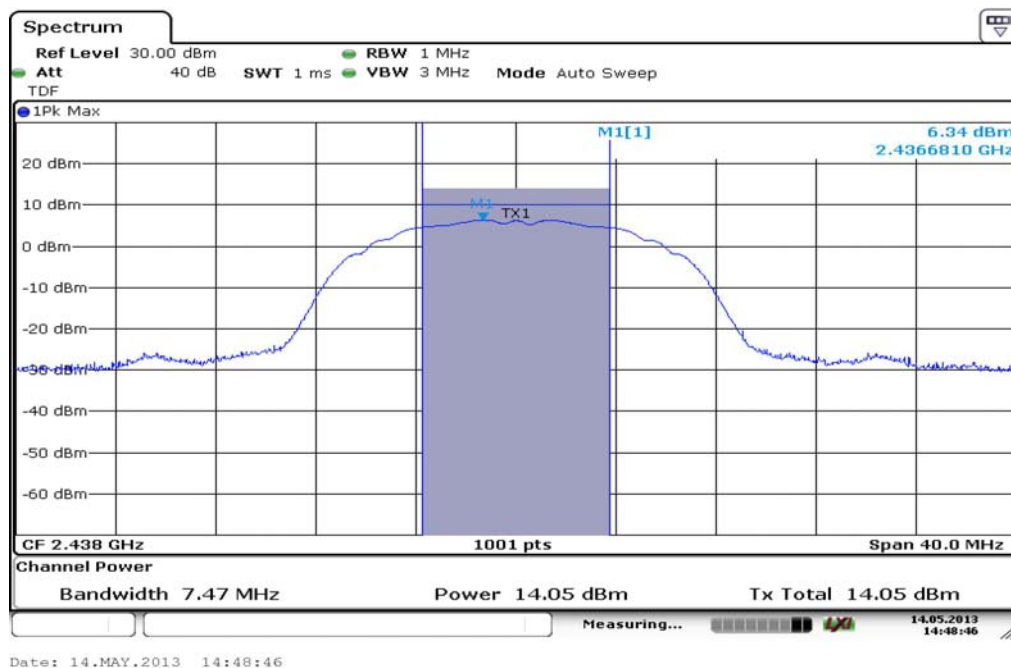
Result: Passed

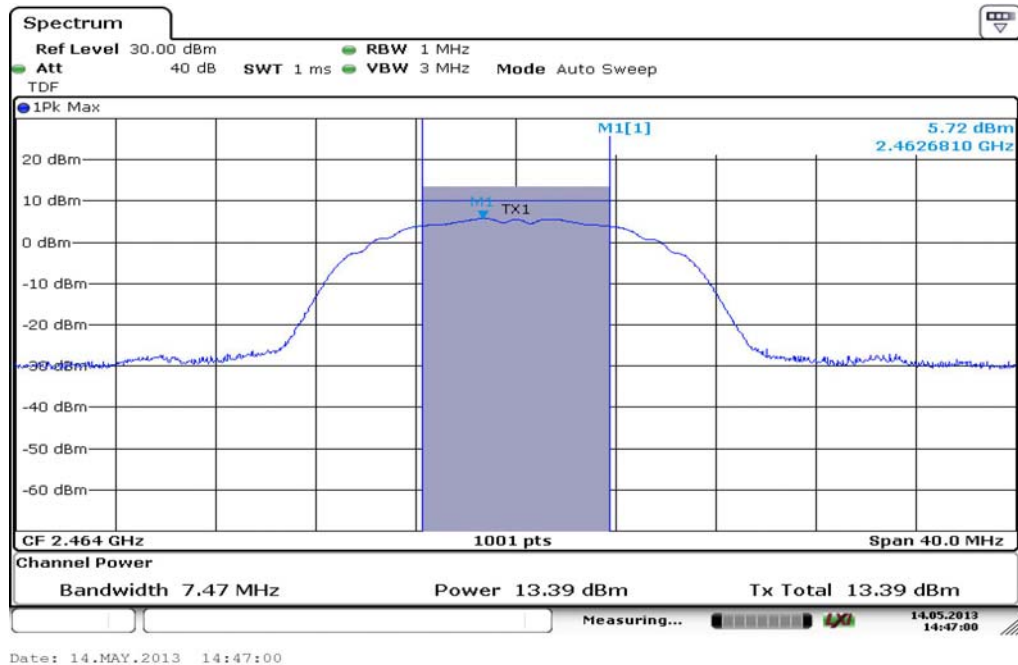
Plots: DSSS, antenna port A, BPSK**Plot 1: TX mode, lowest channel****Plot 2: TX mode, middle channel**

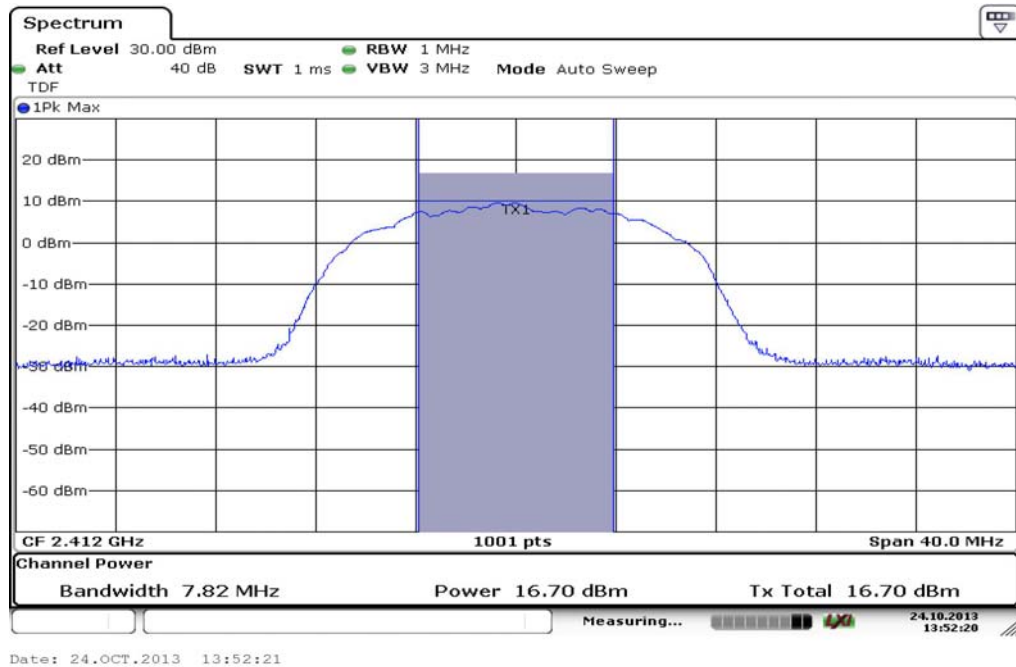
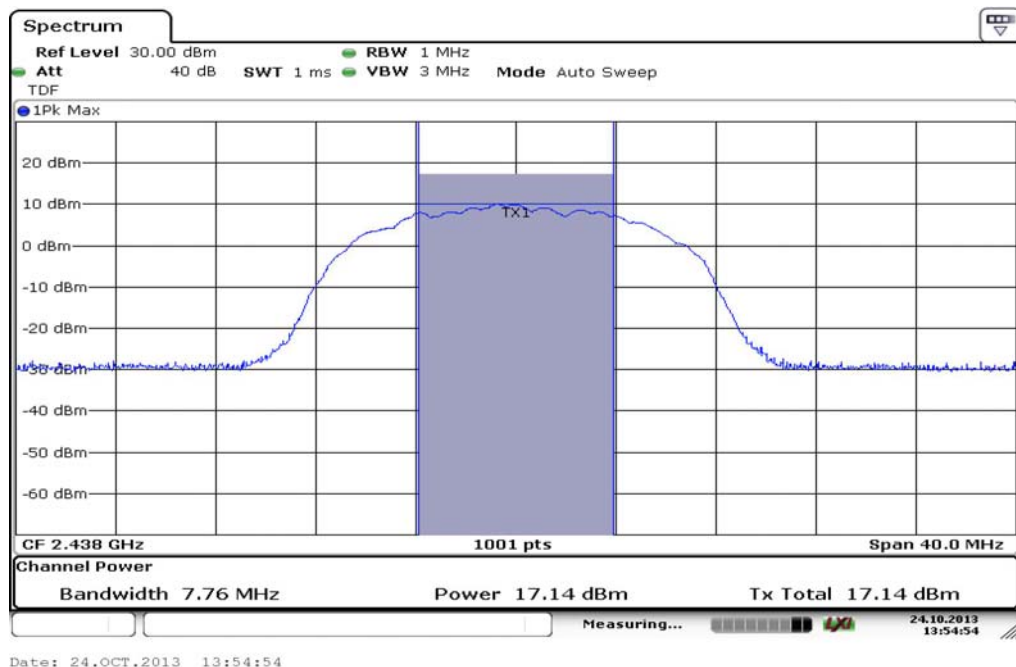
Plot 3: TX mode, highest channel

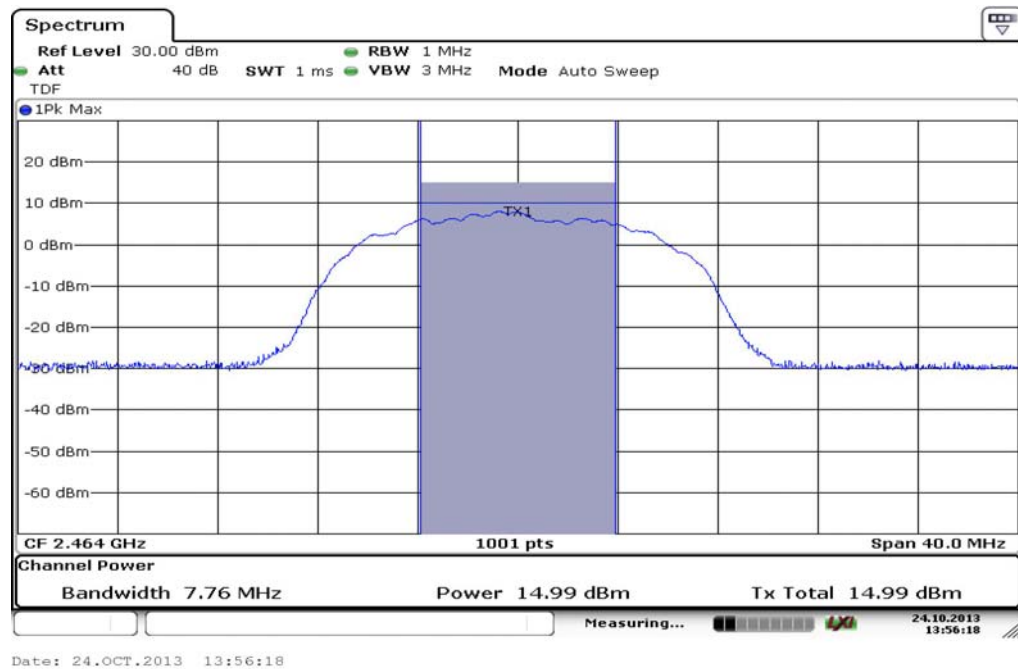


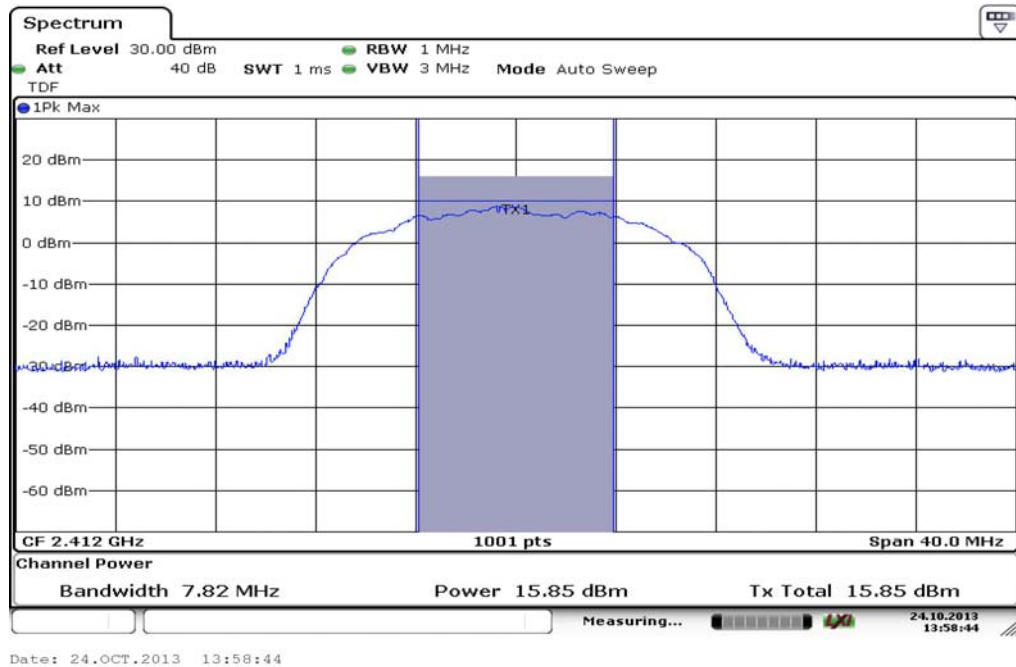
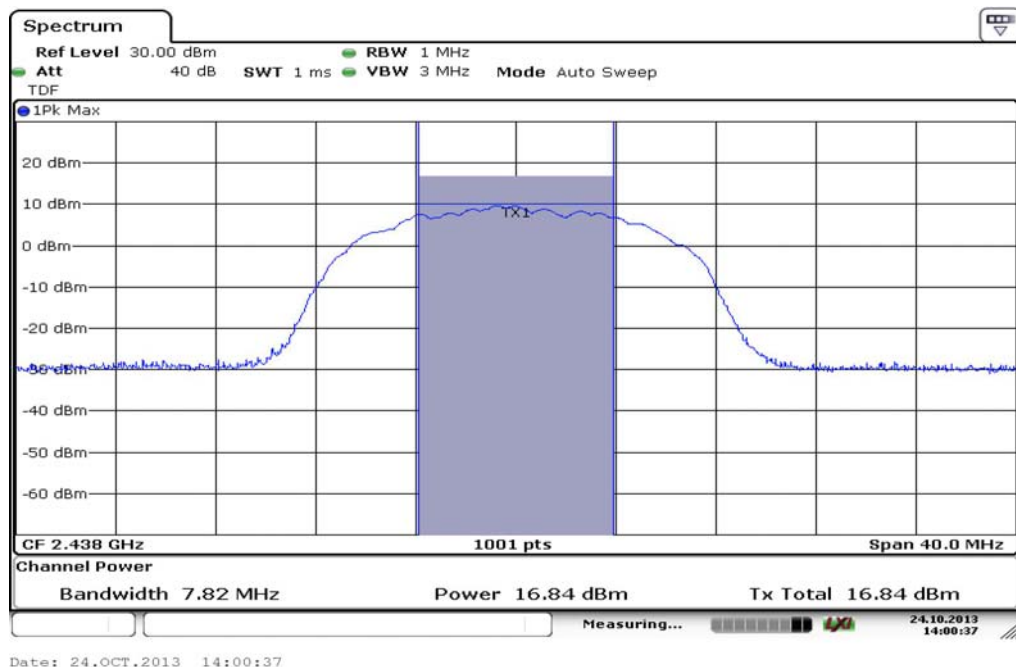
Date: 14.MAY.2013 14:45:05

Plots: DSSS, antenna port B, BPSK**Plot 1: TX mode, lowest channel****Plot 2: TX mode, middle channel**

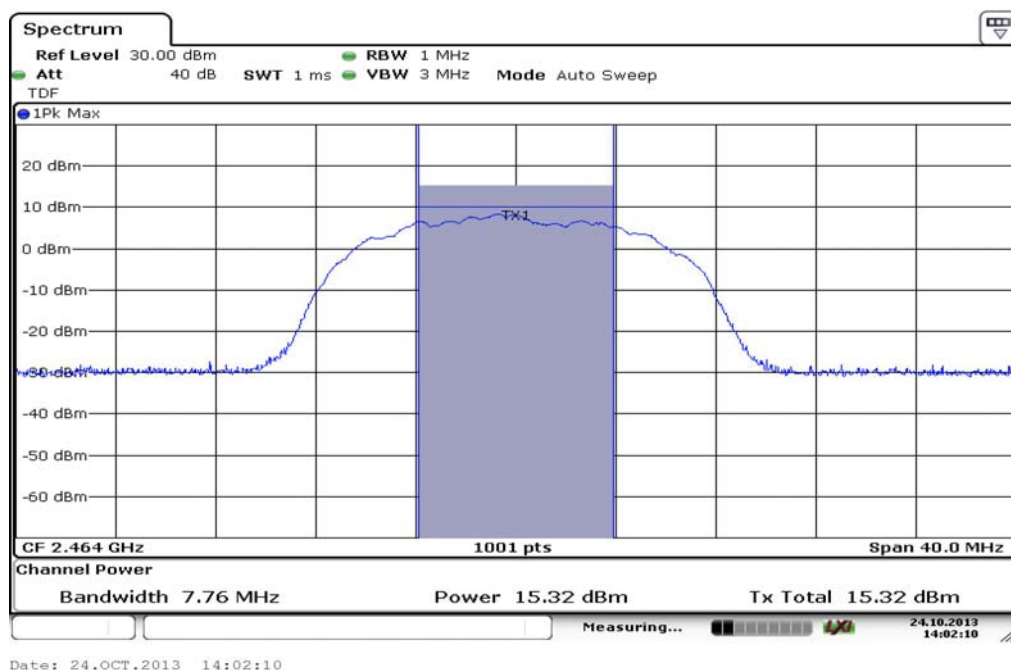
Plot 3: TX mode, highest channel

Plots: DSSS, antenna port A, QPSK**Plot 1: TX mode, lowest channel****Plot 2: TX mode, middle channel**

Plot 3: TX mode, highest channel

Plots: DSSS, antenna port B, QPSK**Plot 1: TX mode, lowest channel****Plot 2: TX mode, middle channel**

Plot 3: TX mode, highest channel



9.3 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 Frequency	Power Spectral density [dBm]		
	2412 MHz	2438 MHz	2464 MHz
DSSS, antenna port A, BPSK	-3.83	-4.42	-5.59
DSSS, antenna port A, QPSK	-14.09	-13.38	-15.13
DSSS, antenna port B, BPSK	-4.32	-3.98	-4.59
DSSS, antenna port B, QPSK	-14.67	-13.48	-15.45
Measurement uncertainty	± 1.5 dB		

Result: **Passed**

9.4 Spectrum bandwidth – 6 dB emission bandwidth

Description:

Measurement of the 75 % 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)

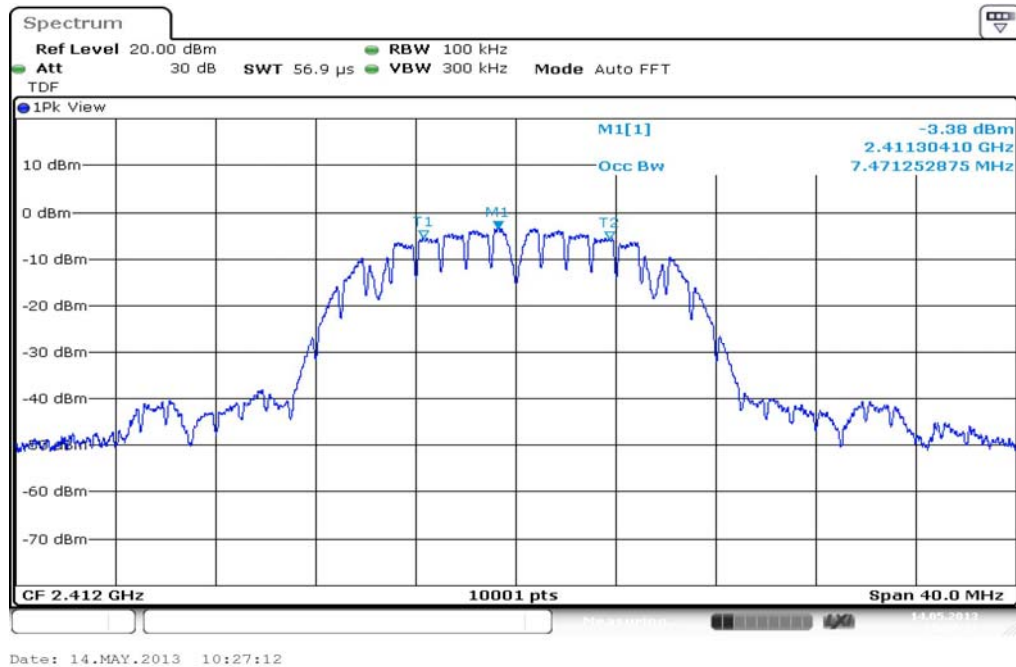
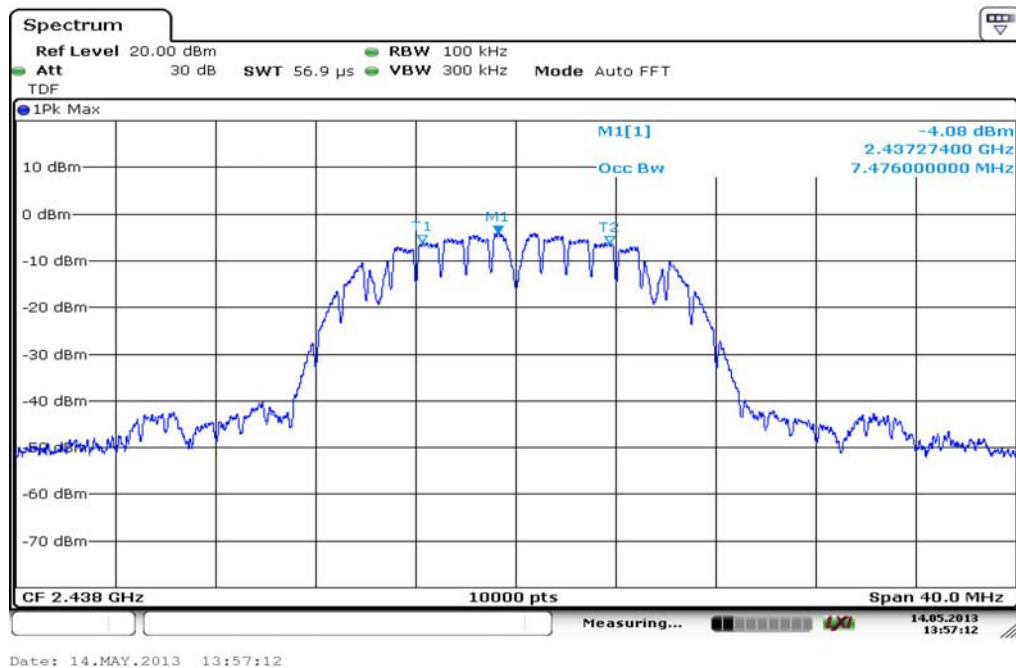
Limits:

FCC	IC
Spectrum Bandwidth – 75 %	
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.	

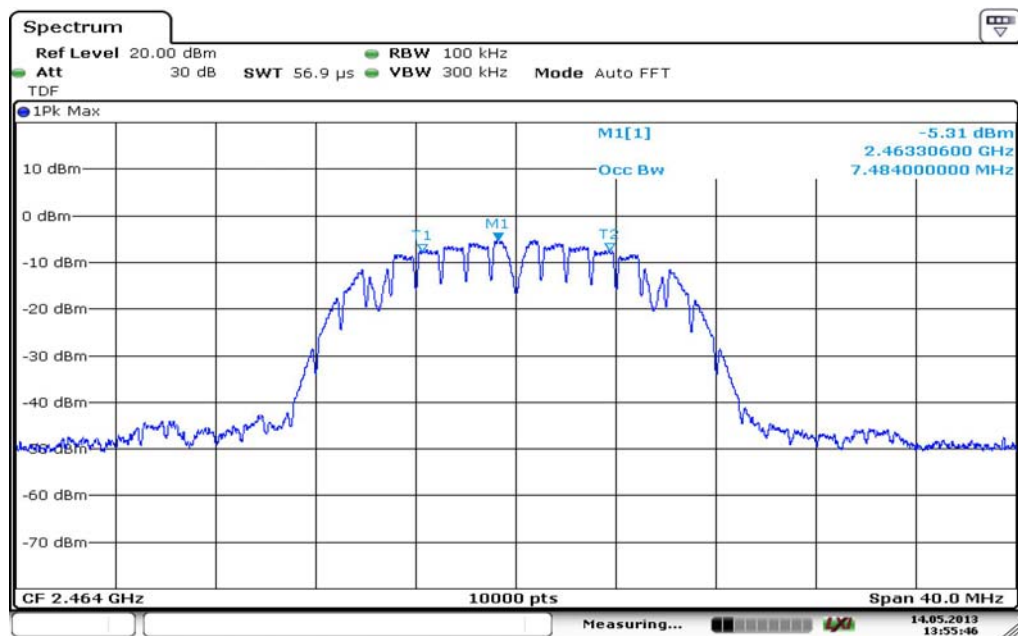
Results:

Modulation Frequency	75 % bandwidth [MHz]		
	2412 MHz	2437 MHz	2462 MHz
DSSS, antenna port A, BPSK	7.47	7.48	7.48
DSSS, antenna port A, QPSK	7.81	7.76	7.76
DSSS, antenna port B, BPSK	7.48	7.47	7.47
DSSS, antenna port B, QPSK	7.81	7.76	7.76
Measurement uncertainty	± RBW		

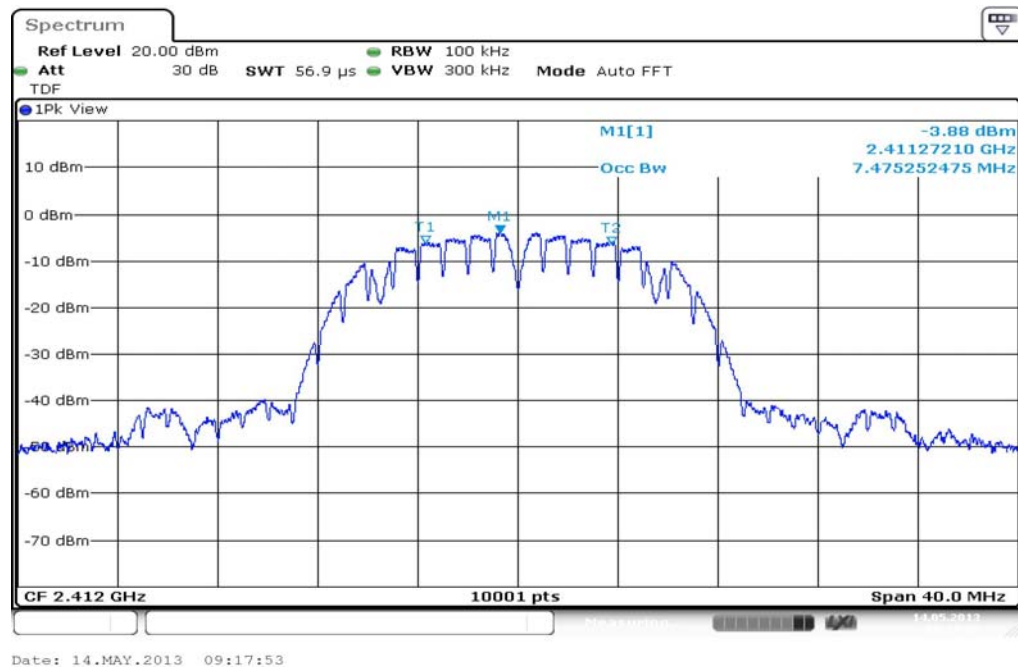
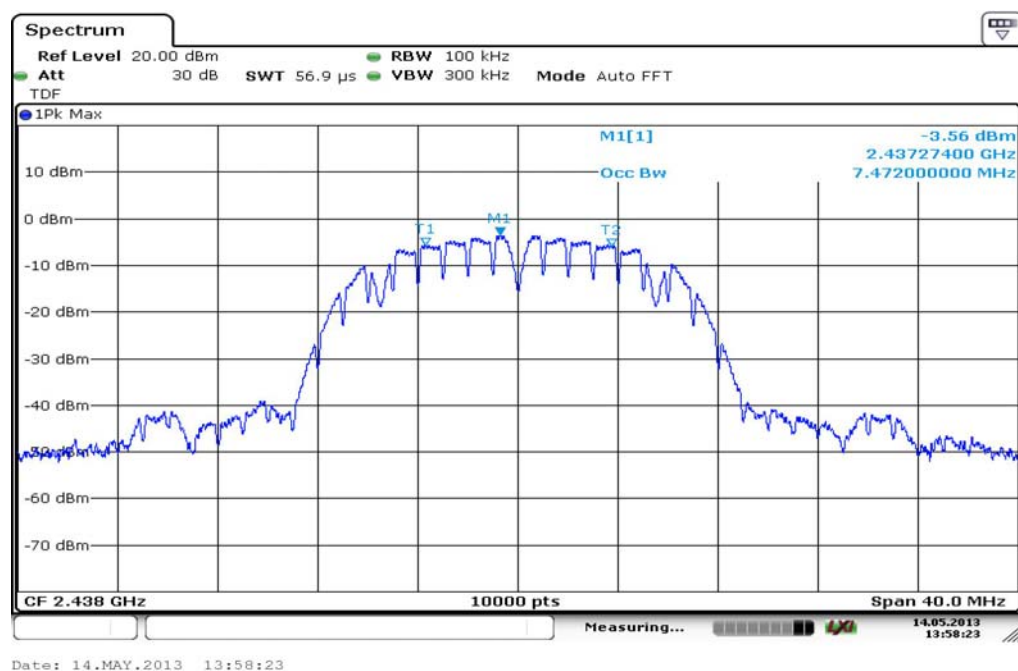
Result: **Passed**

Plots: DSSS, antenna port A, BPSK**Plot 1: TX mode, lowest channel****Plot 2: TX mode, middle channel**

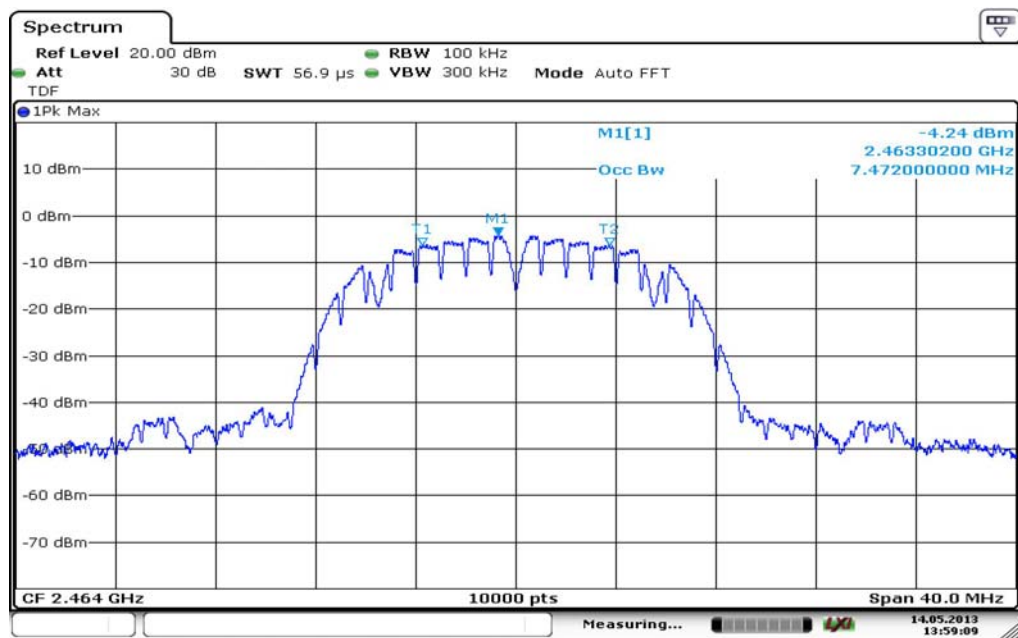
Plot 3: TX mode, highest channel



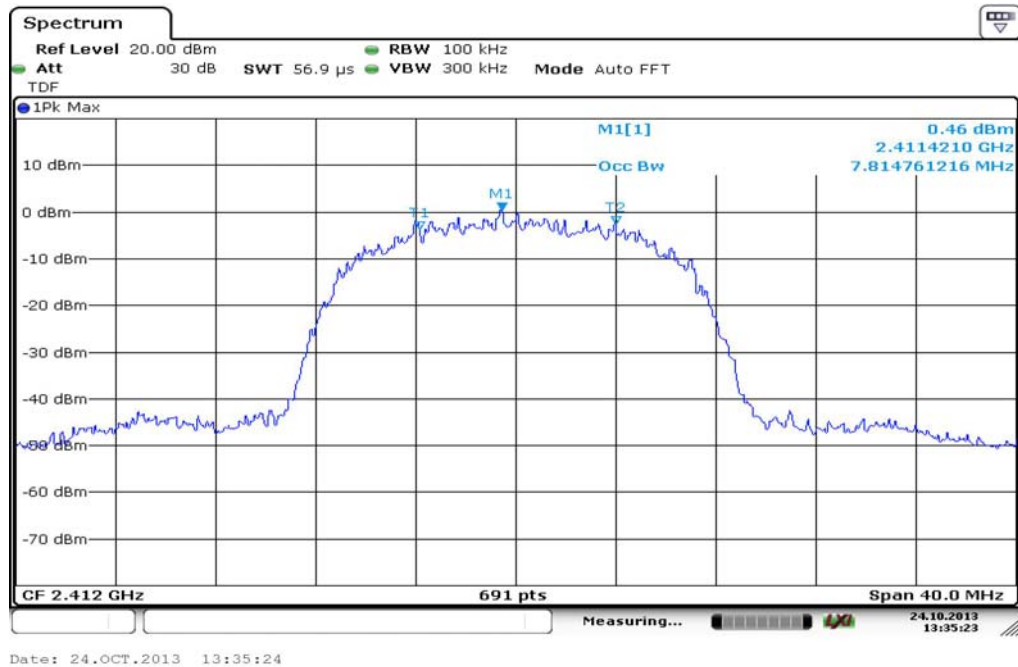
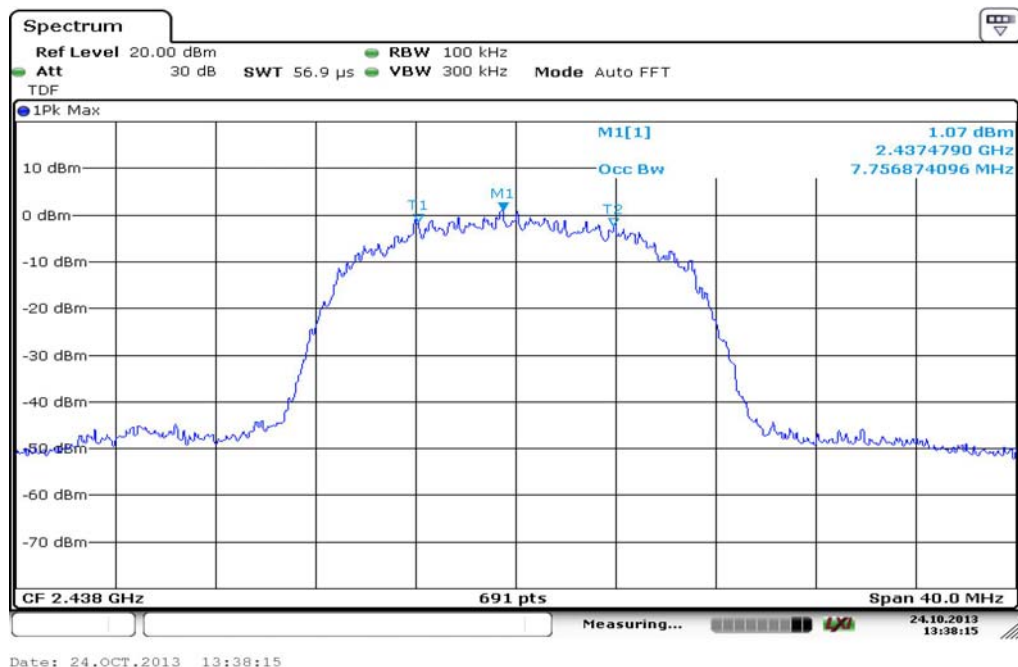
Date: 14.MAY.2013 13:55:46

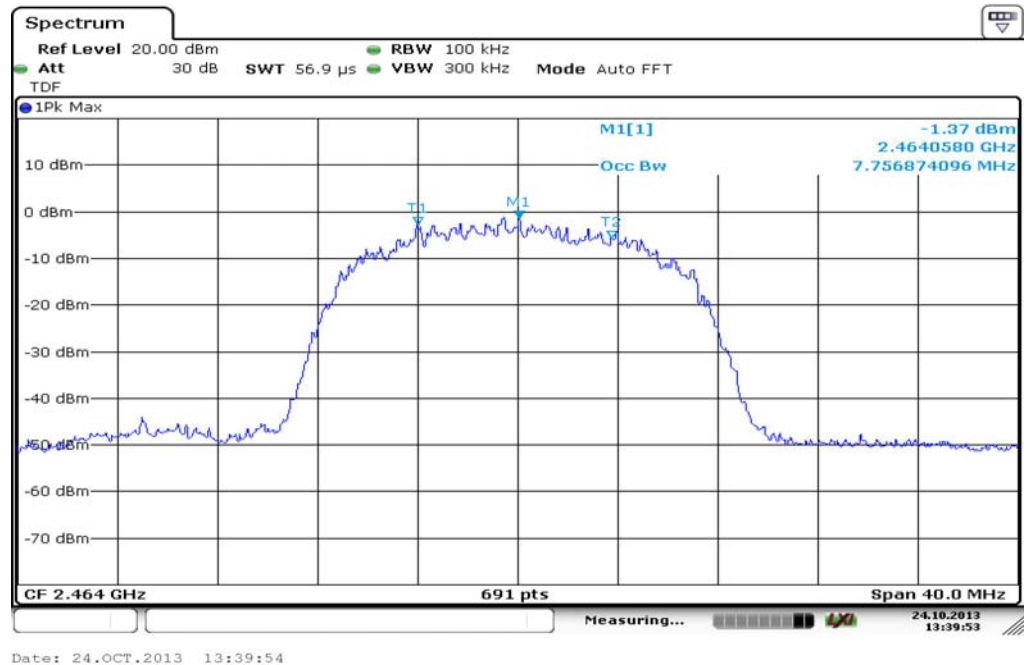
Plots: DSSS, antenna port B, BPSK**Plot 1: TX mode, lowest channel****Plot 2: TX mode, middle channel**

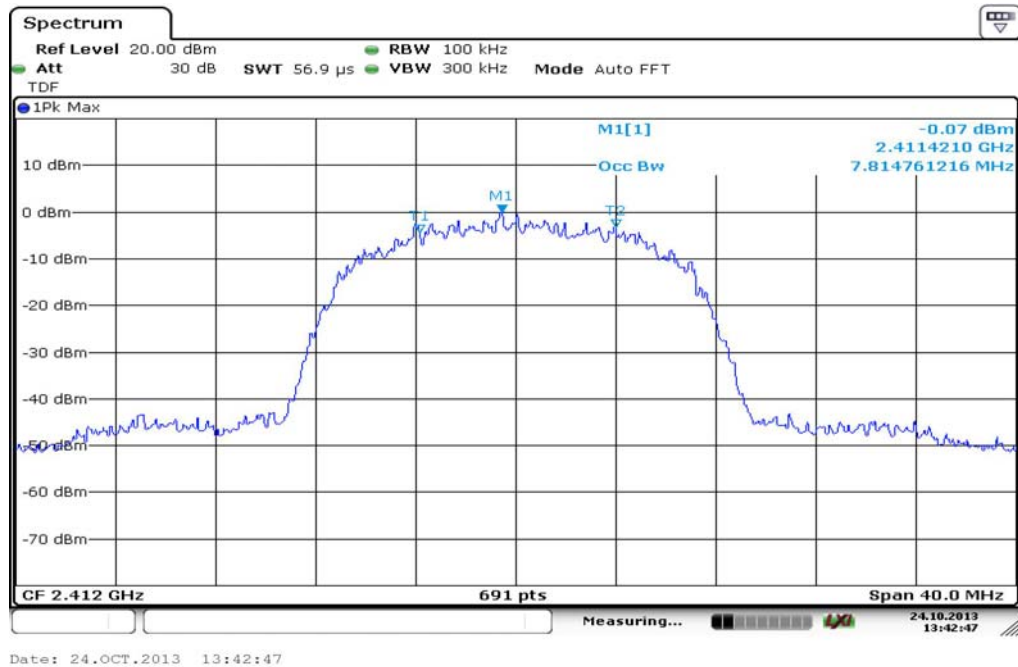
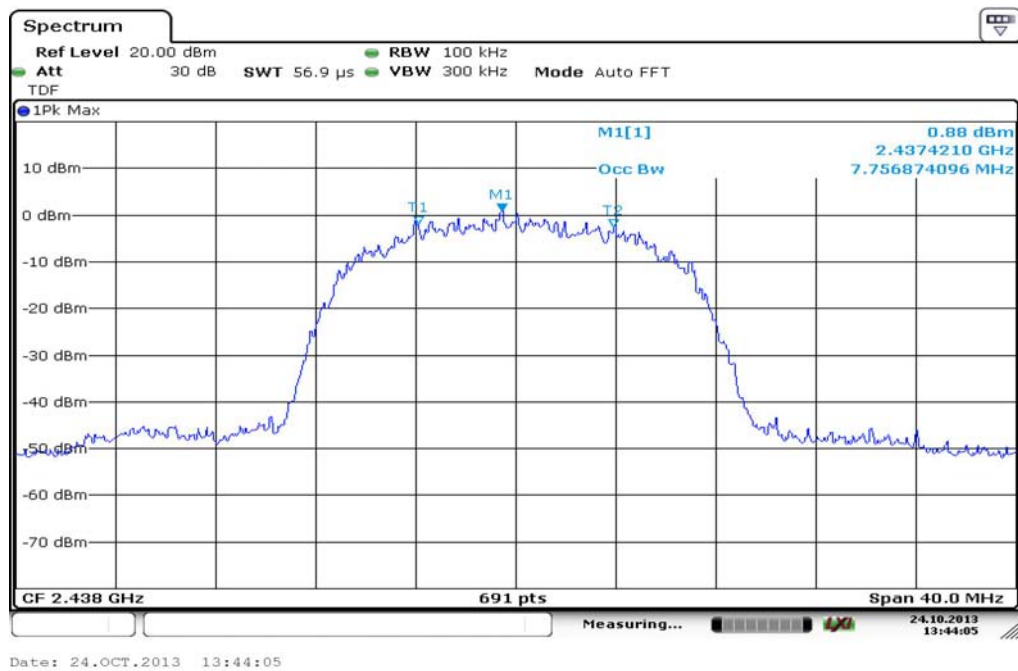
Plot 3: TX mode, highest channel

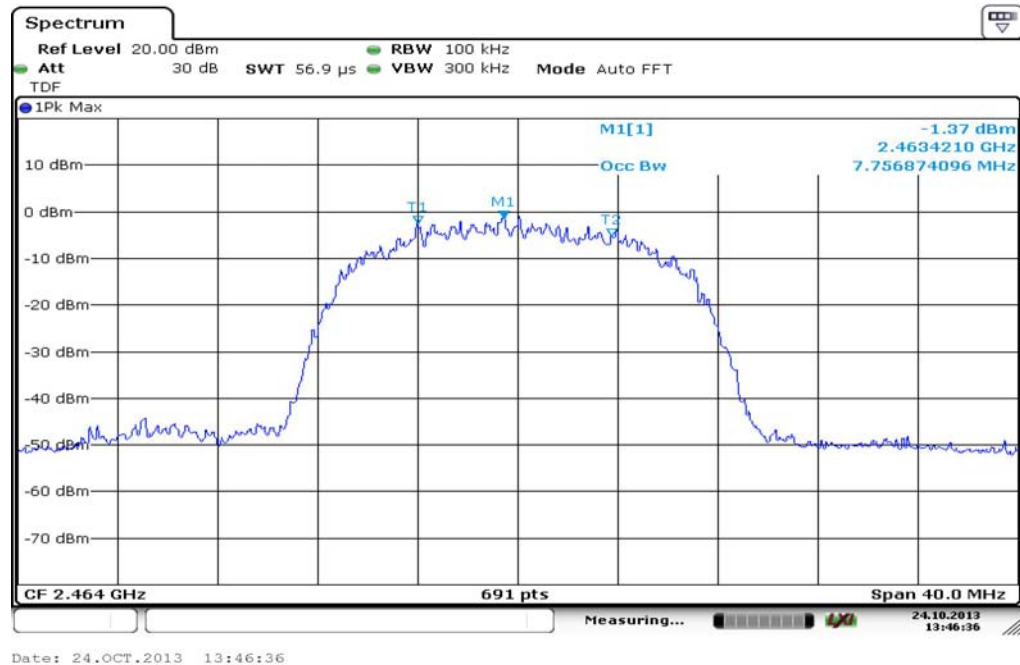


Date: 14.MAY.2013 13:59:08

Plots: DSSS, antenna port A, QPSK**Plot 1: TX mode, lowest channel****Plot 2: TX mode, middle channel**

Plot 3: TX mode, highest channel

Plots: DSSS, antenna port B, QPSK**Plot 1: TX mode, lowest channel****Plot 2: TX mode, middle channel**

Plot 3: TX mode, highest channel

9.5 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 necessary for Emission Designator	

Results:

Modulation Frequency	99 % bandwidth [MHz]		
	2412 MHz	2438 MHz	2464 MHz
DSSS, antenna port A, BPSK	13.94	13.95	13.94
DSSS, antenna port A, QPSK	13.89	13.89	13.95
DSSS, antenna port B, BPSK	13.93	13.96	13.92
DSSS, antenna port B, QPSK	13.89	13.89	13.95
Measurement uncertainty	± RBW		

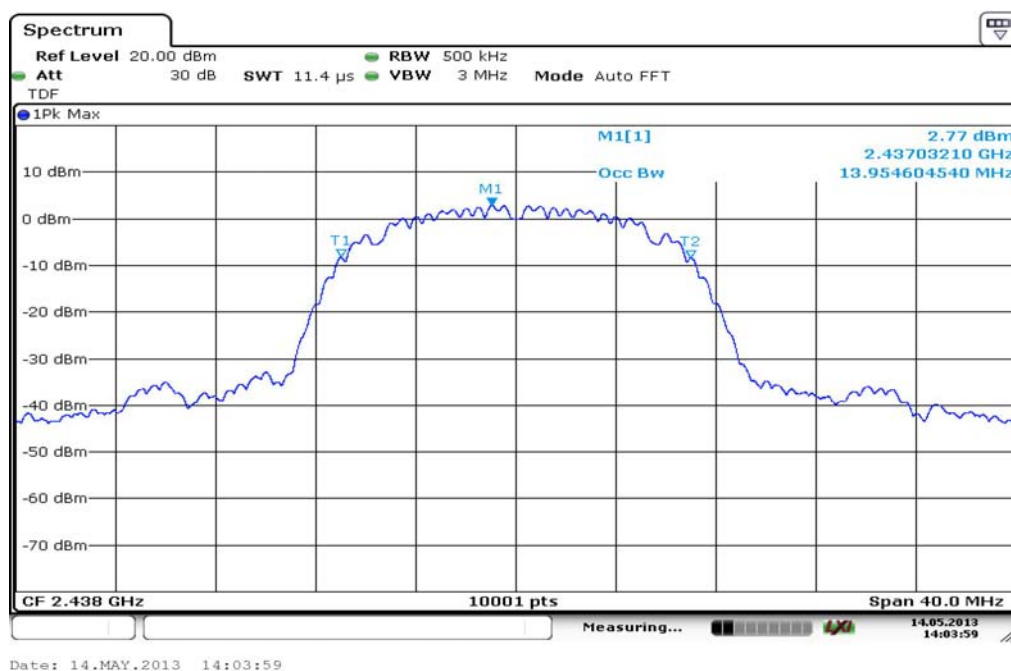
Result: Passed

Plots: DSSS, antenna port A, BPSK

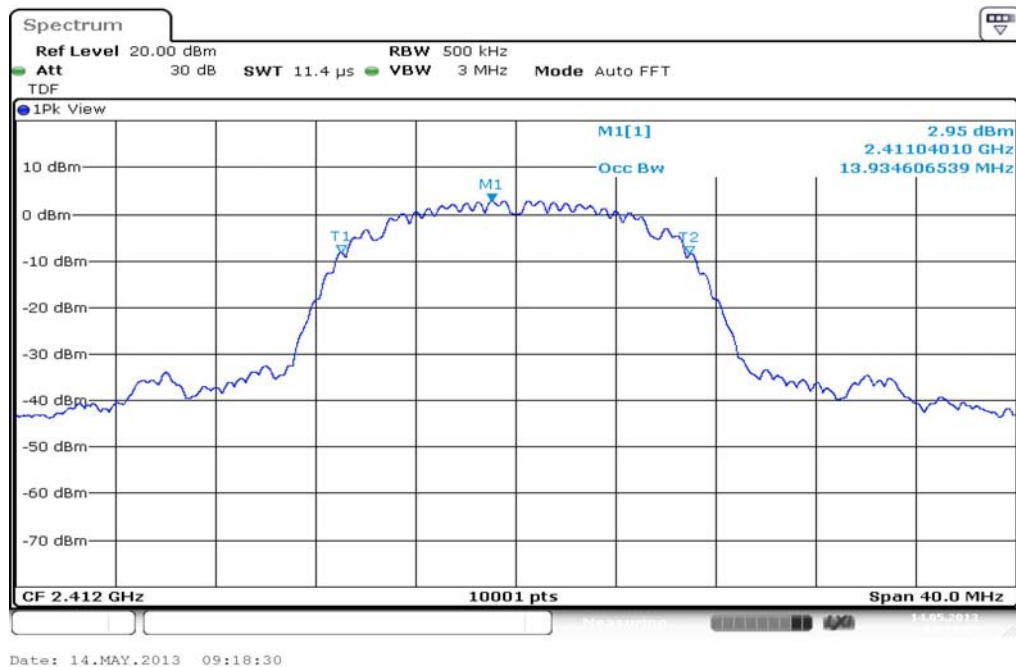
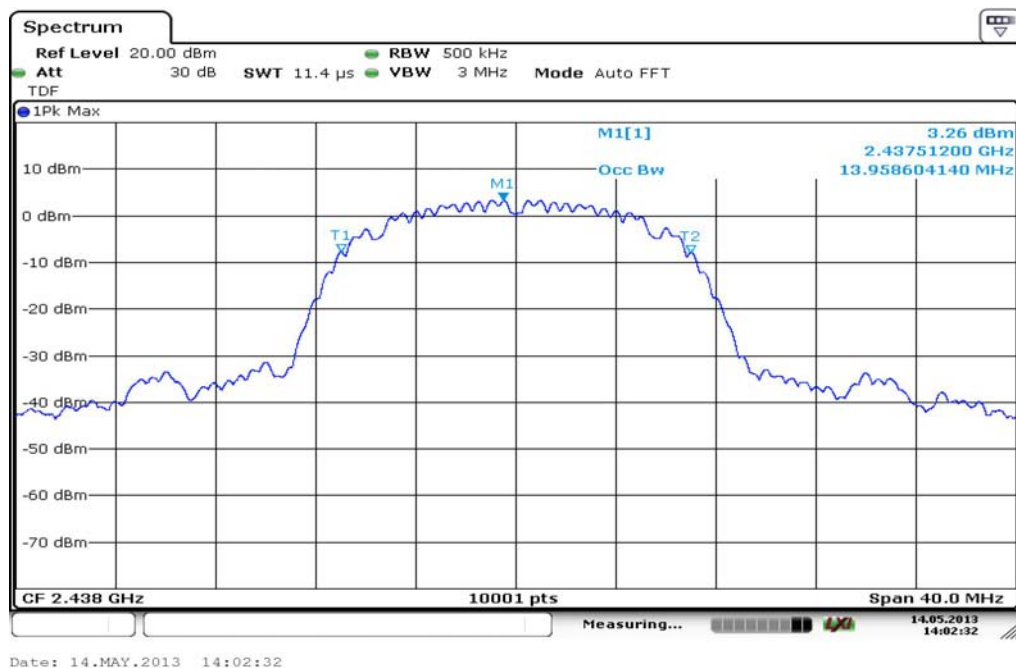
Plot 1: TX mode, lowest channel

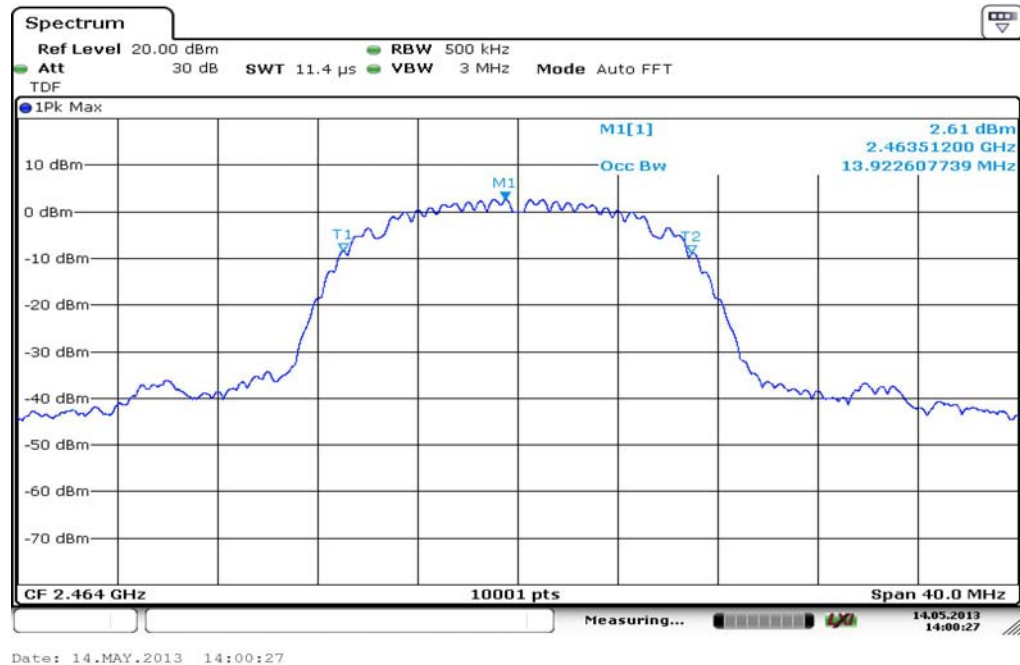


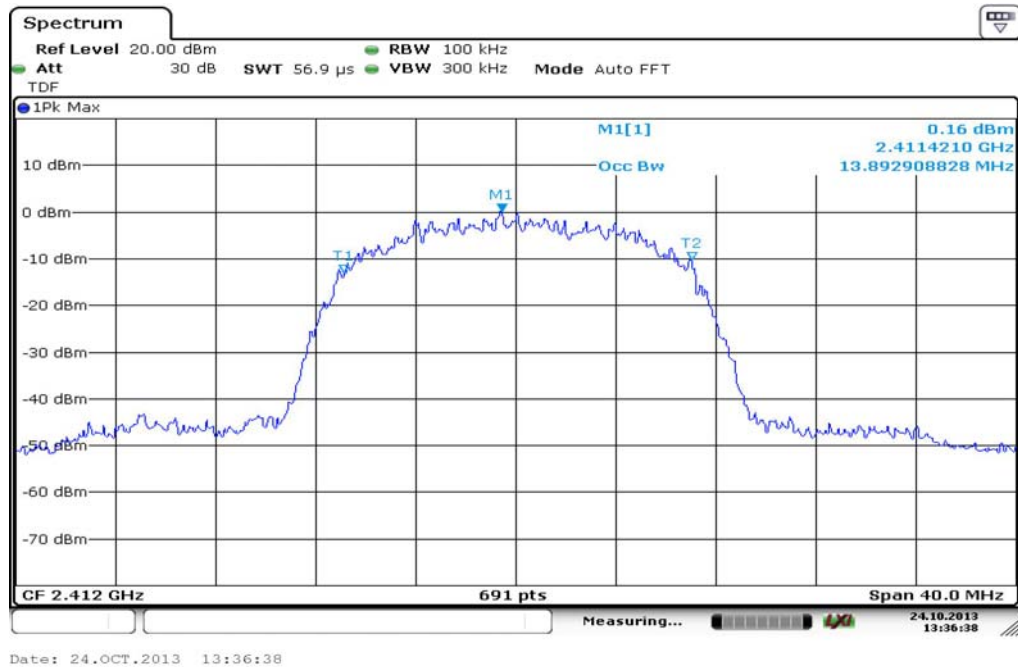
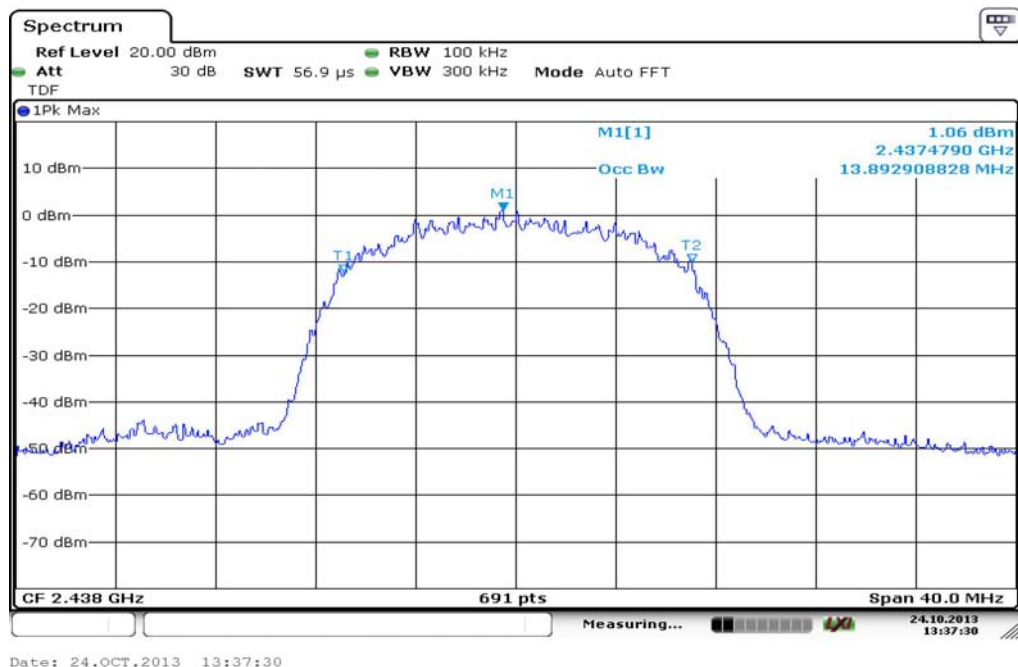
Plot 2: TX mode, middle channel



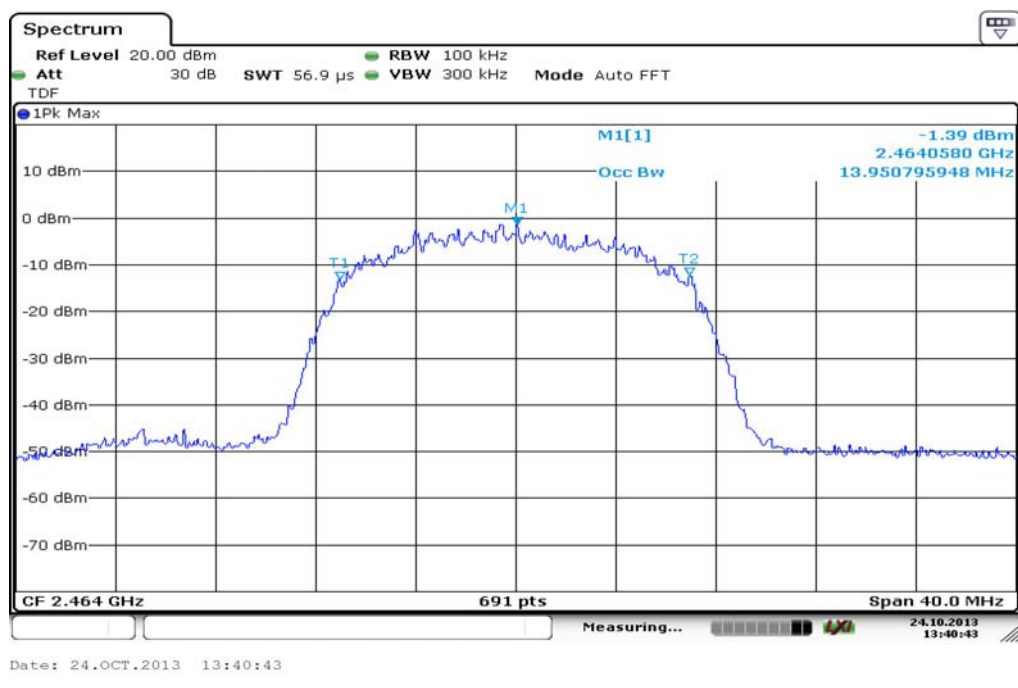
Plot 3: TX mode, highest channel

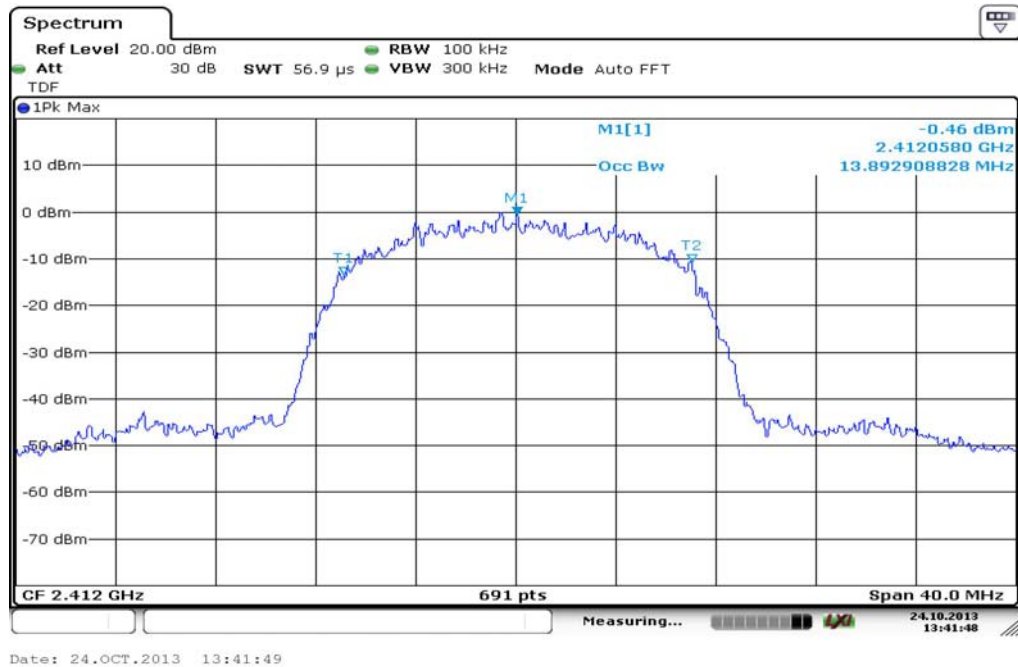
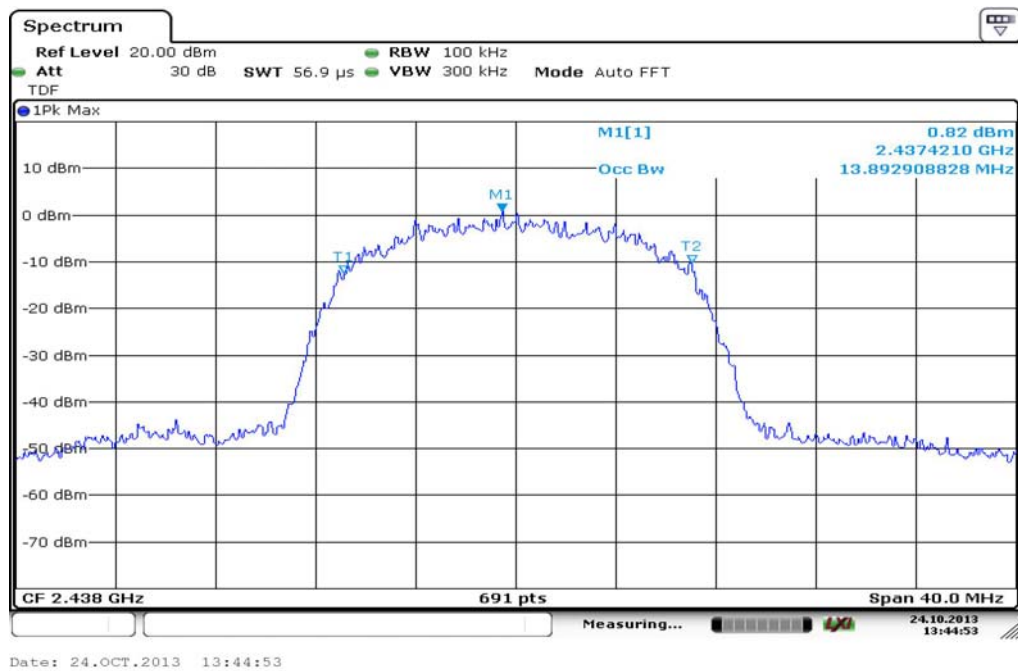
Plots: DSSS, antenna port B, BPSK**Plot 1: TX mode, lowest channel****Plot 2: TX mode, middle channel**

Plot 3: TX mode, highest channel

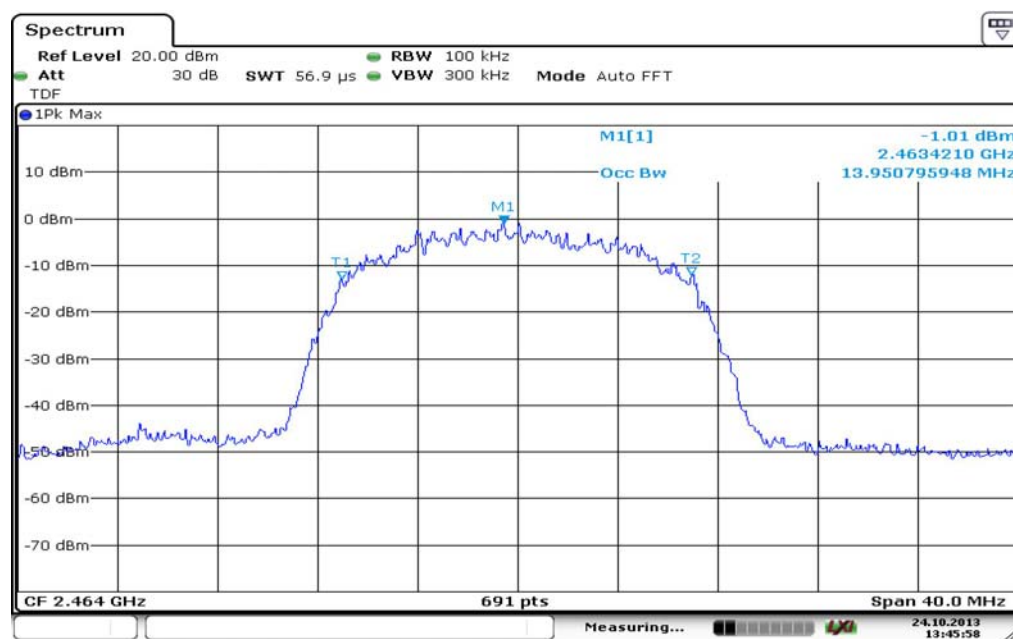
Plots: DSSS, antenna port A, QPSK**Plot 1: TX mode, lowest channel****Plot 2: TX mode, middle channel**

Plot 3: TX mode, highest channel



Plots: DSSS, antenna port B, QPSK**Plot 1: TX mode, lowest channel****Plot 2: TX mode, middle channel**

Plot 3: TX mode, highest channel



Date: 24.OCT.2013 13:45:59

9.6 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

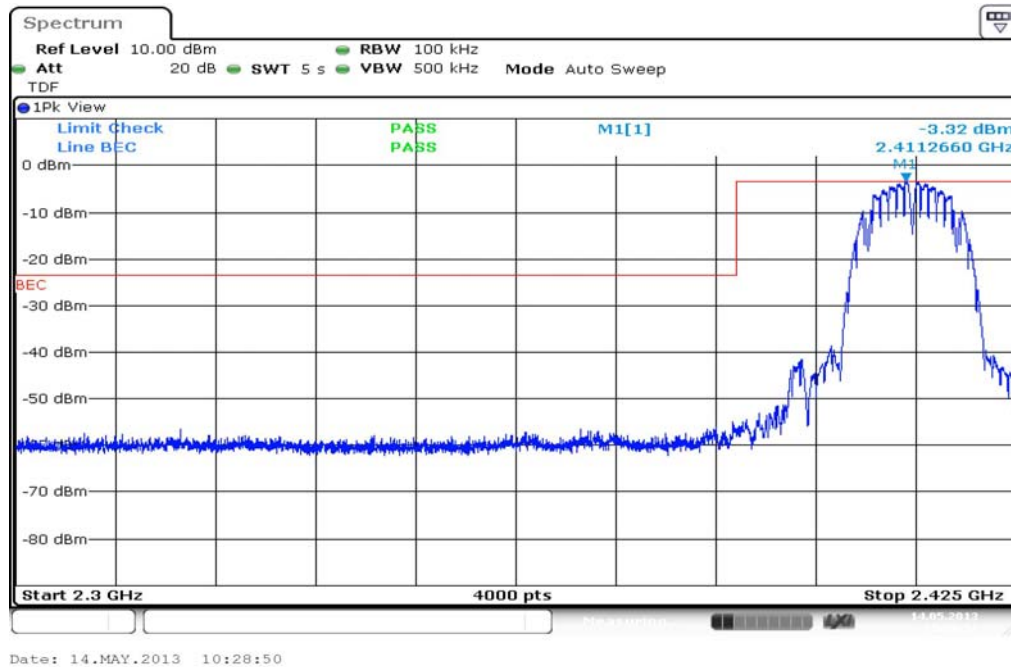
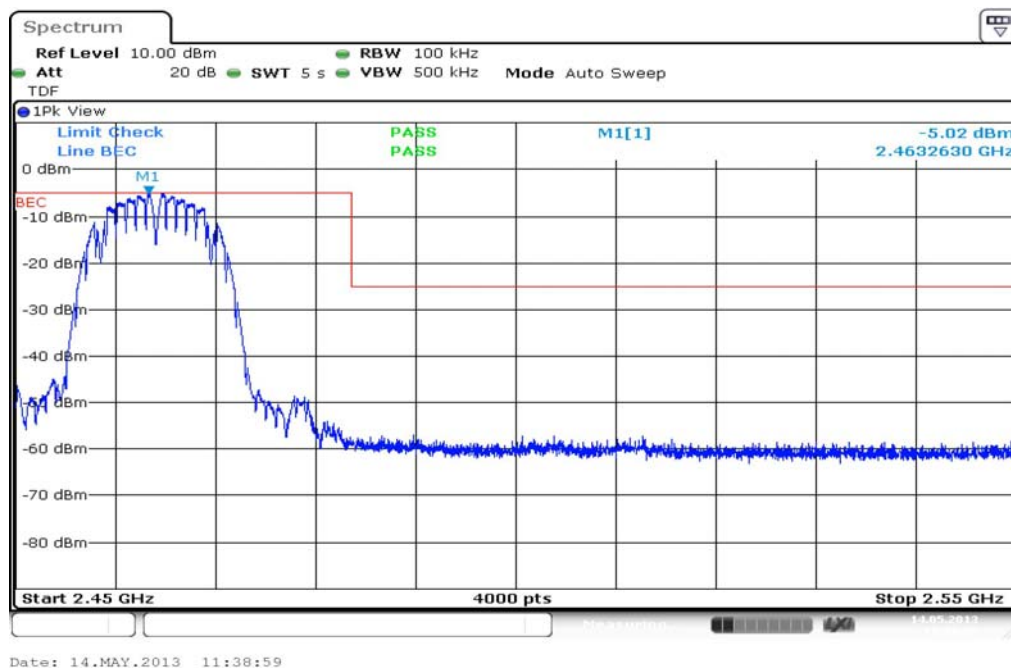
Limits:

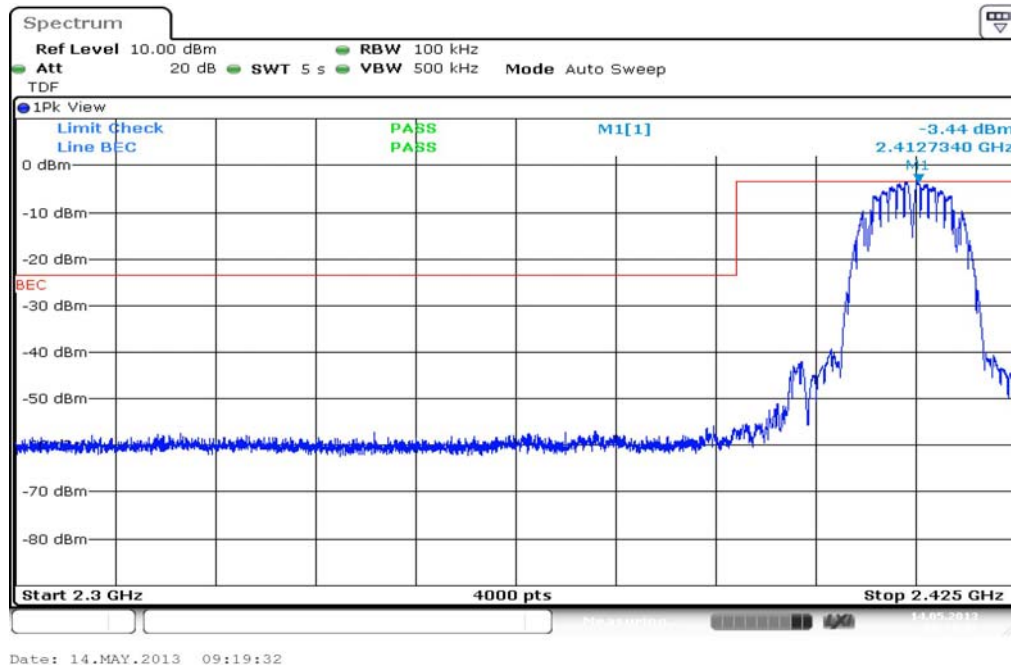
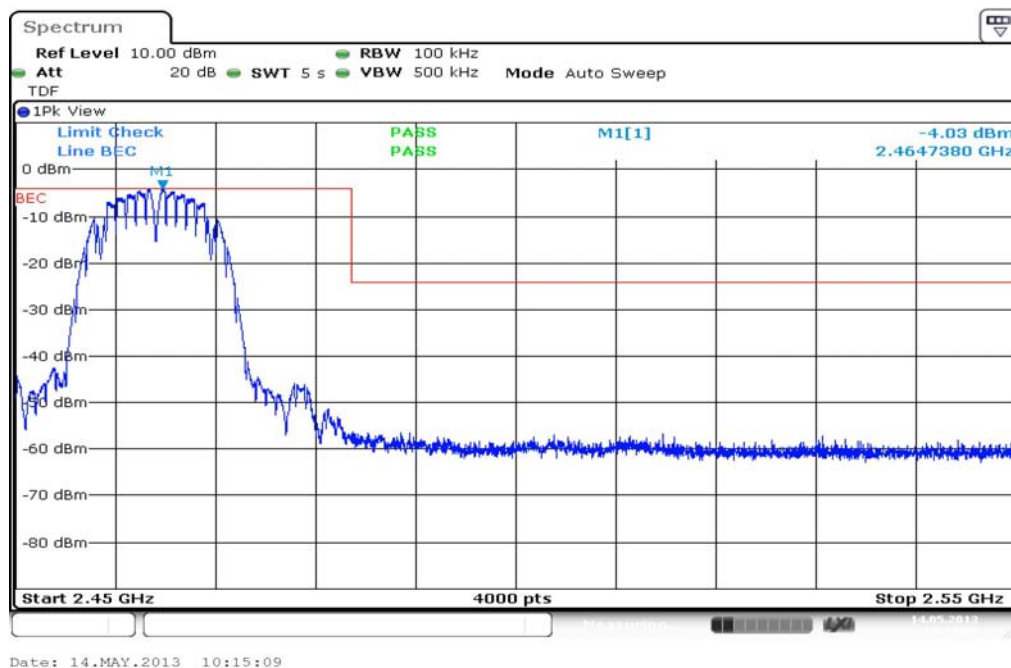
FCC	IC
Band Edge Compliance Conducted	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth 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.	

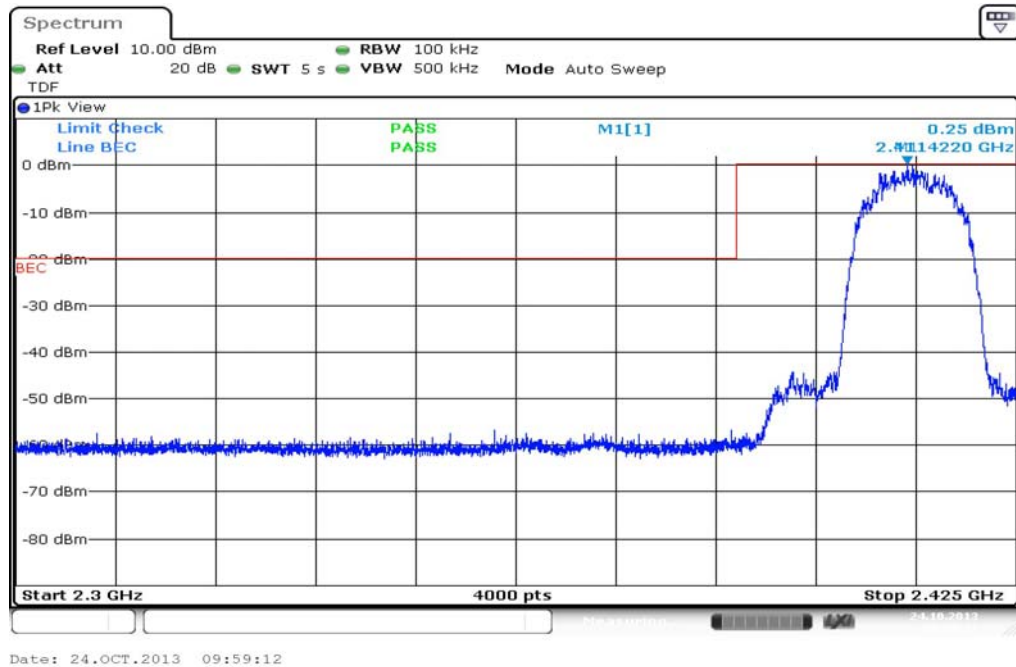
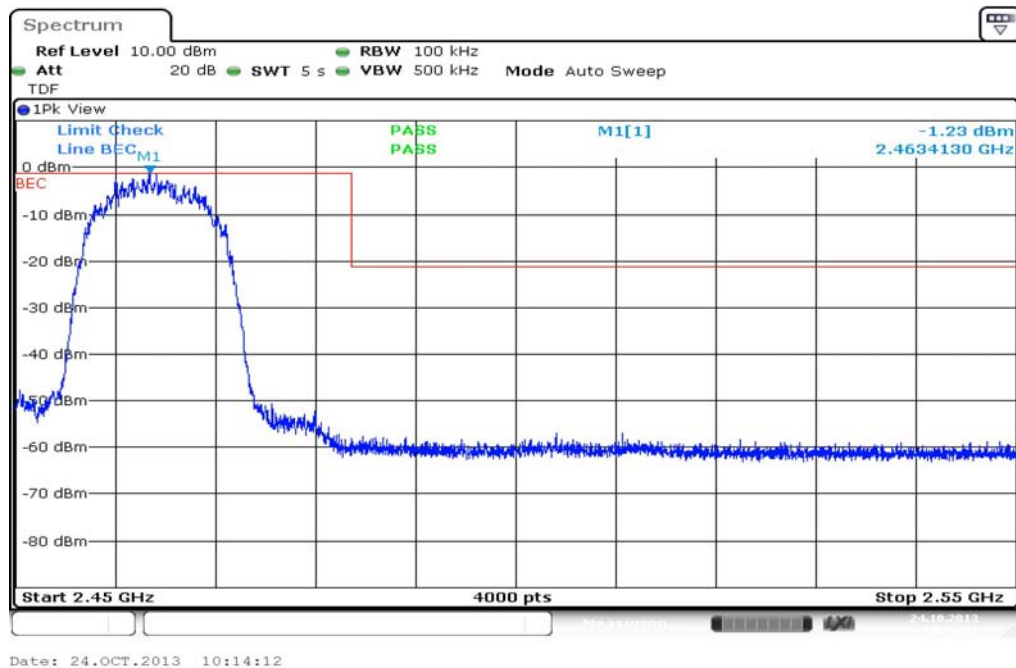
Results:

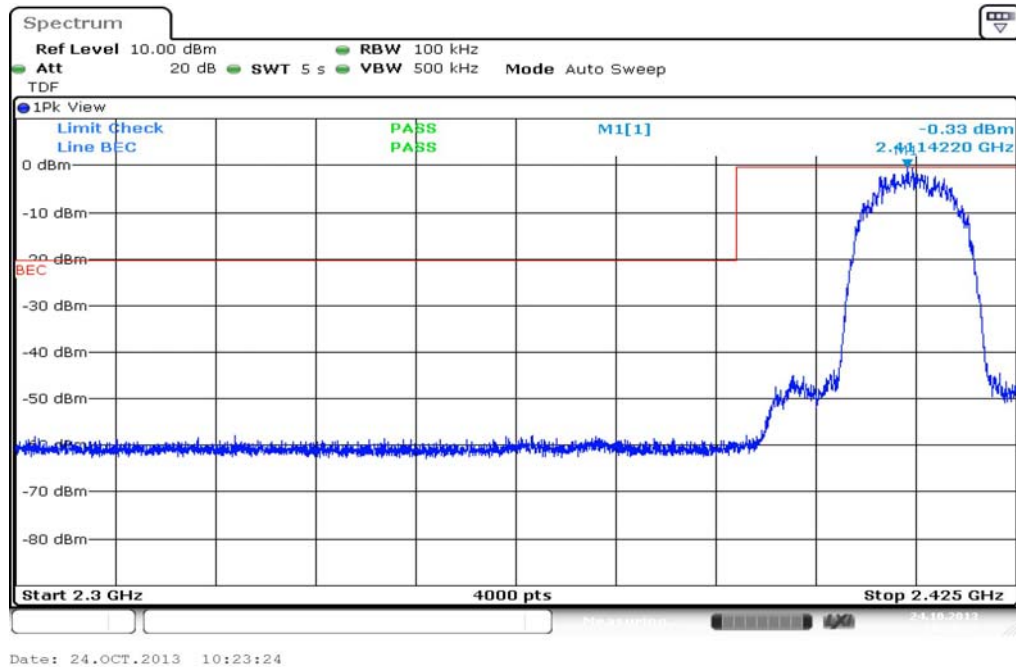
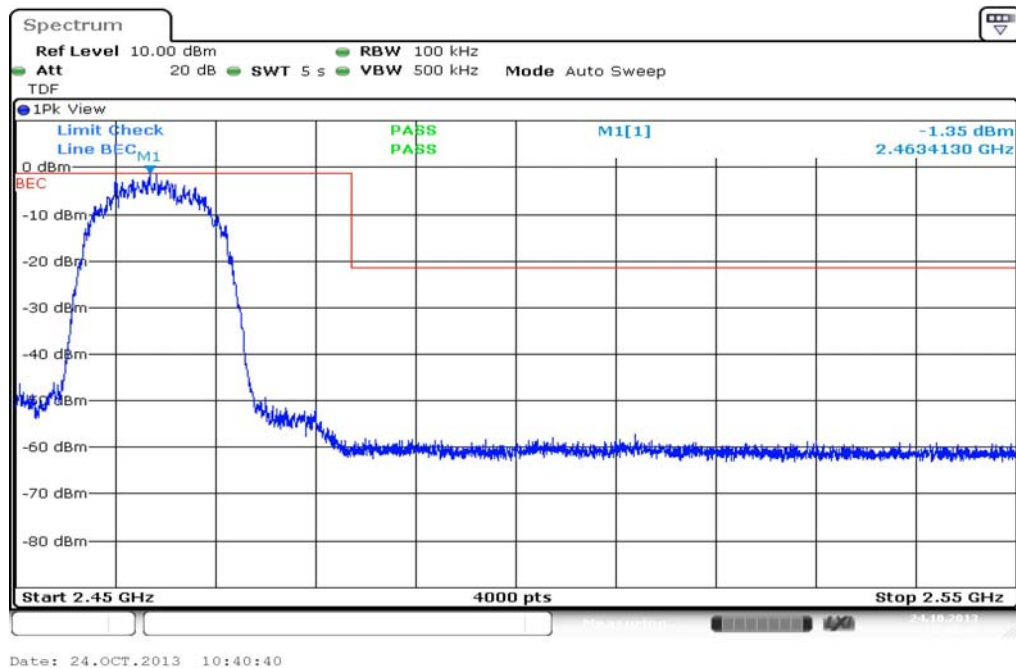
Scenario Modulation	Band Edge Compliance Conducted [dB]	
	DSSS, antenna port A	DSSS, antenna port B
Lower Band Edge, BPSK	> 20 dB	> 20 dB
Lower Band Edge, QPSK	> 20 dB	> 20 dB
Upper Band Edge, BPSK	> 20 dB	> 20 dB
Upper Band Edge, QPSK	> 20 dB	> 20 dB
Measurement uncertainty	± 1.5 dB	

Result: Passed

Plots: DSSS, antenna port A, BPSK**Plot 1: TX mode, lower band edge****Plot 2: TX mode, upper band edge**

Plots: DSSS, antenna port B, BPSK**Plot 1: TX mode, lower band edge****Plot 2: TX mode, upper band edge**

Plots: DSSS, antenna port A, QPSK**Plot 1: TX mode, lower band edge****Plot 2: TX mode, upper band edge**

Plots: DSSS, antenna port B, QPSK**Plot 1: TX mode, lower band edge****Plot 2: TX mode, upper band edge**

9.7 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 dB μ V/m AVG	

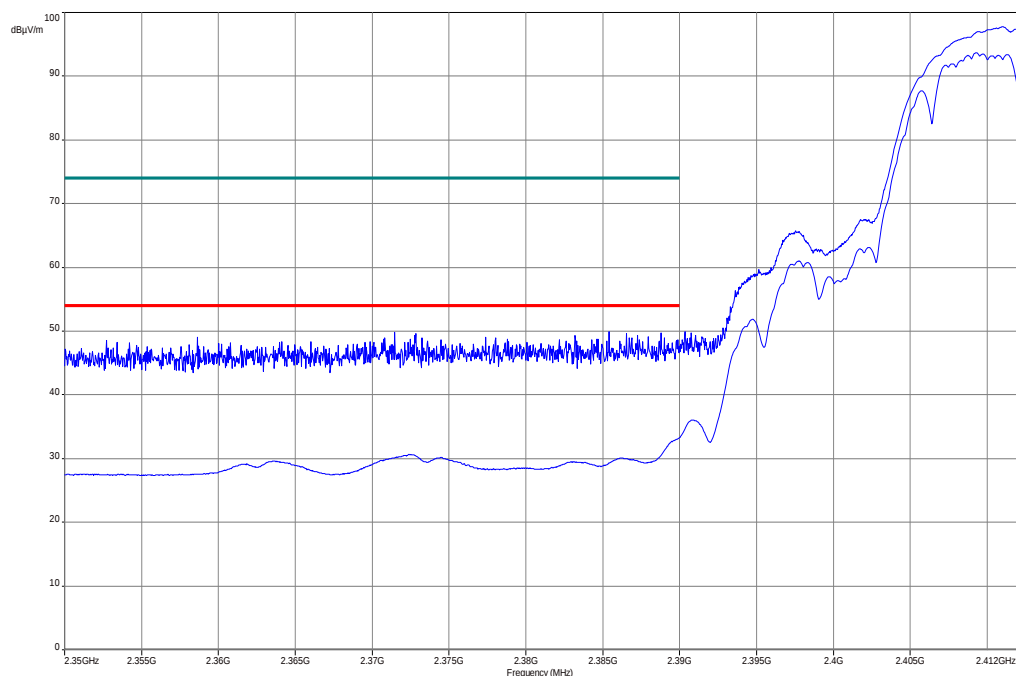
Results:

Scenario	Band Edge Compliance Conducted [dB]	
	DSSS, antenna port A	DSSS, antenna port B
Modulation		
Lower Band Edge BPSK / QPSK	> 20 dB (Peak) > 15 dB (AVG)	> 20 dB (Peak) > 15 dB (AVG)
Upper Band Edge BPSK / QPSK	> 20 dB (Peak) > 15 dB (AVG)	> 20 dB (Peak) > 15 dB (AVG)
Measurement uncertainty	± 3 dB	

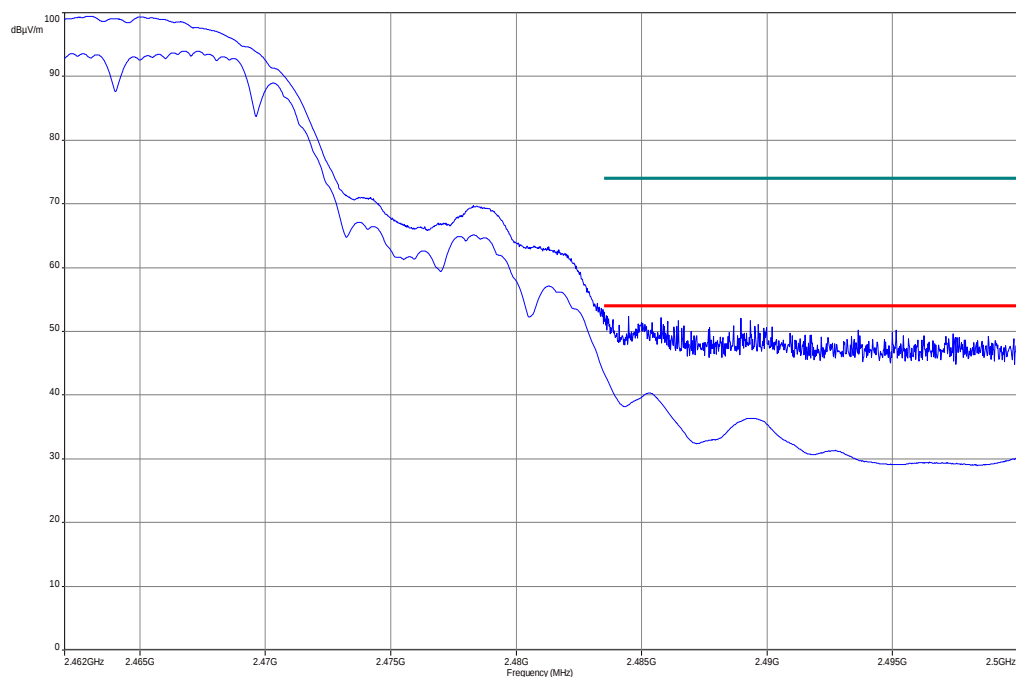
Result: Passed

Plots: DSSS antenna port A - B peak / average, BPSK

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

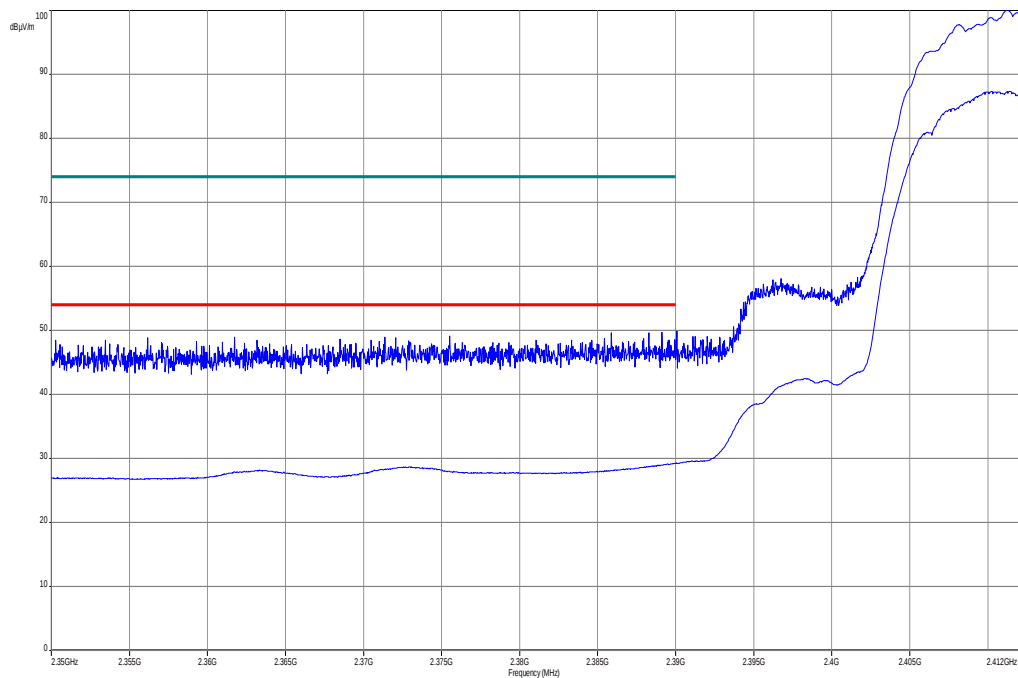


Plot 2: TX mode, upper band edge, vertical & horizontal polarization

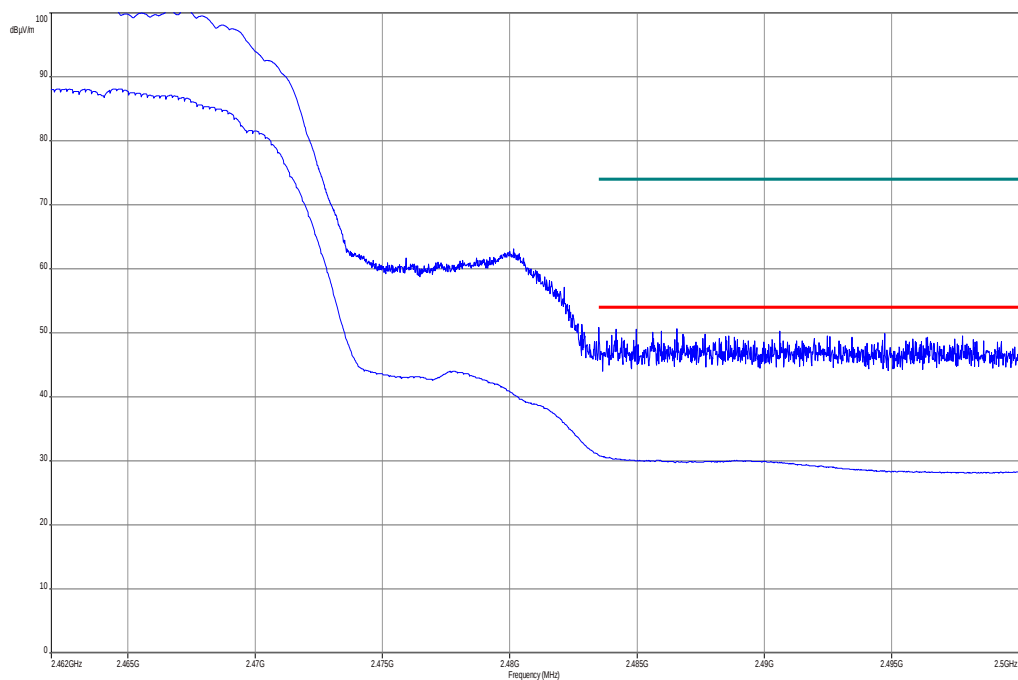


Plots: DSSS antenna port A - B peak / average, QPSK

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



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



9.8 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	
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, antenna port A, BPSK

TX Spurious Emissions Conducted					
DSSS, antenna port A					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		-3.47	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak)		complies
			-30 dBc (average)		
2438		-3.84	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak)		complies
			-30 dBc (average)		
2464		-5.19	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak)		complies
			-30 dBc (average)		
Measurement uncertainty			± 3 dB		

Result: Passed**Results: DSSS, antenna port B, BPSK**

TX Spurious Emissions Conducted					
DSSS, antenna port B					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		-3.57	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak)		complies
			-30 dBc (average)		
2438		-3.38	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak)		complies
			-30 dBc (average)		
2464		-4.20	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak)		complies
			-30 dBc (average)		
Measurement uncertainty			± 3 dB		

Result: Passed

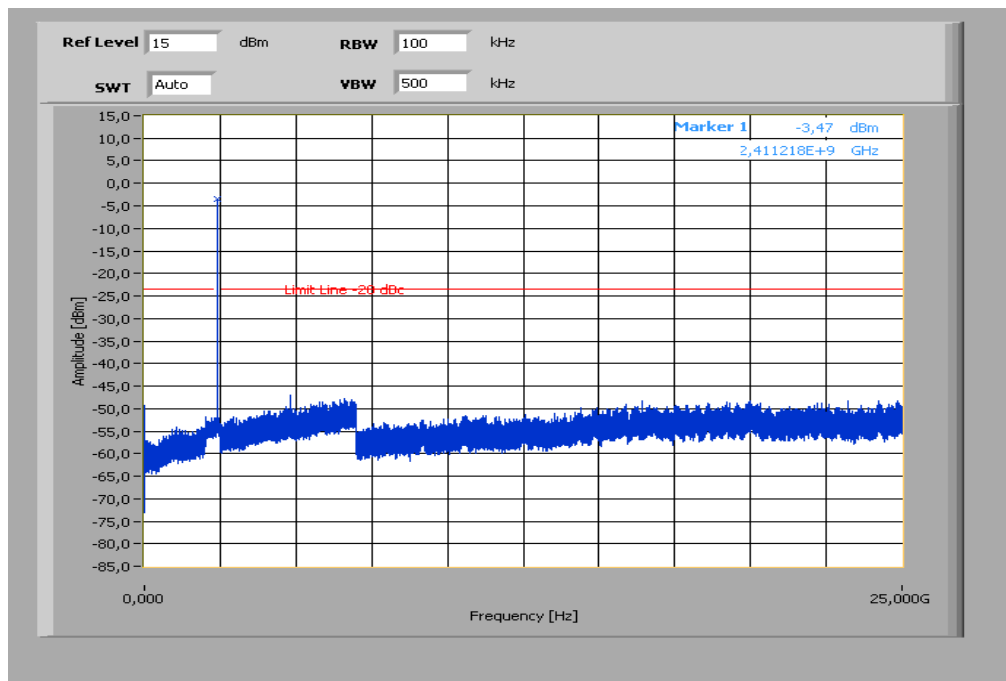
Results: DSSS, antenna port A, BPSK

TX Spurious Emissions Conducted					
DSSS, antenna port A					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		0.36	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak)		complies
			-30 dBc (average)		
2438		0.74	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak)		complies
			-30 dBc (average)		
2464		-1.34	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak)		complies
			-30 dBc (average)		
Measurement uncertainty			± 3 dB		

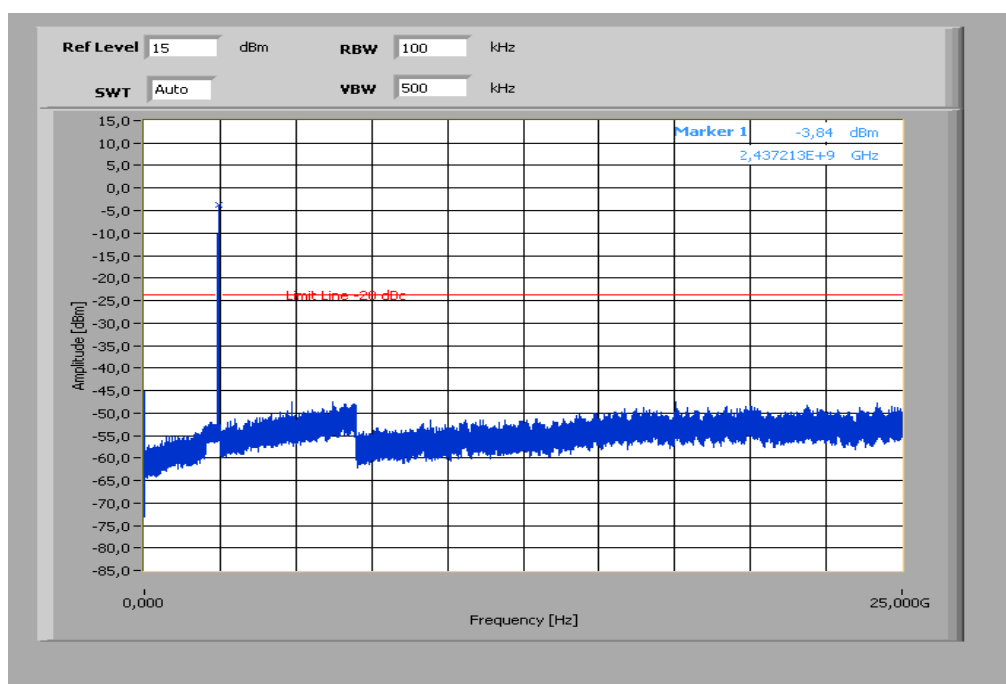
Result: Passed**Results: DSSS, antenna port B, BPSK**

TX Spurious Emissions Conducted					
DSSS, antenna port B					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		-0.44	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak)		complies
			-30 dBc (average)		
2438		0.64	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak)		complies
			-30 dBc (average)		
2464		-1.45	30 dBm		Operating frequency
No peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak)		complies
			-30 dBc (average)		
Measurement uncertainty			± 3 dB		

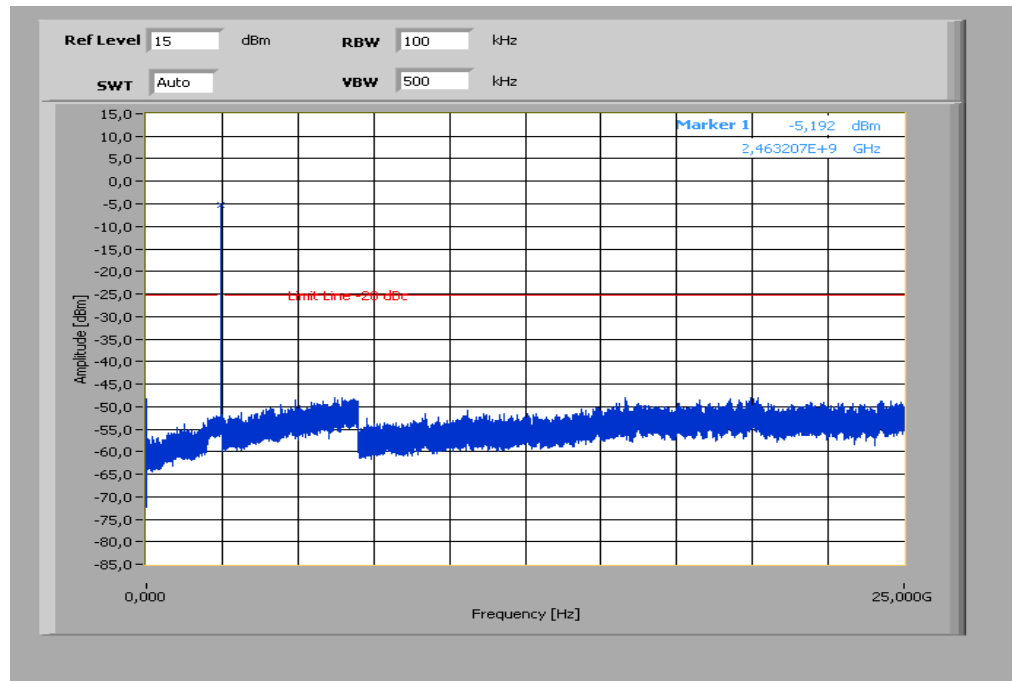
Result: Passed

Plots: DSSS, antenna port A, BPSK**Plot 1: TX mode, lowest channel, up to 25 GHz**

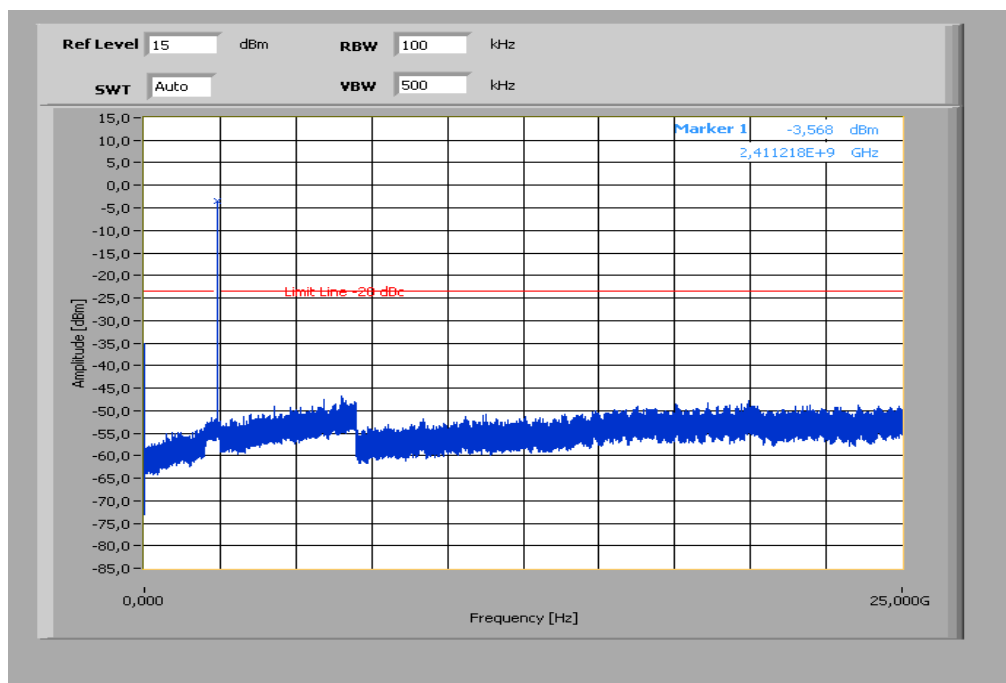
The peak at the beginning of the plot is the LO from the SA.

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

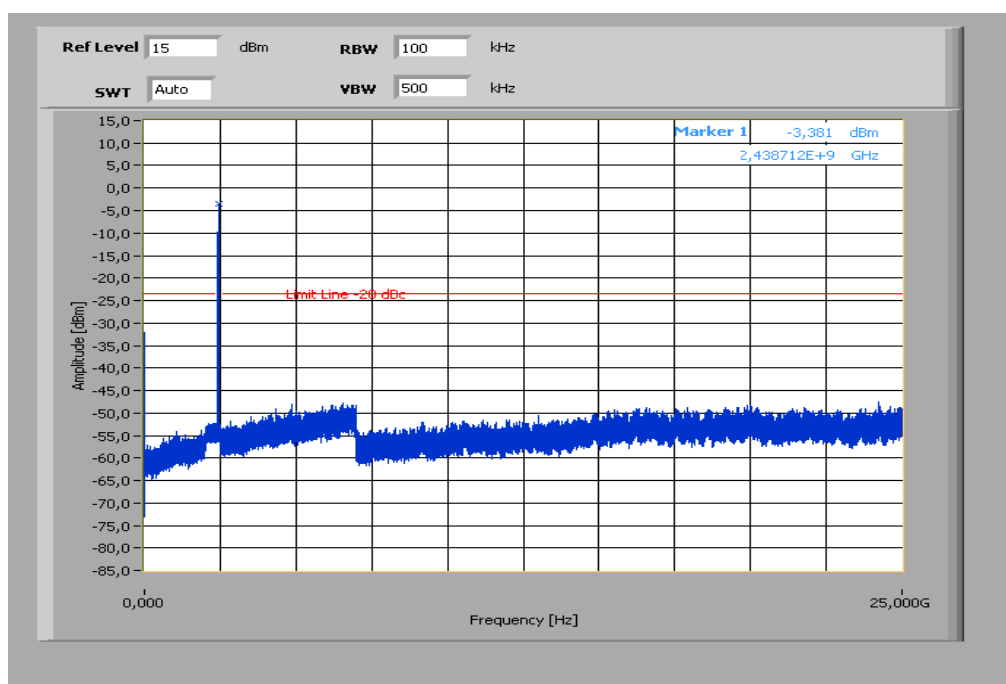
The peak at the beginning of the plot is the LO from the SA.

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

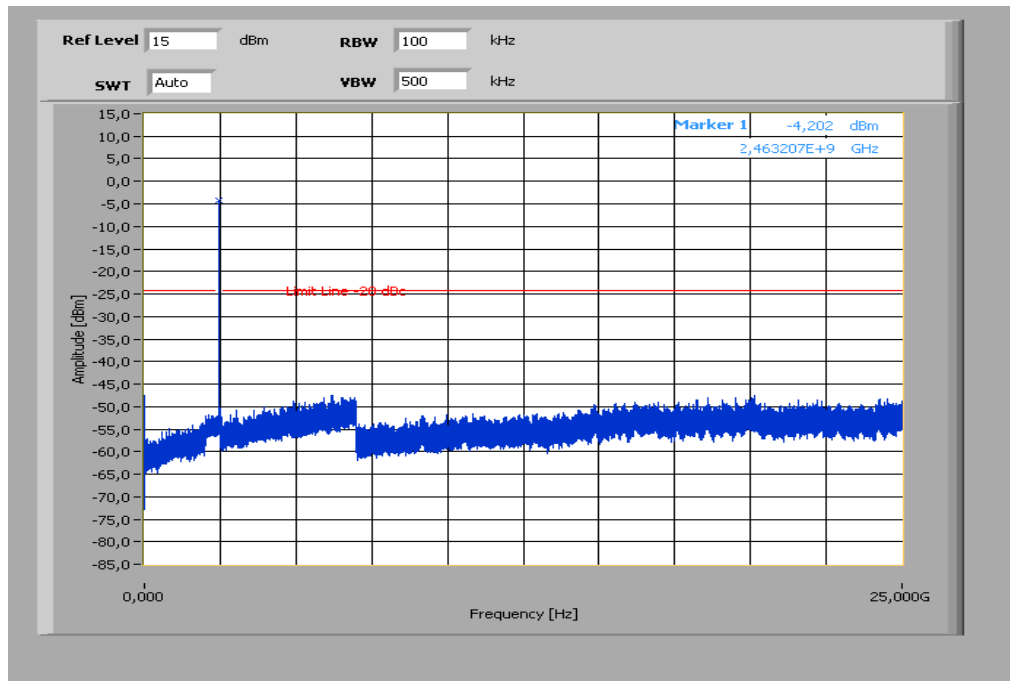
The peak at the beginning of the plot is the LO from the SA.

Plots: DSSS, antenna port B, BPSK**Plot 1:** TX mode, lowest channel, up to 25 GHz

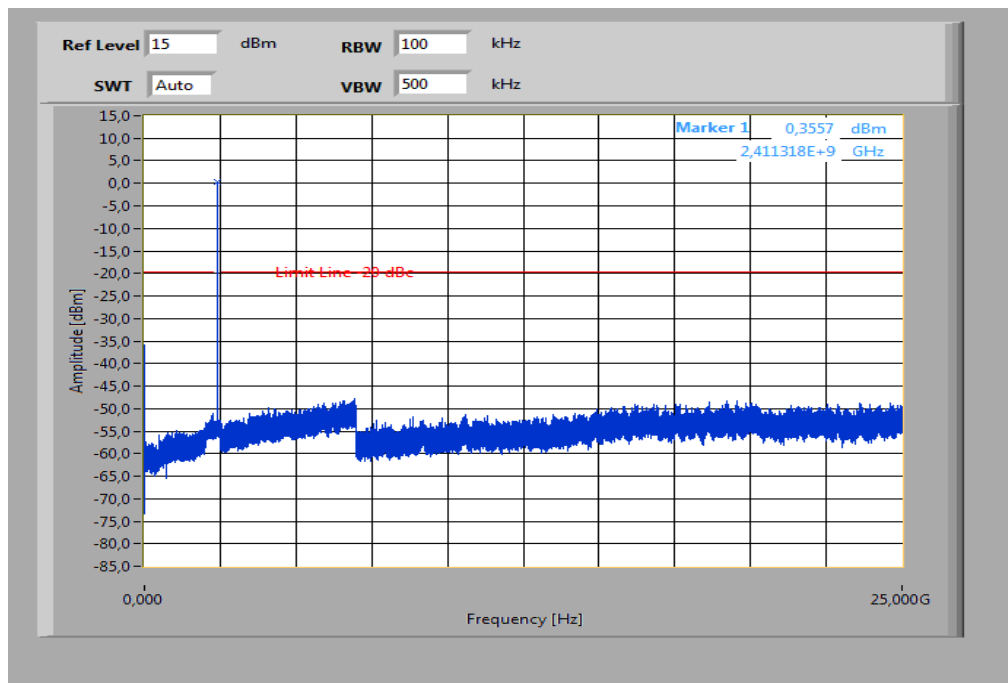
The peak at the beginning of the plot is the LO from the SA.

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

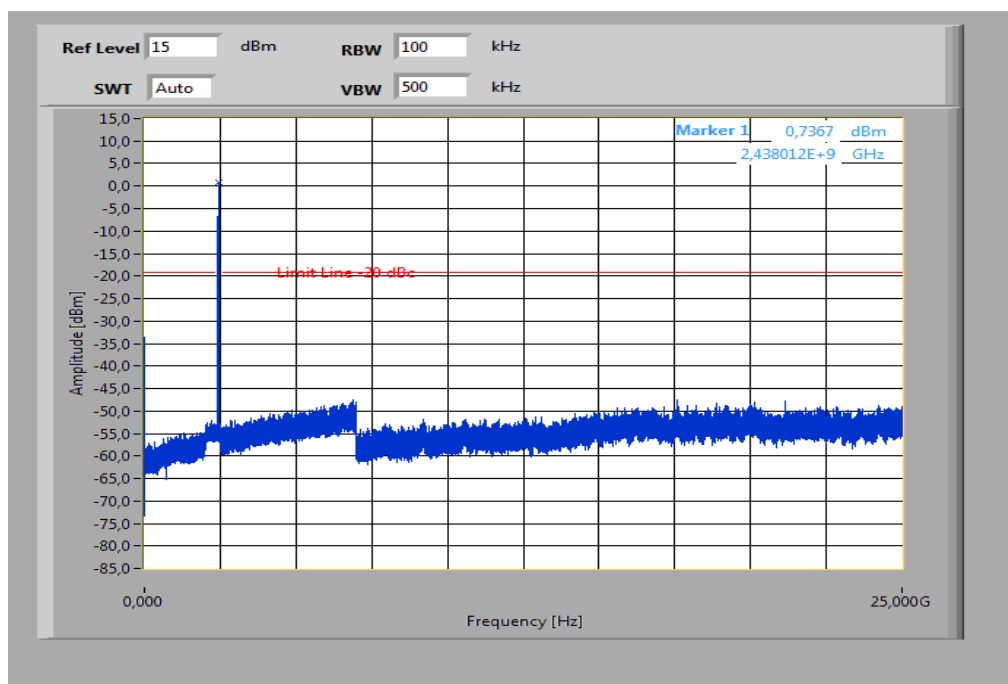
The peak at the beginning of the plot is the LO from the SA.

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

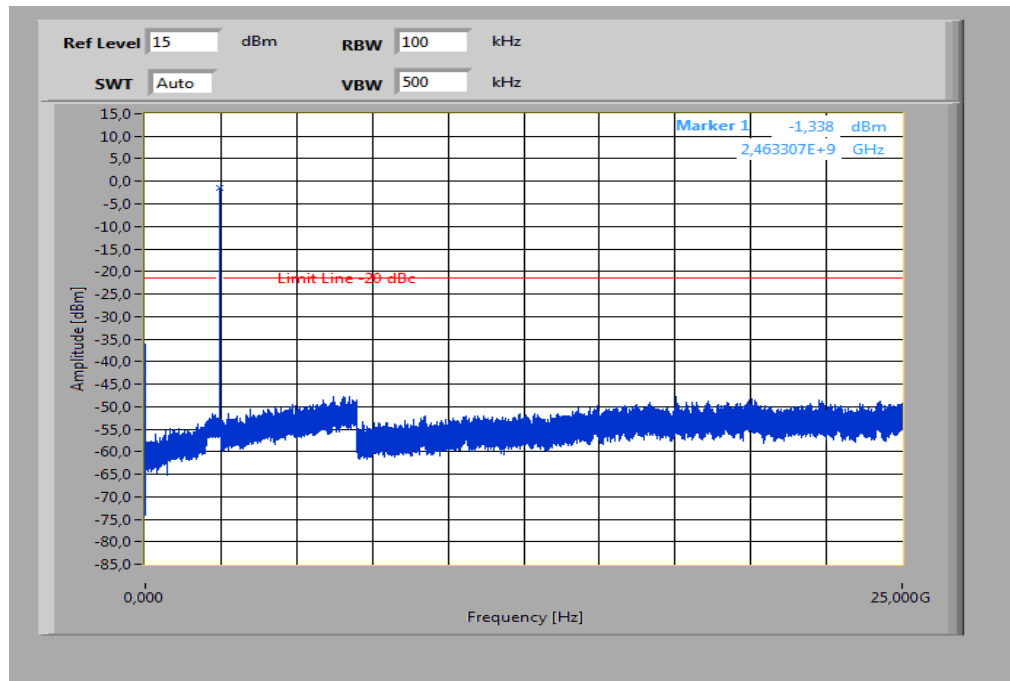
The peak at the beginning of the plot is the LO from the SA.

Plots: DSSS, antenna port A, QPSK**Plot 1:** TX mode, lowest channel, up to 25 GHz

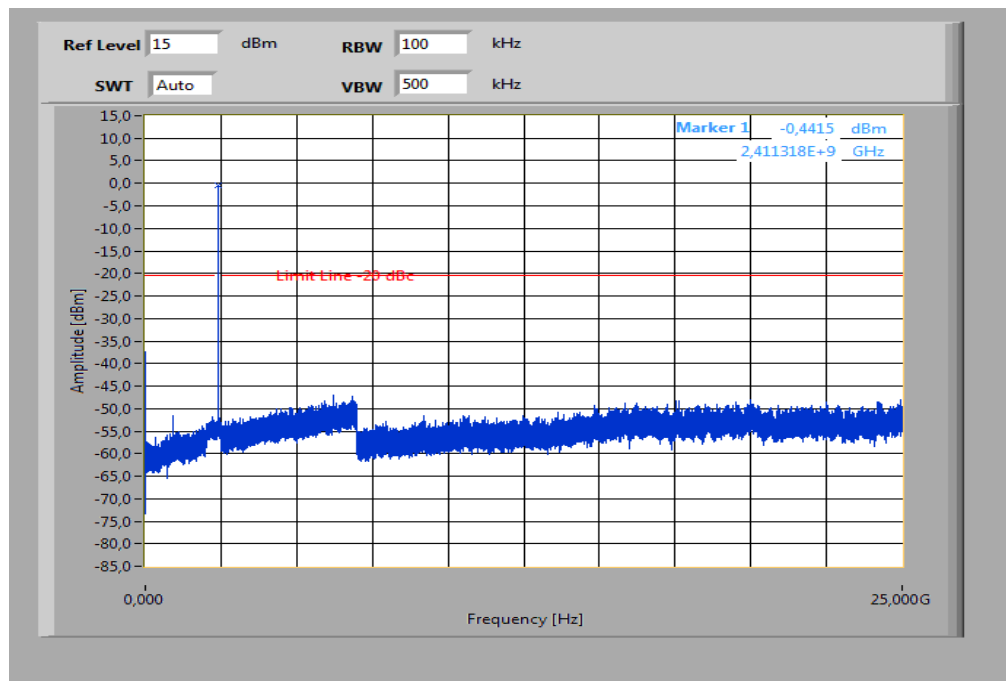
The peak at the beginning of the plot is the LO from the SA.

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

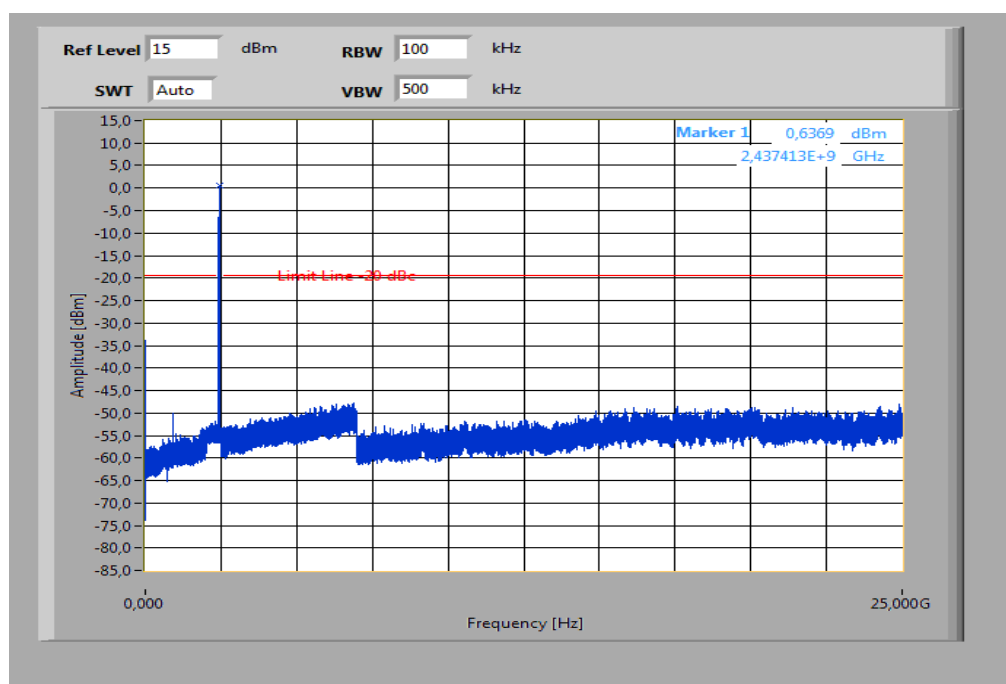
The peak at the beginning of the plot is the LO from the SA.

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

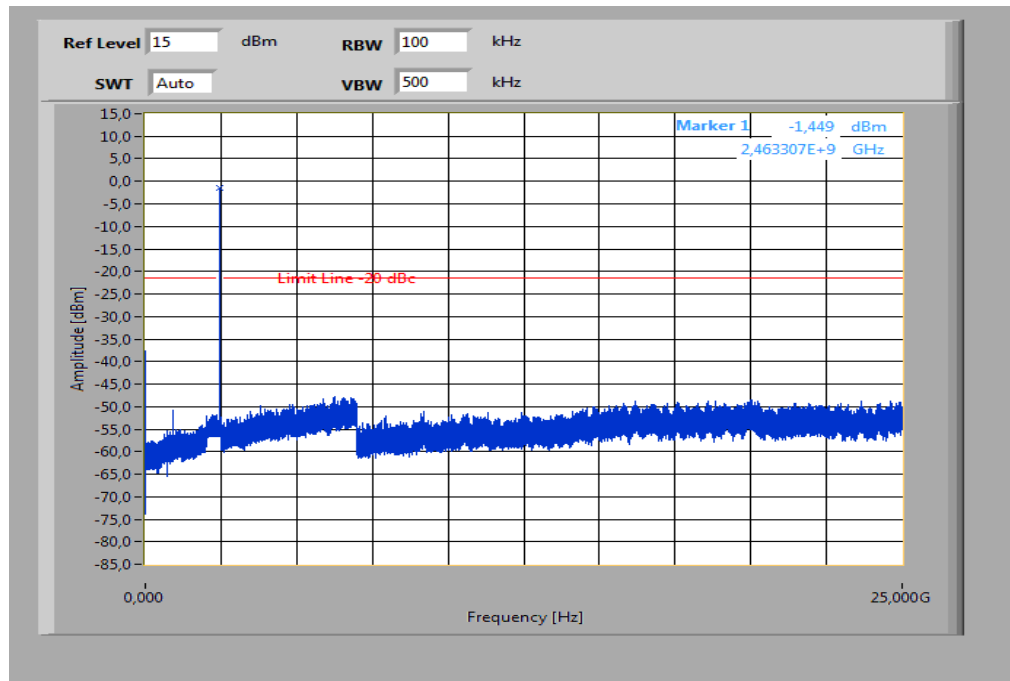
The peak at the beginning of the plot is the LO from the SA.

Plots: DSSS, antenna port B, QPSK**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.

9.9 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode.

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

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, antenna port A, BPSK

TX Spurious Emissions Radiated [dBμV/m]								
DSSS, antenna port A								
2412 MHz			2438 MHz			2464 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	1 MHz Peak	39.89	4876	1 MHz Peak	41.82	4928	1 MHz Peak	52.97
			8866	1 MHz Peak	46.06			
Measurement uncertainty			± 3 dB					

Result: Passed**Results: DSSS, antenna port B, BPSK**

TX Spurious Emissions Radiated [dBμV/m]								
OFDM, antenna port B								
2412 MHz			2438 MHz			2464 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.		
All detected emissions above 1 GHz are more than 20 dB below the limit.			4876	1 MHz Peak	40.02	4928	1 MHz Peak	51.05
Measurement uncertainty			± 3 dB					

Result: Passed

Results: DSSS, antenna port A, QPSK

TX Spurious Emissions Radiated [dB μ V/m]								
DSSS, antenna port A								
2412 MHz			2438 MHz			2464 MHz		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
Above 1 GHz - all detected peak emissions are below the average limit.			Above 1 GHz - all detected peak emissions are below the average limit			Above 1 GHz - all detected peak emissions are below the average limit		
Measurement uncertainty			± 3 dB					

Result: Passed**Results: DSSS, antenna port B, QPSK**

TX Spurious Emissions Radiated [dB μ V/m]								
OFDM, antenna port B								
2412 MHz			2438 MHz			2464 MHz		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]
For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.			For emissions below 1 GHz, please take a look at the table below the 1 GHz plot.		
Above 1 GHz - all detected peak emissions are below the average limit			Above 1 GHz - all detected peak emissions are below the average limit			Above 1 GHz - all detected peak emissions are below the average limit		
Measurement uncertainty			± 3 dB					

Result: Passed

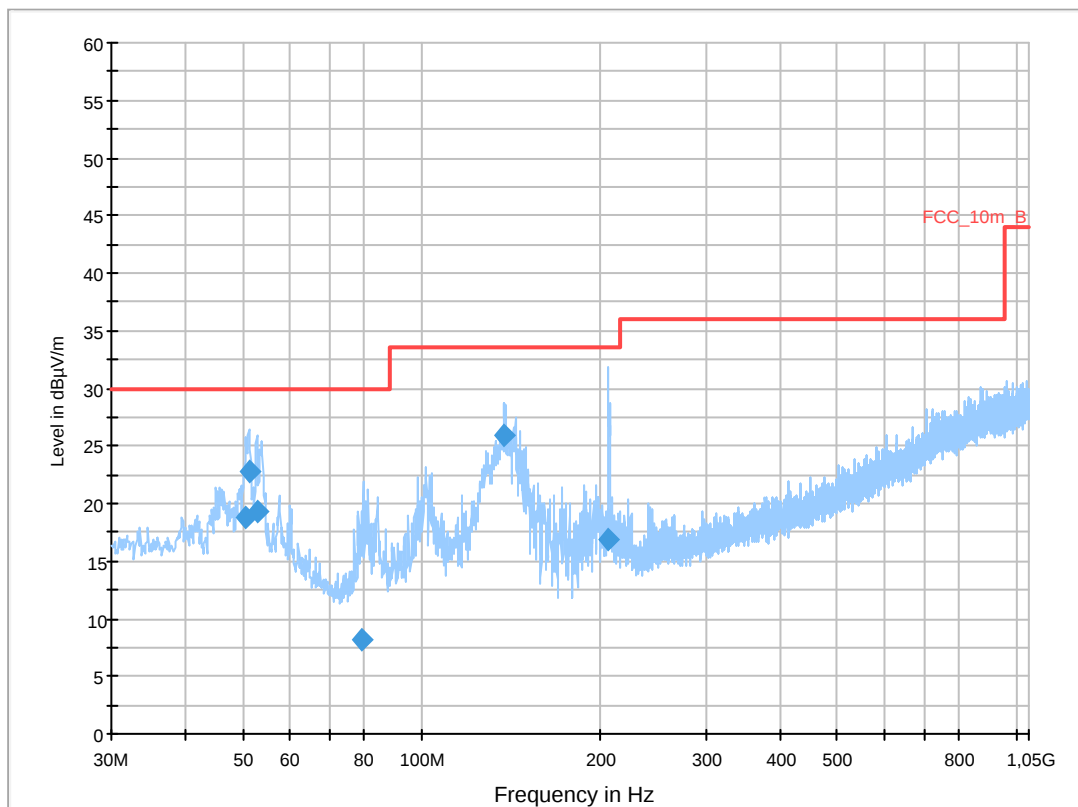
Plots: DSSS, antenna port A, BPSK**Plot 1:** Lowest channel, 30 MHz to 1 GHz, vertical & horizontal polarization**Common Information**

EUT: Quinta MU 3x (Revoluto)
 Serial Number: 00001
 Test Description: FCC part 15 B class B @ 10 m
 Operating Conditions: 2,4G, ANT A, tx@2412MHz + charging
 Operator Name: Wolsdorfer
 Comment: AC 115V / 60Hz

Scan Setup: STAN_Fin [EMI radiated]

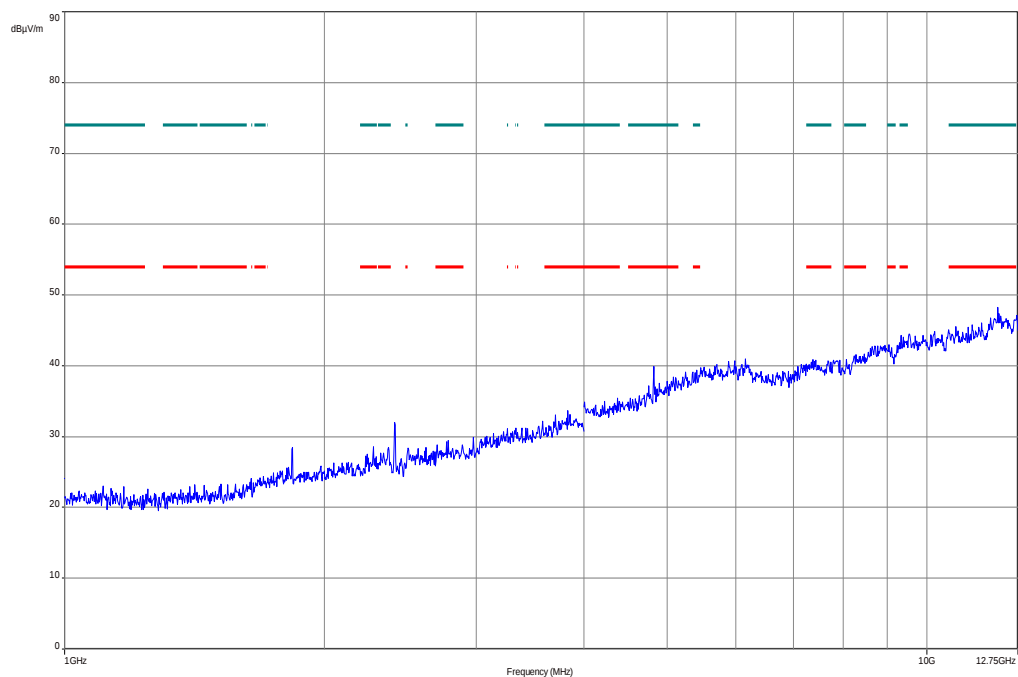
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

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

**Final Result 1**

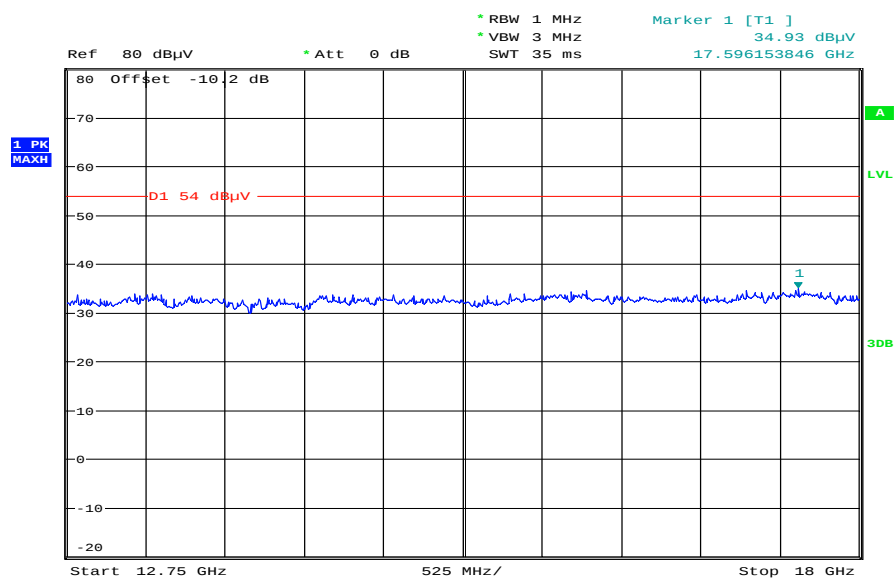
Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
50.534700	18.7	1000.0	120.000	100.0	V	89.0	13.3	11.3	30.0	
51.214650	22.8	1000.0	120.000	100.0	V	130.0	13.3	7.2	30.0	
52.703850	19.3	1000.0	120.000	200.0	V	-44.0	13.1	10.7	30.0	
79.296750	8.1	1000.0	120.000	200.0	V	304.0	9.1	21.9	30.0	
137.904150	26.0	1000.0	120.000	200.0	V	198.0	8.8	7.5	33.5	
206.488350	16.9	1000.0	120.000	100.0	V	131.0	11.9	16.6	33.5	

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



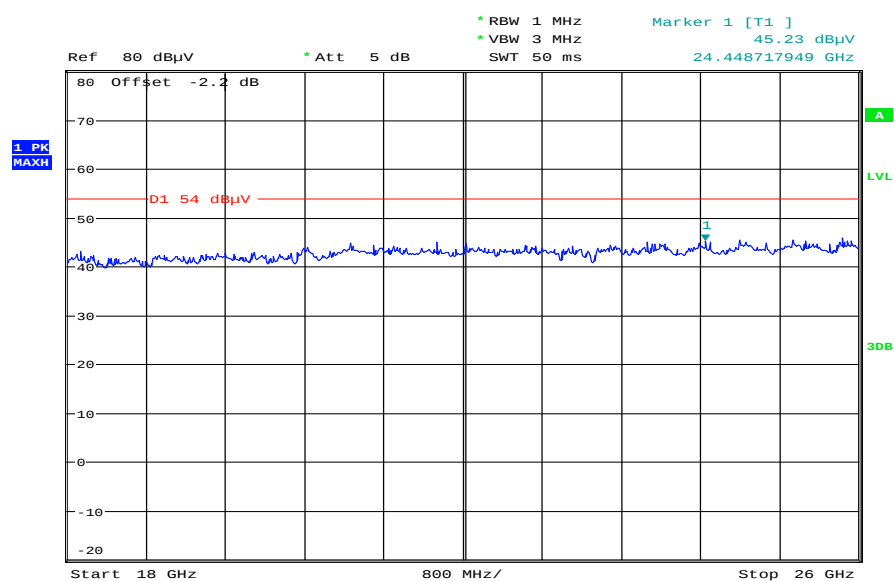
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



Date: 16.MAY.2013 14:50:15

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



Date: 16.MAY.2013 14:39:43

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

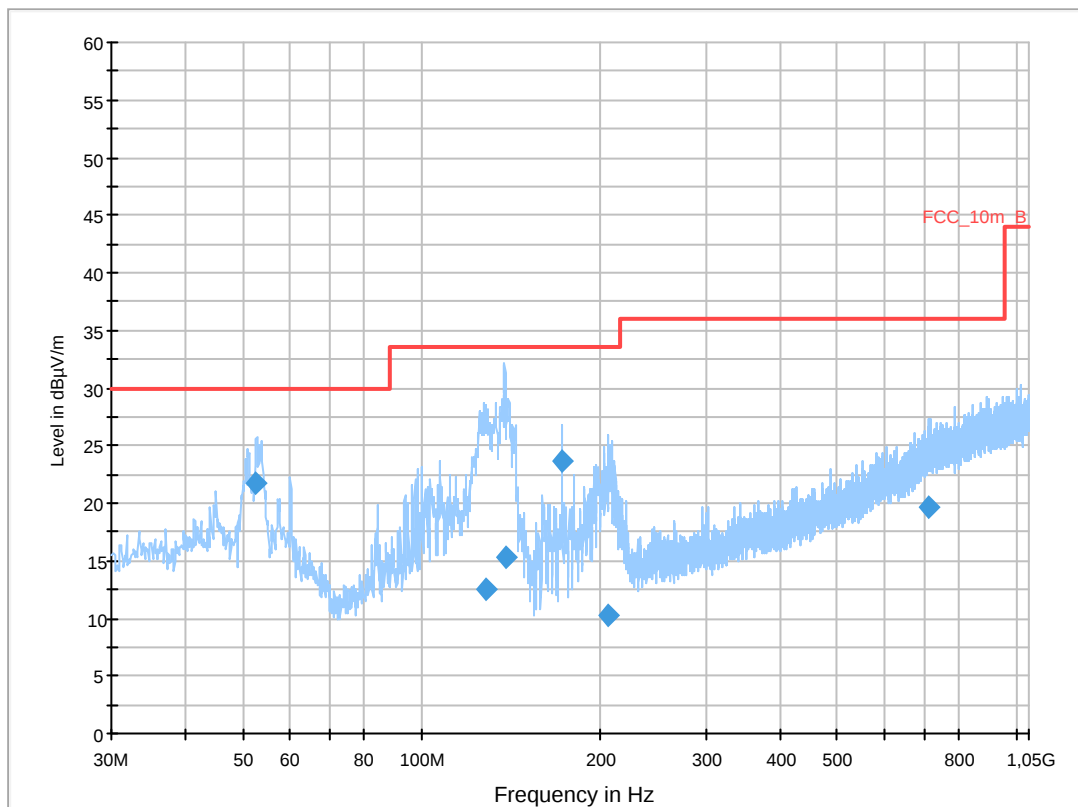
Common Information

EUT: Quinta MU 3x (Revoluto)
 Serial Number: 00001
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: 2,4G, ANT A, tx@2438 MHz + charging
 Operator Name: Wolsdorfer
 Comment: AC 115V / 60Hz

Scan Setup: STAN_Fin [EMI radiated]

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

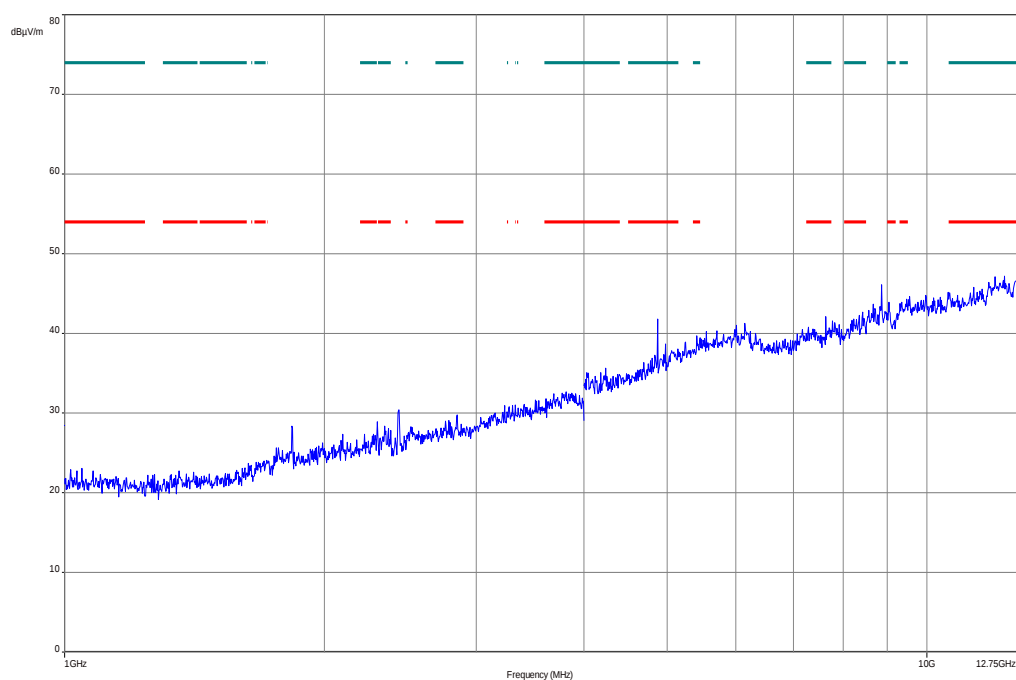
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

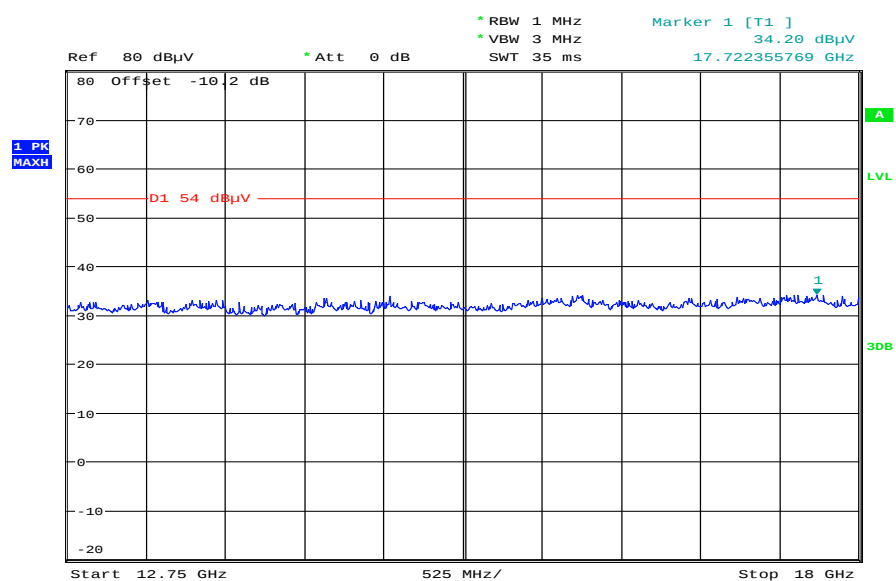
Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
52.588050	21.8	1000.0	120.000	98.0	V	280.0	13.1	8.2	30.0	
128.187150	12.6	1000.0	120.000	98.0	V	260.0	9.6	20.9	33.5	
138.009600	15.4	1000.0	120.000	159.0	V	260.0	8.8	18.1	33.5	
172.472850	23.7	1000.0	120.000	122.0	V	171.0	10.0	9.8	33.5	
204.955950	10.2	1000.0	120.000	170.0	V	268.0	11.9	23.3	33.5	
711.321450	19.6	1000.0	120.000	170.0	H	100.0	22.8	16.4	36.0	

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



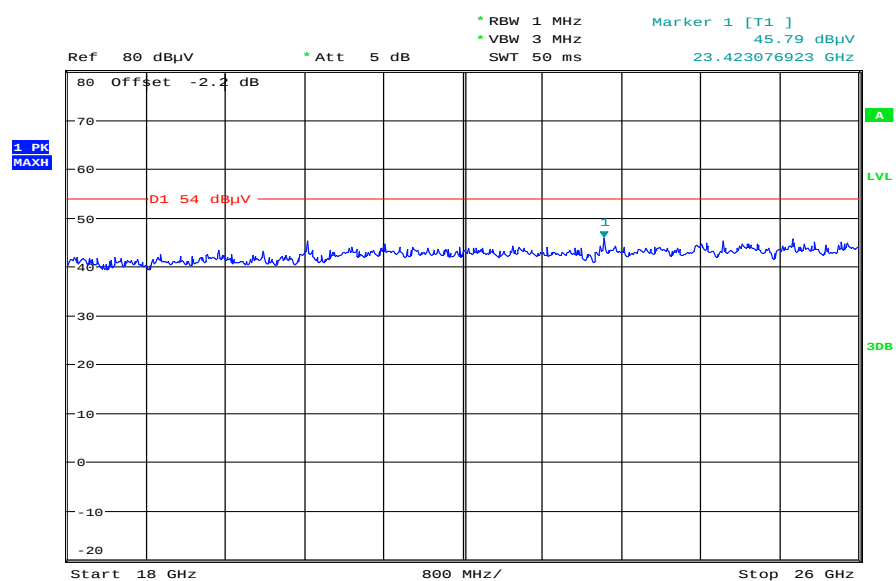
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



Date: 16.MAY.2013 14:51:05

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



Date: 16.MAY.2013 14:40:29

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

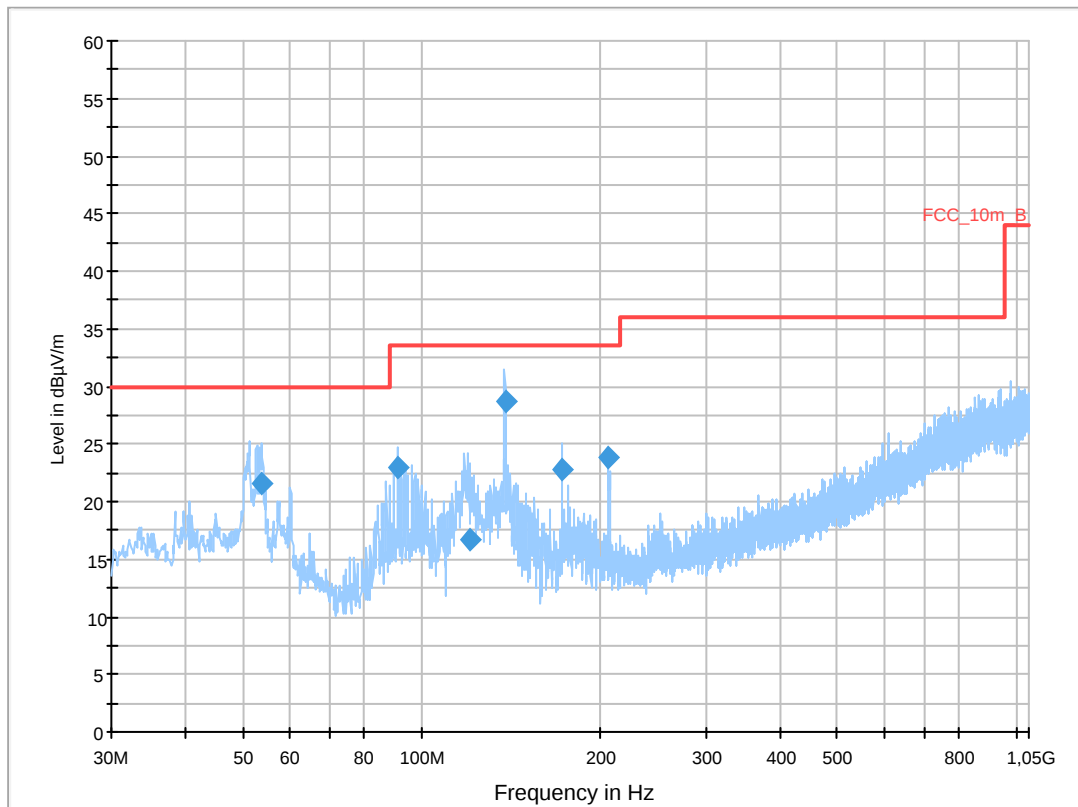
Common Information

EUT: Quinta MU 3x (Revoluto)
 Serial Number: 00001
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: 2,4G, ANT A, tx@2464MHz + charging
 Operator Name: Wolsdorfer
 Comment: AC 115V / 60Hz

Scan Setup: STAN_Fin [EMI radiated]

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

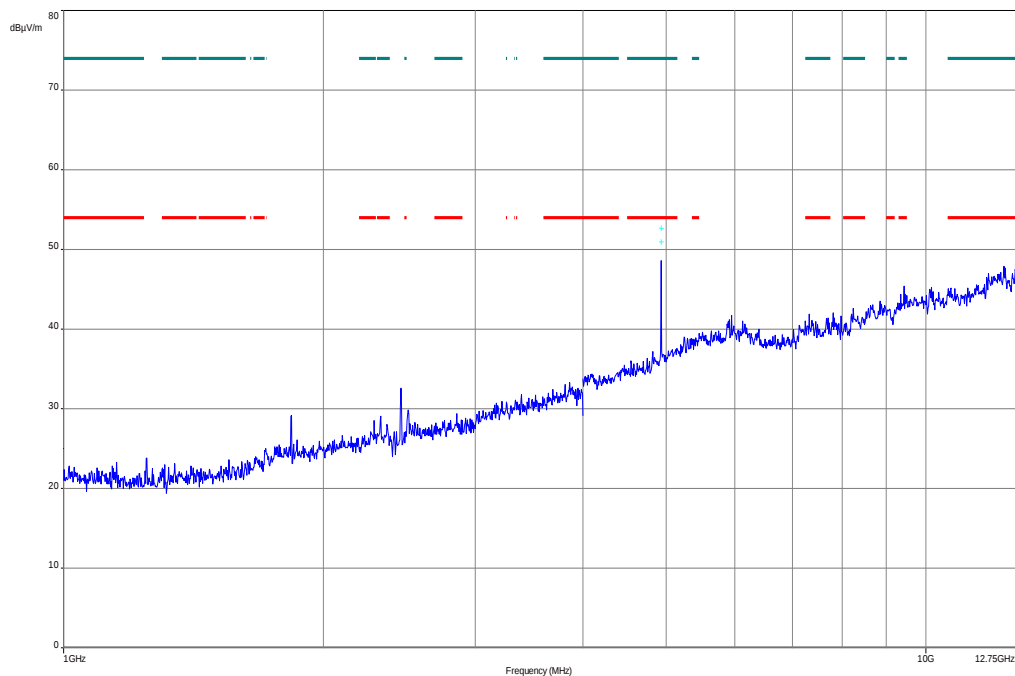
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



Final Result 1

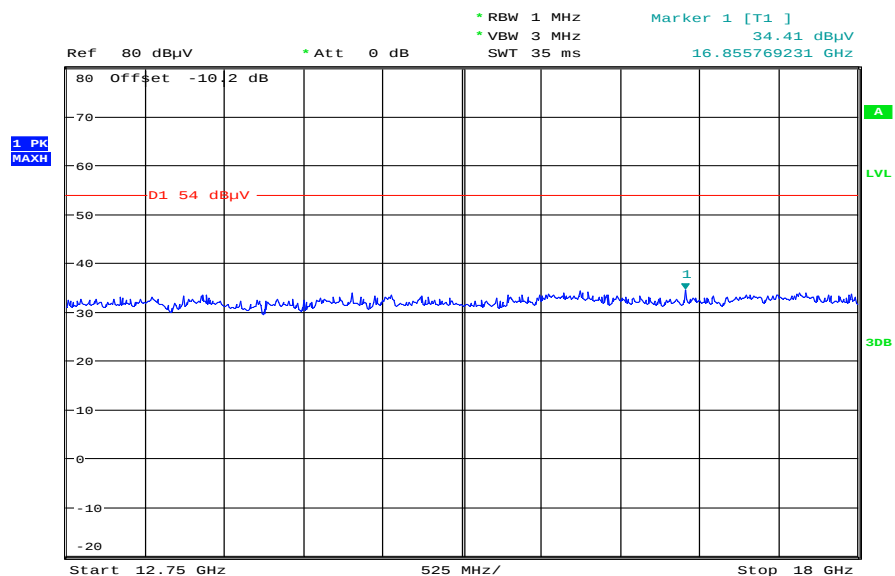
Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
53.773350	21.5	1000.0	120.000	170.0	V	270.0	13.0	8.5	30.0	
90.895800	22.9	1000.0	120.000	98.0	V	89.0	10.7	10.6	33.5	
120.328200	16.8	1000.0	120.000	170.0	V	10.0	10.2	16.7	33.5	
137.972850	28.6	1000.0	120.000	170.0	V	10.0	8.8	4.9	33.5	
171.857550	22.7	1000.0	120.000	98.0	V	260.0	9.9	10.8	33.5	
206.344350	23.8	1000.0	120.000	104.0	V	100.0	11.9	9.7	33.5	

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



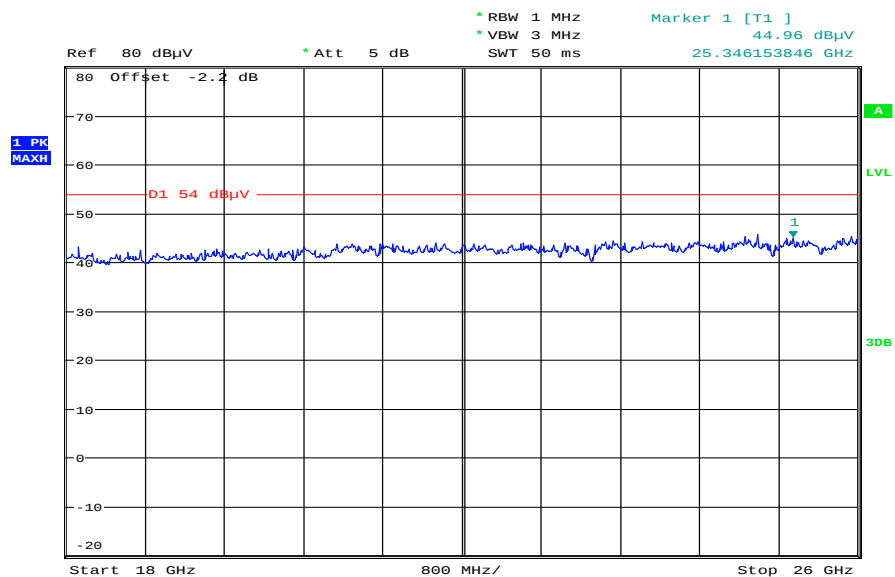
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



Date: 16.MAY.2013 14:52:07

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



Date: 16.MAY.2013 14:44:52

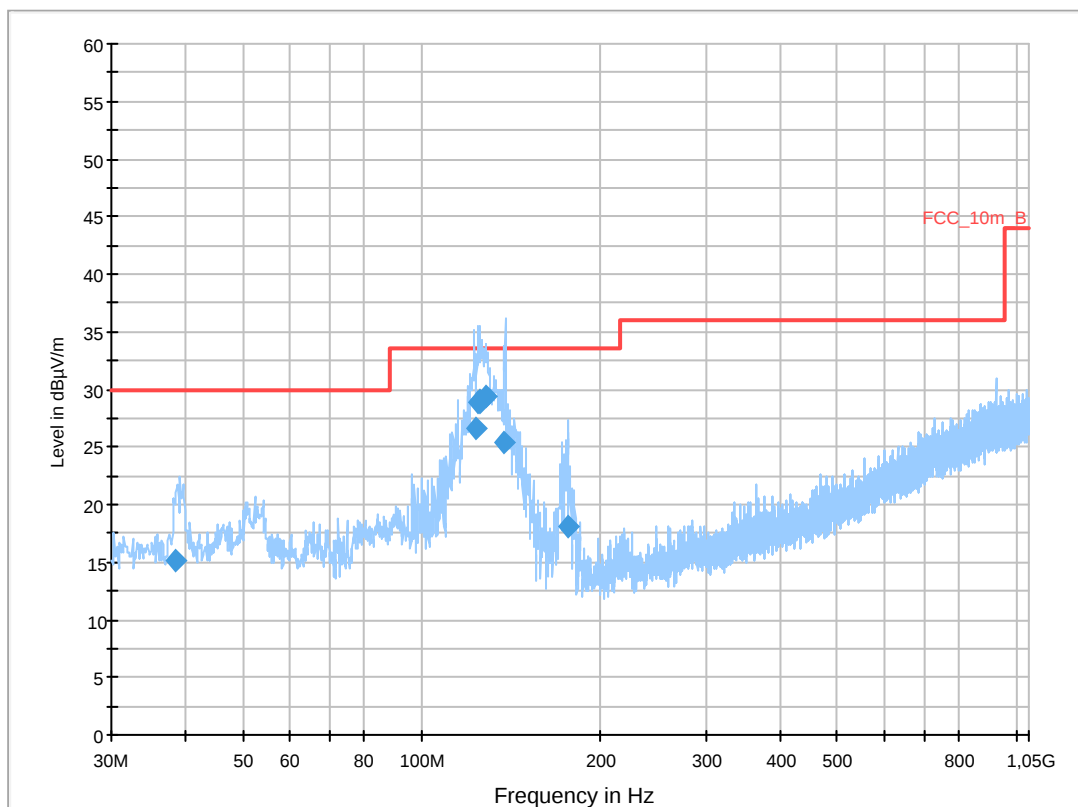
Plots: DSSS, antenna port B, BPSK**Plot 1:** Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization**Common Information**

EUT: Quinta MU 3x (Revoluto)
 Serial Number: 00001
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: 2,4G, ANT B, 2438MHz
 Operator Name: Medrow
 Comment: AC 115V / 60Hz

Scan Setup: STAN_Fin [EMI radiated]

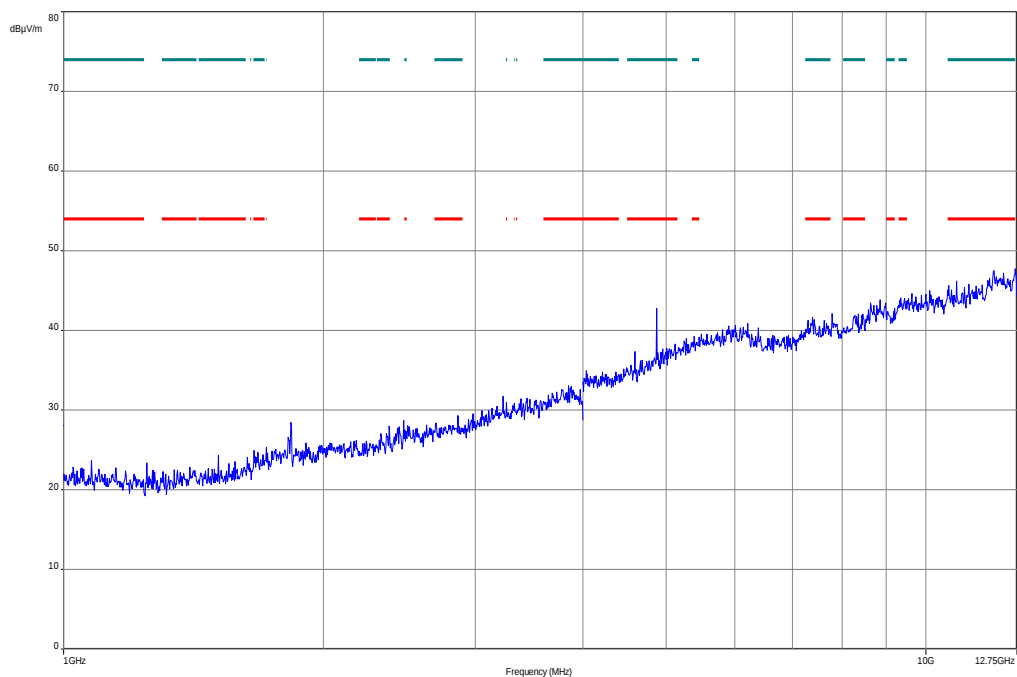
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

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

**Final Result 1**

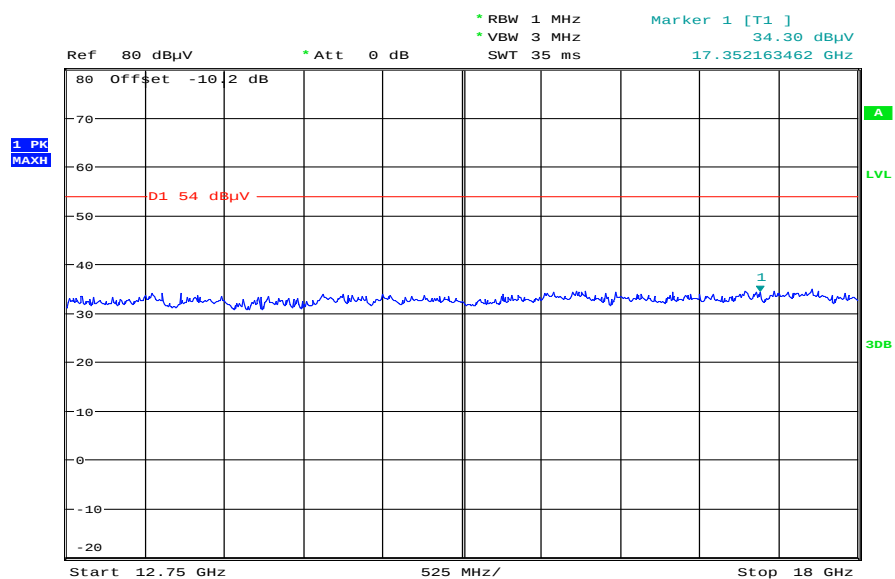
Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
38.547750	15.2	1000.0	120.000	98.0	V	183.0	13.3	14.8	30.0	
122.958450	26.6	1000.0	120.000	162.0	V	171.0	10.0	6.9	33.5	
124.393050	28.9	1000.0	120.000	143.0	V	170.0	9.9	4.6	33.5	
125.454900	29.0	1000.0	120.000	130.0	V	171.0	9.8	4.5	33.5	
125.484900	28.9	1000.0	120.000	120.0	V	170.0	9.8	4.6	33.5	
128.182650	29.3	1000.0	120.000	134.0	V	170.0	9.6	4.2	33.5	
137.515200	25.3	1000.0	120.000	170.0	V	190.0	8.8	8.2	33.5	
175.479000	18.2	1000.0	120.000	153.0	V	-9.0	10.2	15.3	33.5	

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



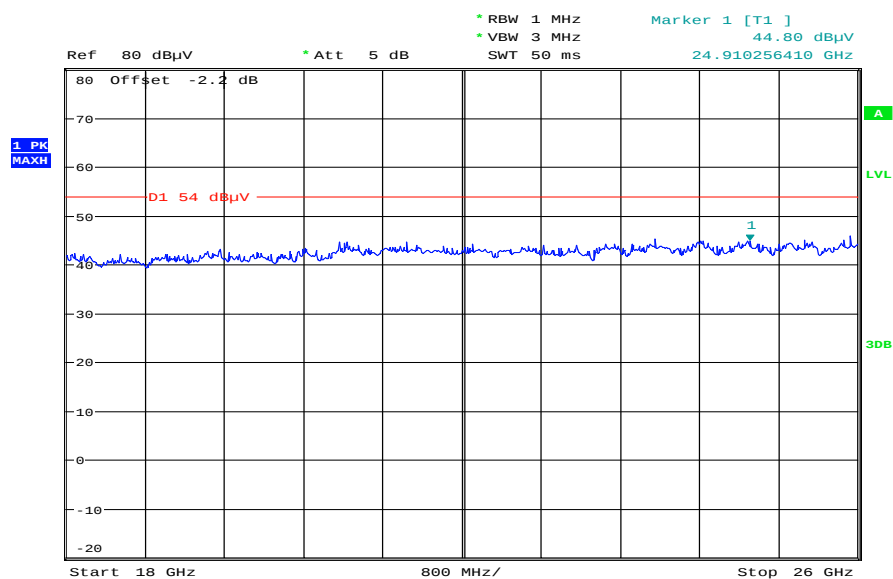
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



Date: 16.MAY.2013 14:57:37

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



Date: 16.MAY.2013 14:46:09

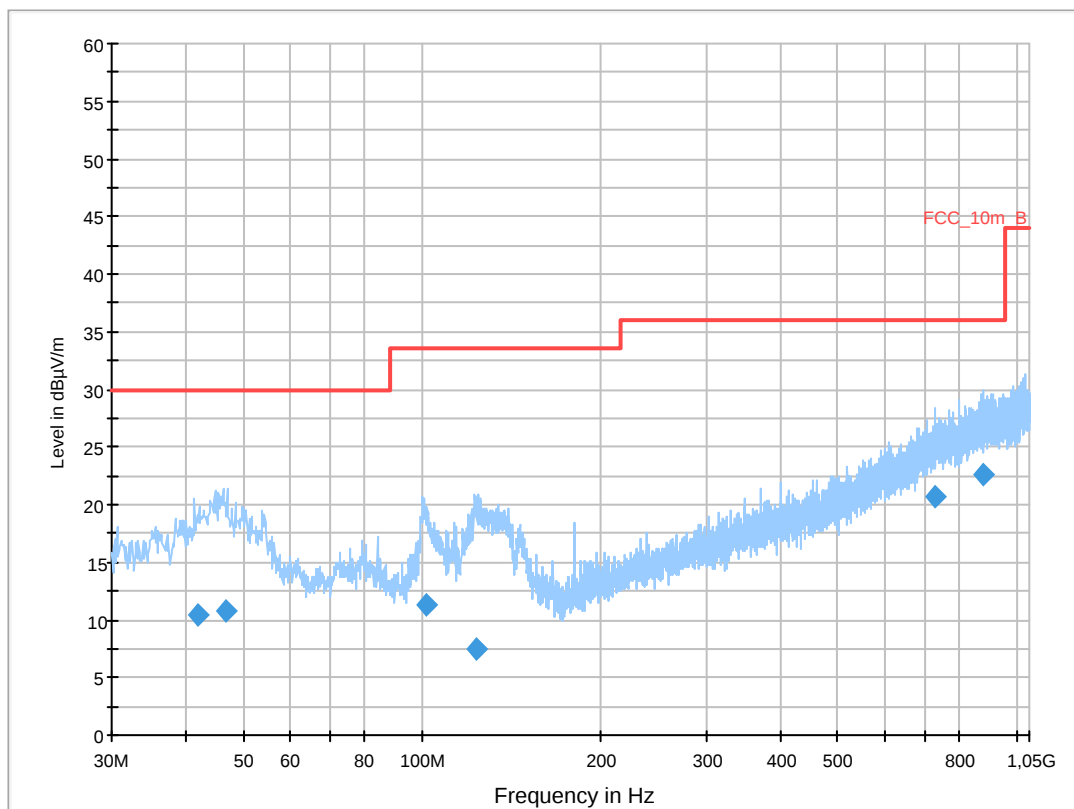
Plots: DSSS, antenna port A, QPSK**Plot 1:** Lowest channel, 30 MHz to 1 GHz, vertical & horizontal polarization**Common Information**

Test Description: FCC part 15 class B
 Operating Conditions: TX low channel Ant. A
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

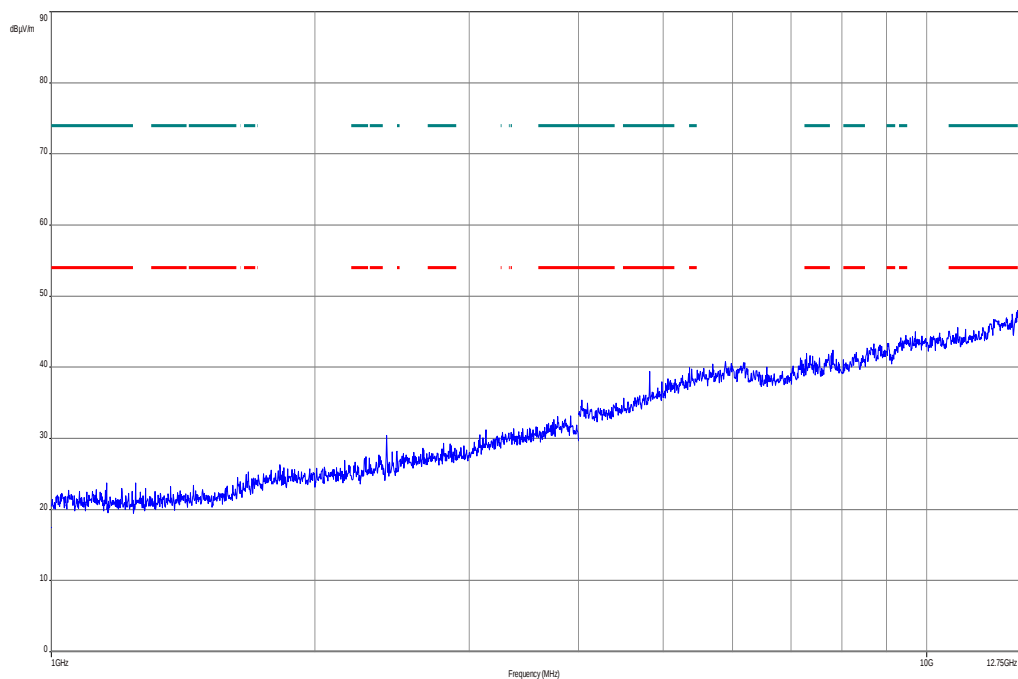
Scan Setup: STAN_Fin [EMI radiated]

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

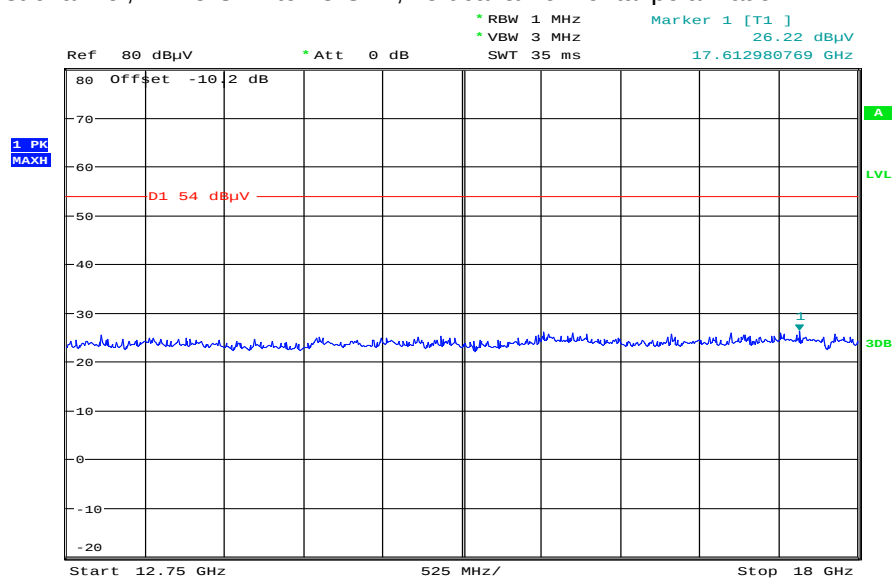
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB

**Final Result 1**

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
41.754450	10.5	1000.0	120.000	112.0	V	2.0	13.4	19.5	30.0	
46.742250	10.8	1000.0	120.000	112.0	V	-6.0	13.3	19.2	30.0	
101.360250	11.4	1000.0	120.000	170.0	V	100.0	11.8	22.1	33.5	
123.514200	7.5	1000.0	120.000	170.0	V	190.0	9.9	26.0	33.5	
729.156600	20.7	1000.0	120.000	153.0	H	93.0	23.2	15.3	36.0	
877.145850	22.5	1000.0	120.000	120.0	H	14.0	24.9	13.5	36.0	

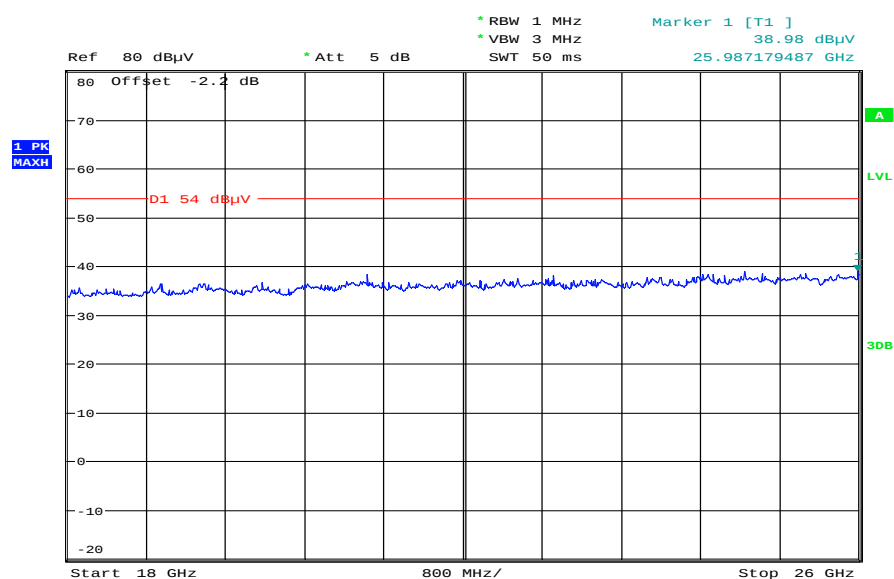
Plot 2: Lowest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

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

Date: 24.OCT.2013 14:18:26

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



Date: 24.OCT.2013 14:35:43

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

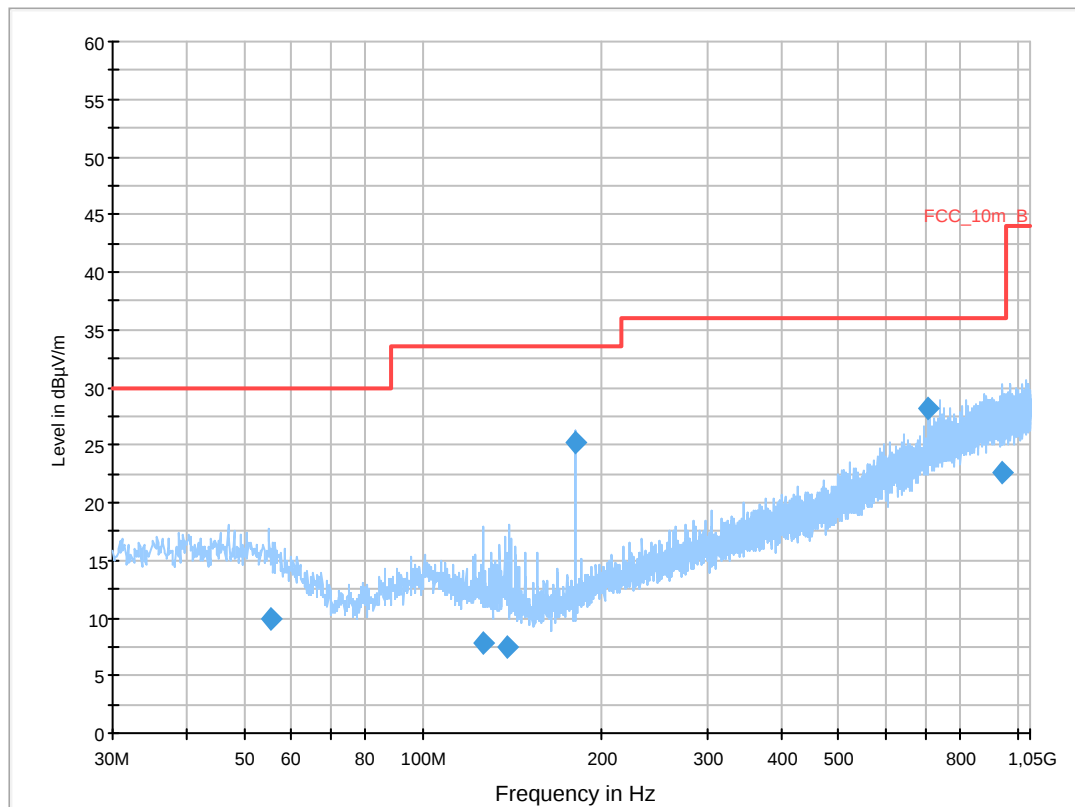
Common Information

Test Description: FCC part 15 class B
 Operating Conditions: tx @2438MHz Ant. A
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

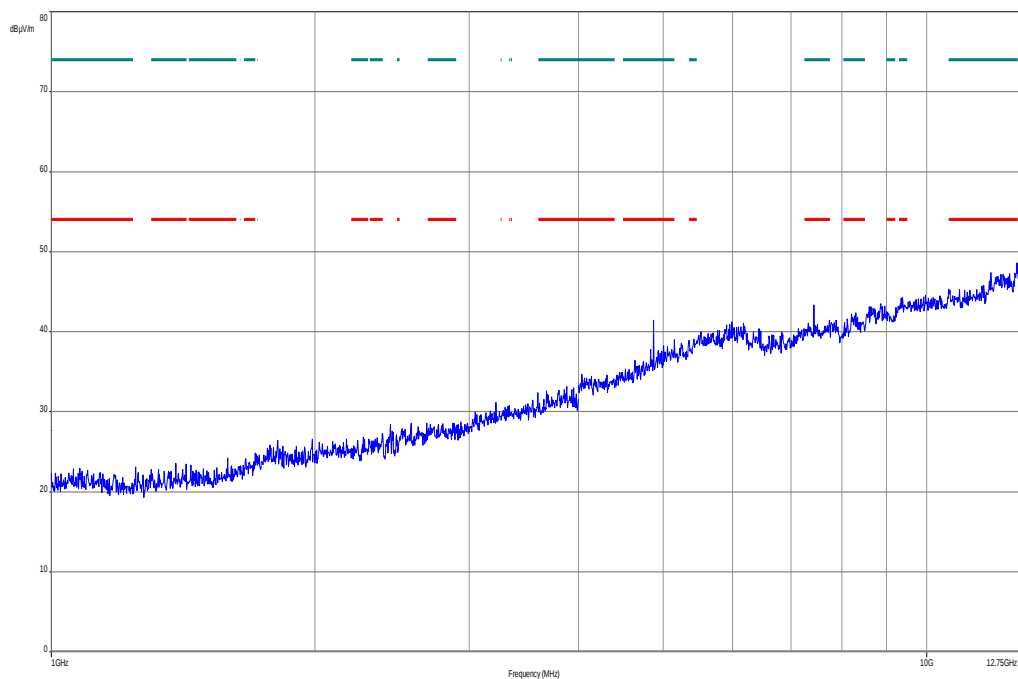
Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dBμV/m

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

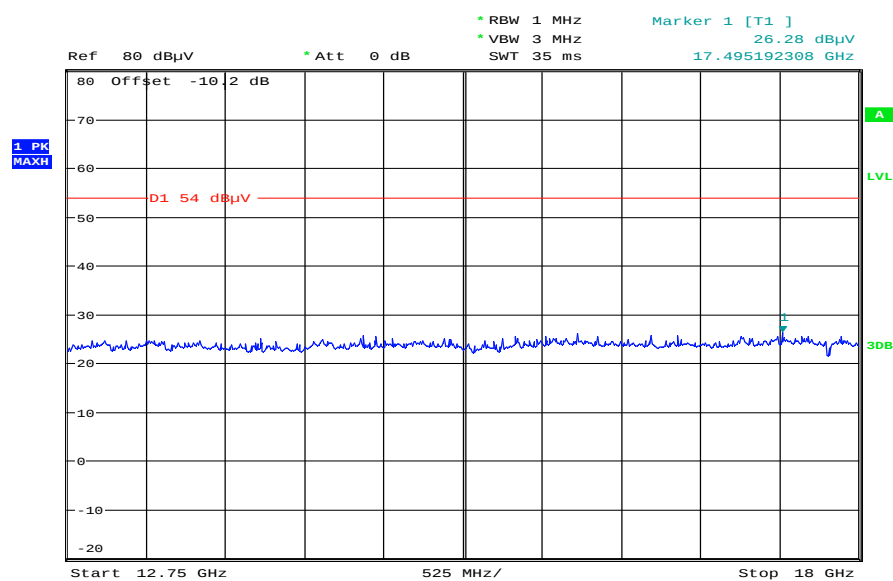


Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
55.209900	10.0	1000.0	120.000	170.0	V	2.0	12.8	20.0	30.0	
125.880450	7.8	1000.0	120.000	109.0	V	269.0	9.7	25.7	33.5	
138.974100	7.4	1000.0	120.000	104.0	V	175.0	8.7	26.1	33.5	
179.998200	25.2	1000.0	120.000	98.0	V	183.0	10.4	8.3	33.5	
707.996700	28.1	1000.0	120.000	170.0	H	280.0	22.7	7.9	36.0	
940.588050	22.6	1000.0	120.000	161.0	V	190.0	25.3	13.4	36.0	

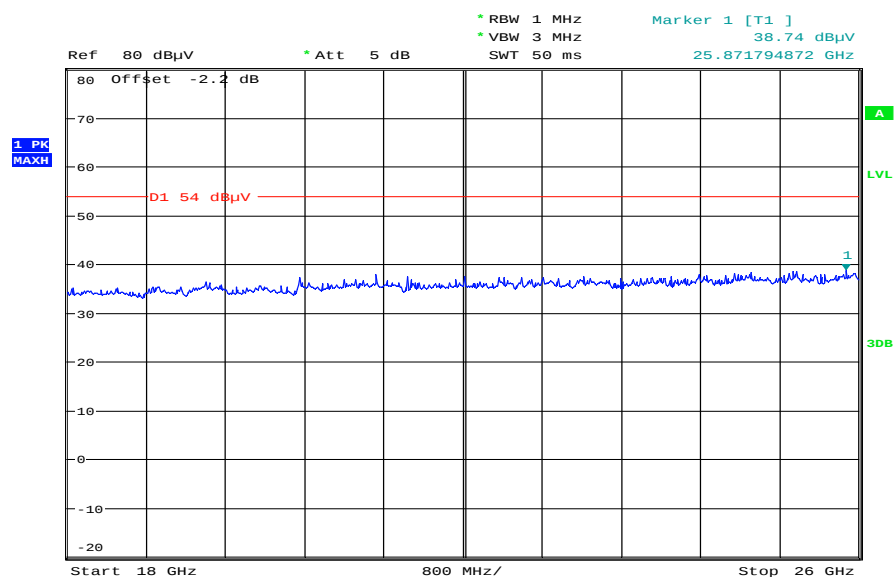
Plot 6: Middle channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

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

Date: 24.OCT.2013 14:19:26

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



Date: 24.OCT.2013 14:36:54

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

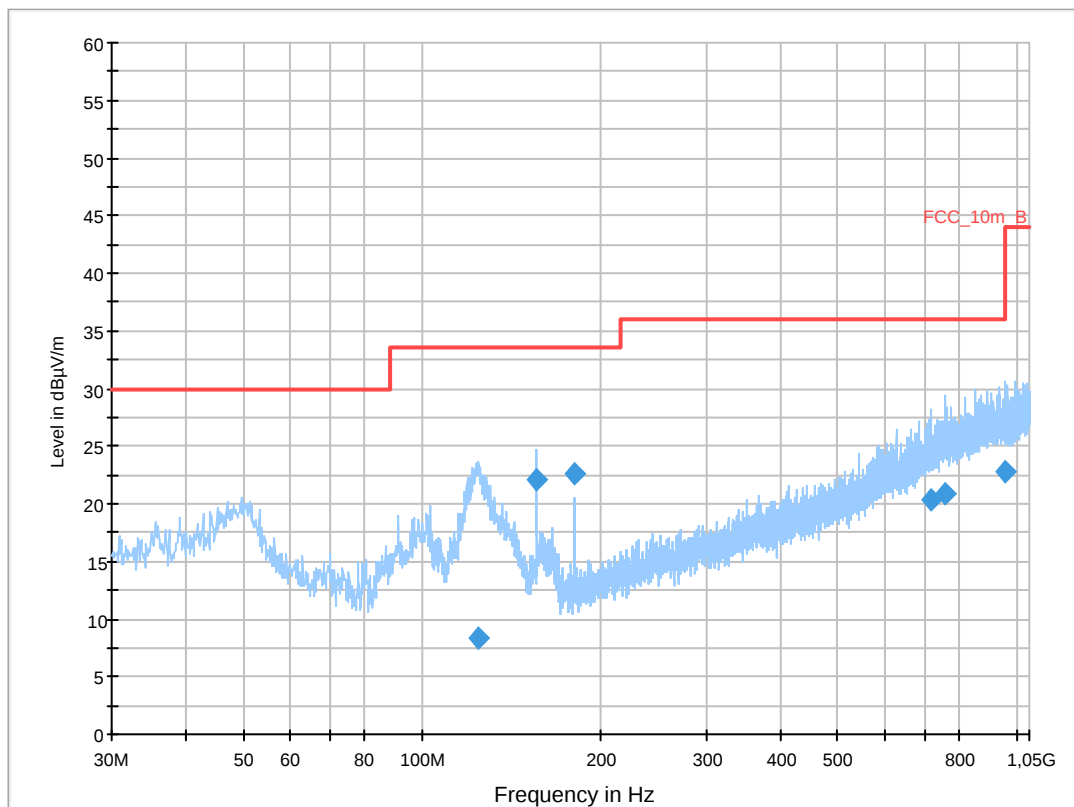
Common Information

Test Description: FCC part 15 class B
 Operating Conditions: tx @2464MHz Ant. A
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

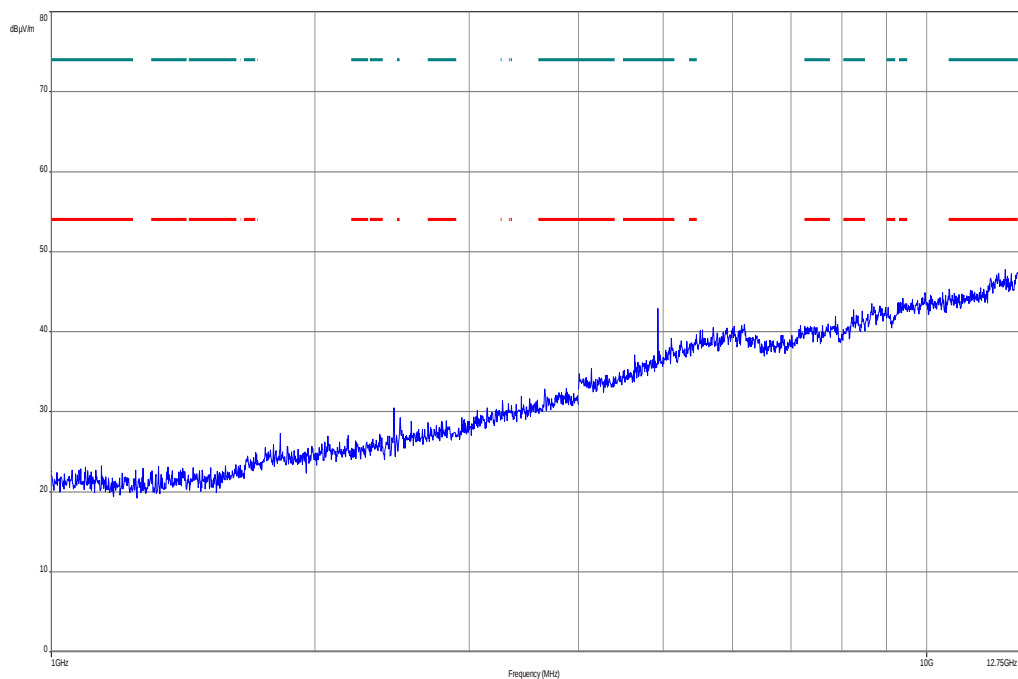
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

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

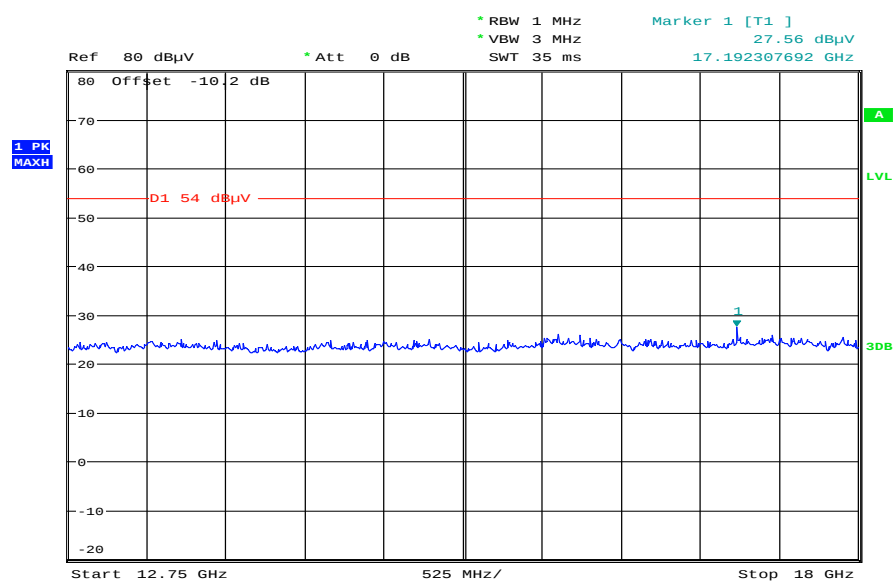


Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
123.885450	8.4	1000.0	120.000	120.0	V	267.0	9.9	25.1	33.5	
156.019200	22.1	1000.0	120.000	112.0	V	-10.0	9.1	11.4	33.5	
179.989050	22.7	1000.0	120.000	121.0	V	260.0	10.4	10.8	33.5	
716.868300	20.3	1000.0	120.000	132.0	V	268.0	22.9	15.7	36.0	
759.122100	20.9	1000.0	120.000	170.0	V	190.0	23.7	15.1	36.0	
958.273200	22.7	1000.0	120.000	170.0	V	10.0	25.4	13.3	36.0	

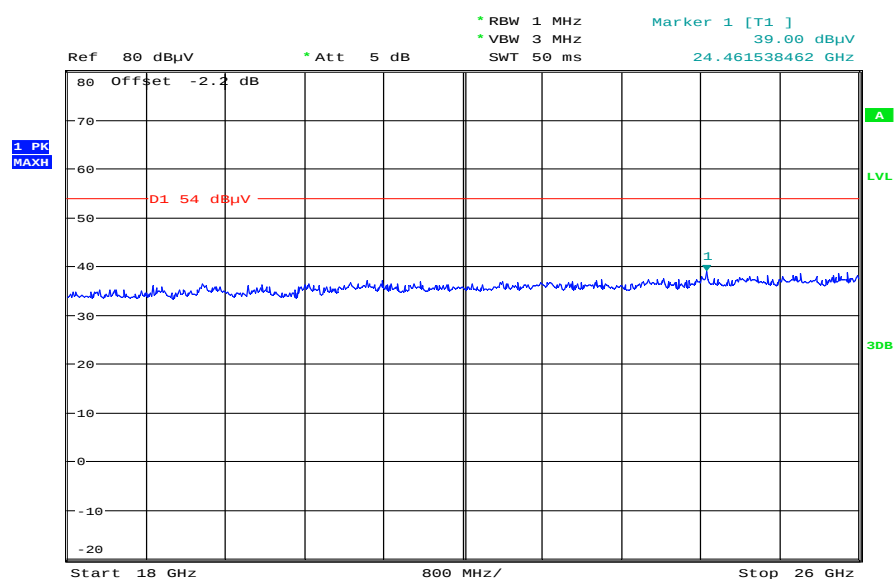
Plot 10: Highest channel, 1 GHz to 12.75 GHz, vertical & horizontal polarization

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: 24.OCT.2013 14:22:32

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



Date: 24.OCT.2013 14:39:08

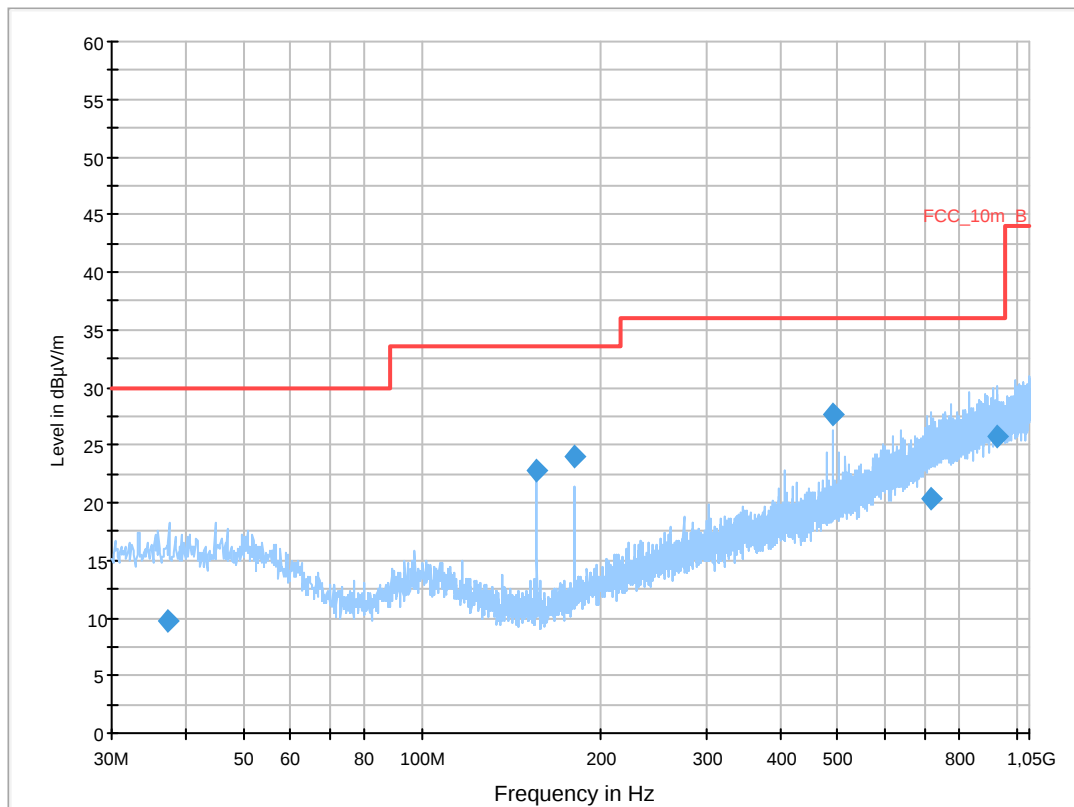
Plots: DSSS, antenna port B, BPSK**Plot 1:** Middle channel, 30 MHz to 1 GHz, vertical & horizontal polarization**Common Information**

Test Description: FCC part 15 class B
 Operating Conditions: tx @2438MHz Ant. B
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

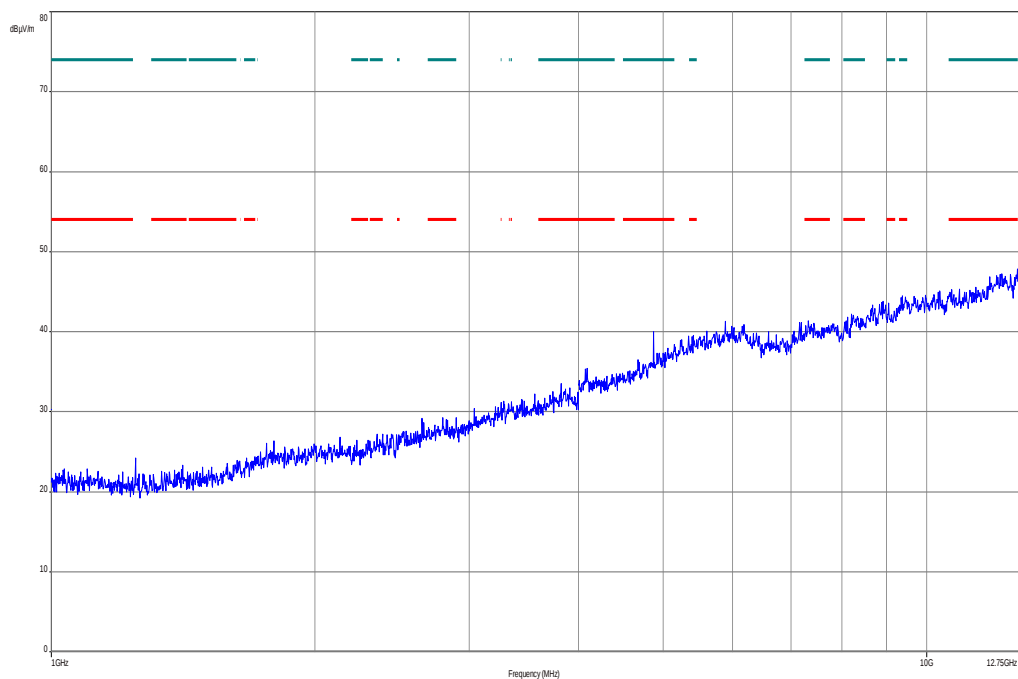
Hardware Setup: Electric Field (NOS)
 Receiver: [ESC1 3]
 Level Unit: dB μ V/m

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

**Final Result 1**

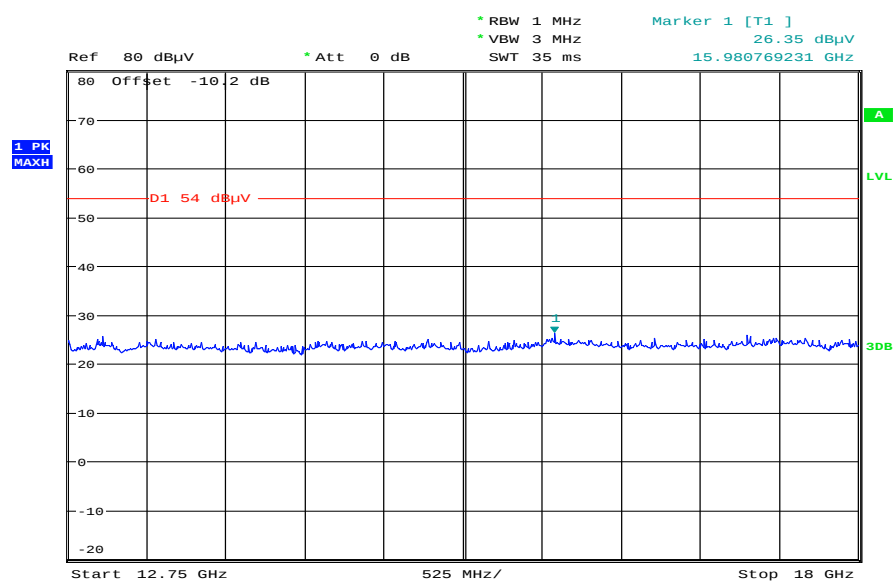
Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
37.308150	9.7	1000.0	120.000	120.0	H	190.0	13.2	20.3	30.0	
156.008400	22.8	1000.0	120.000	98.0	V	280.0	9.1	10.7	33.5	
180.050550	24.0	1000.0	120.000	105.0	V	280.0	10.4	9.5	33.5	
492.011100	27.7	1000.0	120.000	170.0	H	2.0	18.5	8.3	36.0	
719.347950	20.3	1000.0	120.000	143.0	H	10.0	23.0	15.7	36.0	
927.441750	25.8	1000.0	120.000	170.0	V	92.0	25.3	10.2	36.0	

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



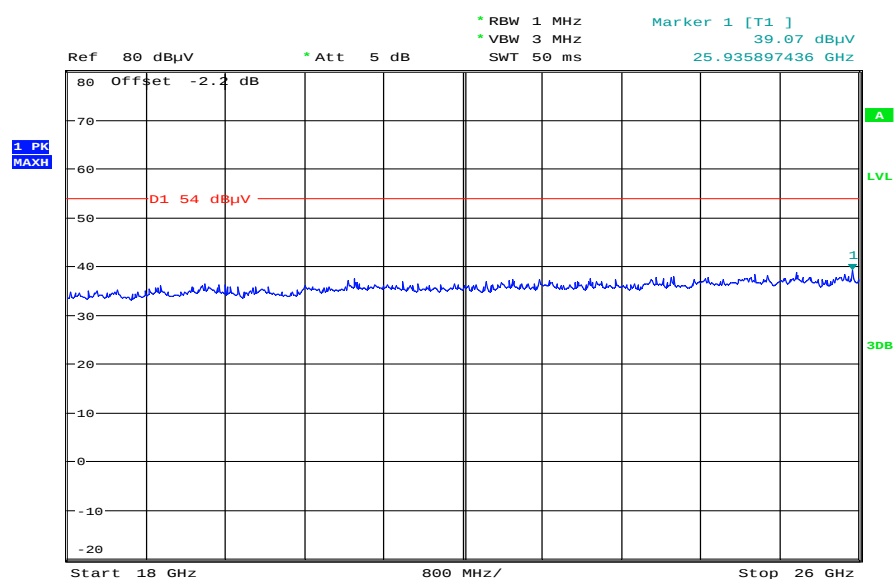
The carrier signal is notched with a 2.4 GHz band rejection filter.

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



Date: 24.OCT.2013 14:21:06

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



Date: 24.OCT.2013 14:37:51

9.10 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 (dB μ V/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 [dB μ V/m]		
F [MHz]	Detector	Level [dB μ V/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.

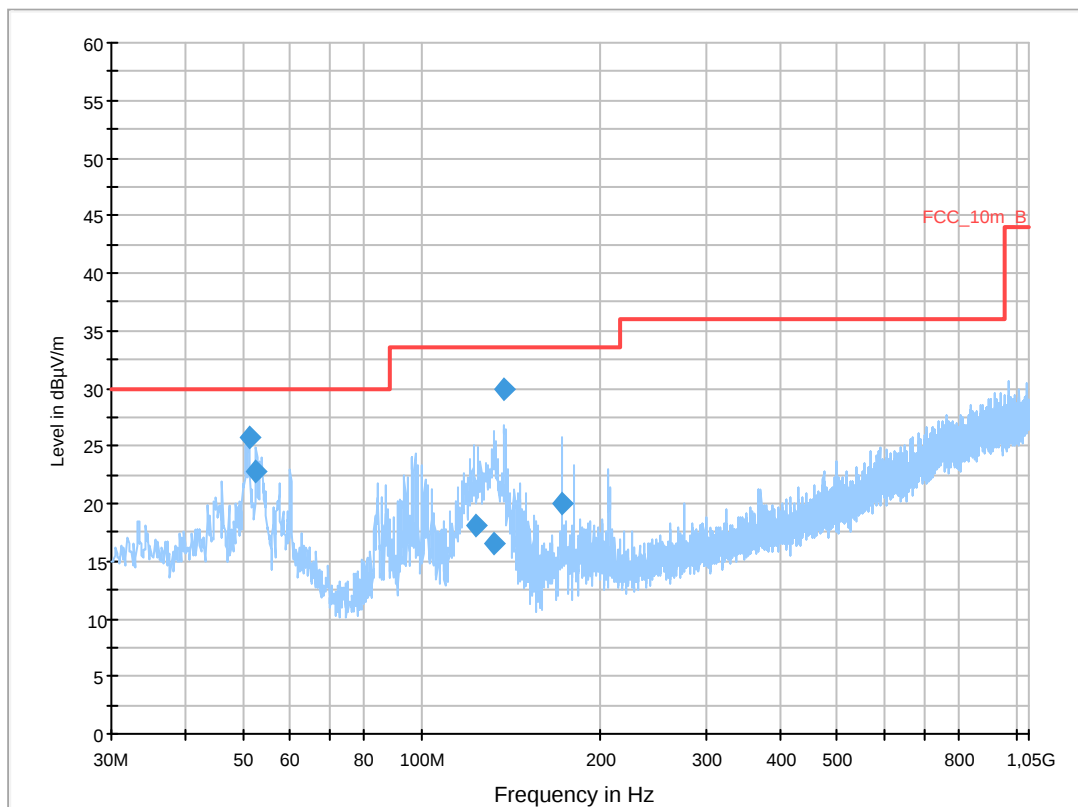
Plots: RX / Idle – mode**Plot 1:** 30 MHz to 1 GHz, vertical & horizontal polarization**Common Information**

EUT: Quinta MU 3x (Revoluto)
 Serial Number: 00001
 Test Description: FCC part 15 C class B @ 10 m
 Operating Conditions: RX + charging
 Operator Name: Wolsdorfer
 Comment: AC 115V / 60Hz

Scan Setup: STAN_Fin [EMI radiated]

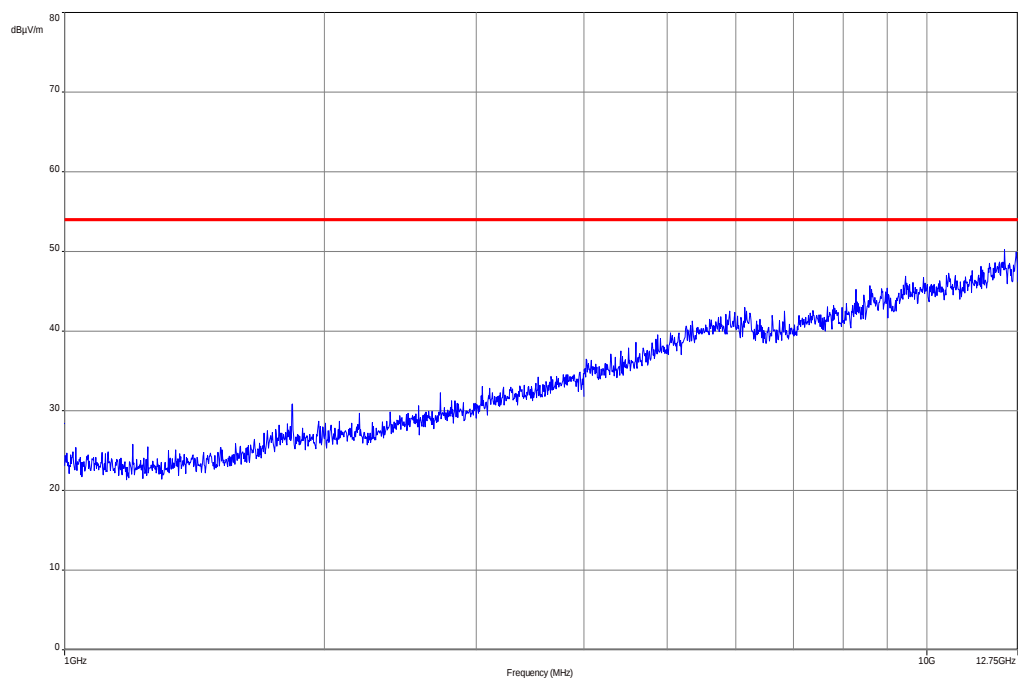
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

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

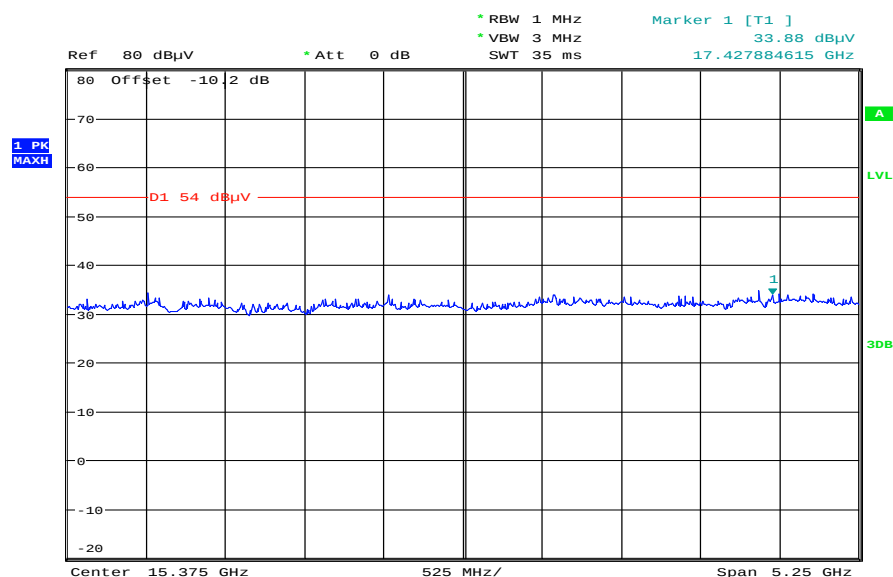
**Final Result 1**

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
51.228300	25.8	1000.0	120.000	98.0	V	190.0	13.2	4.2	30.0	
52.572300	22.9	1000.0	120.000	98.0	V	-10.0	13.1	7.1	30.0	
122.922150	18.0	1000.0	120.000	170.0	V	92.0	10.0	15.5	33.5	
131.873400	16.4	1000.0	120.000	111.0	V	100.0	9.3	17.1	33.5	
137.539800	29.8	1000.0	120.000	170.0	V	81.0	8.8	3.7	33.5	
171.898200	20.1	1000.0	120.000	111.0	V	182.0	9.9	13.4	33.5	

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

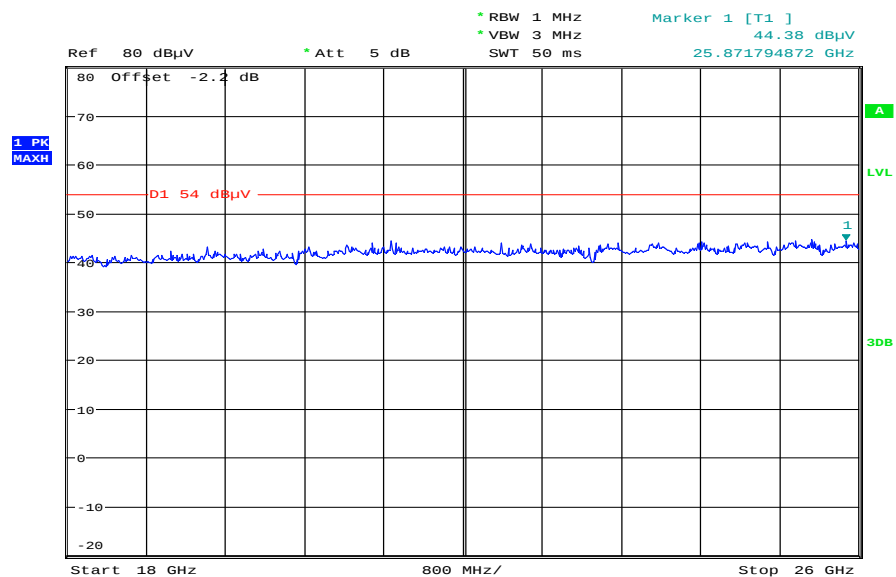


Plot 3: 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 16.MAY.2013 13:21:20

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



Date: 16.MAY.2013 13:19:25

9.11 Spurious emissions radiated < 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to mid channel. This measurement is representative for all channels and modes. If peaks are found the low channel and high channel 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

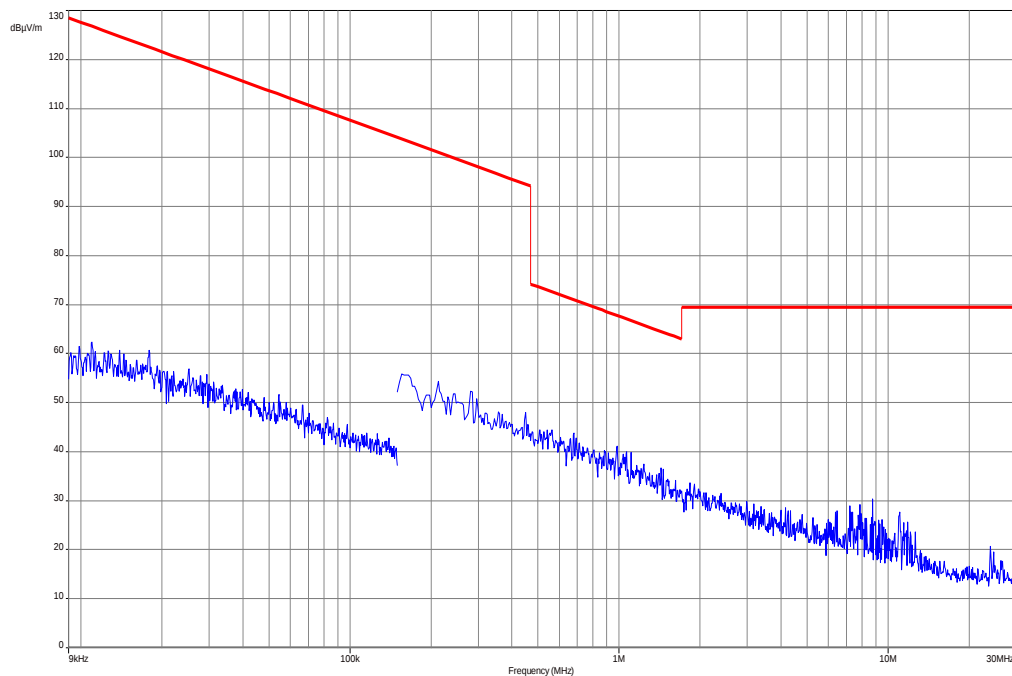
Results:

TX Spurious Emissions Radiated < 30 MHz [dBμV/m]		
F [MHz]	Detector	Level [dBμV/m]
All detected peak values are below the average limits.		
Measurement uncertainty	± 3 dB	

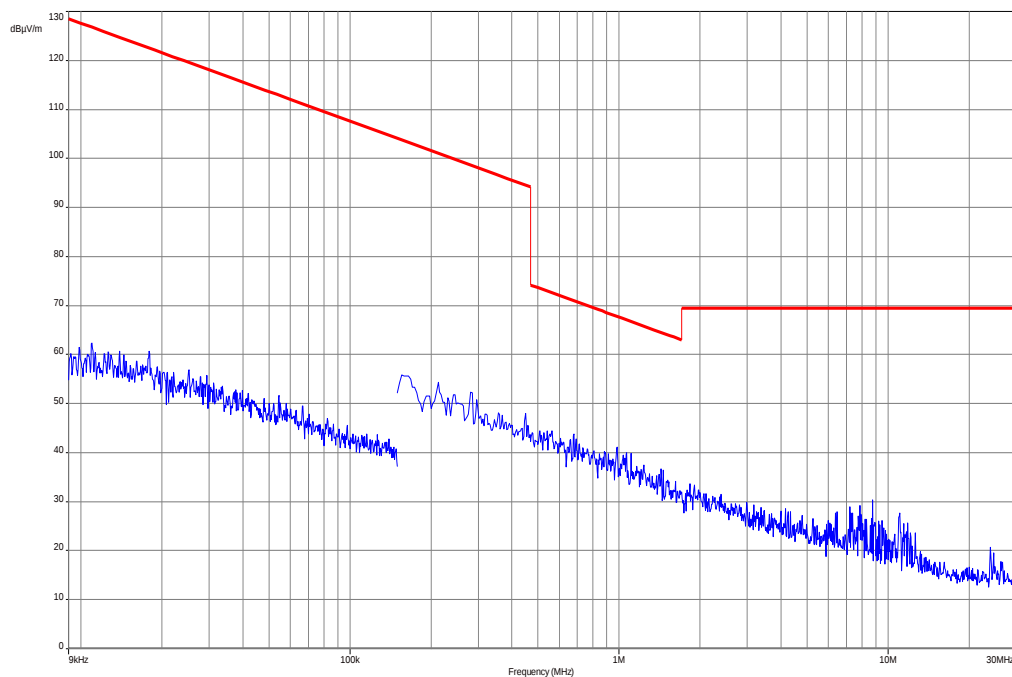
Result: Passed

Plots: TX mode

Plot 1: 9 kHz to 30 MHz, BPSK

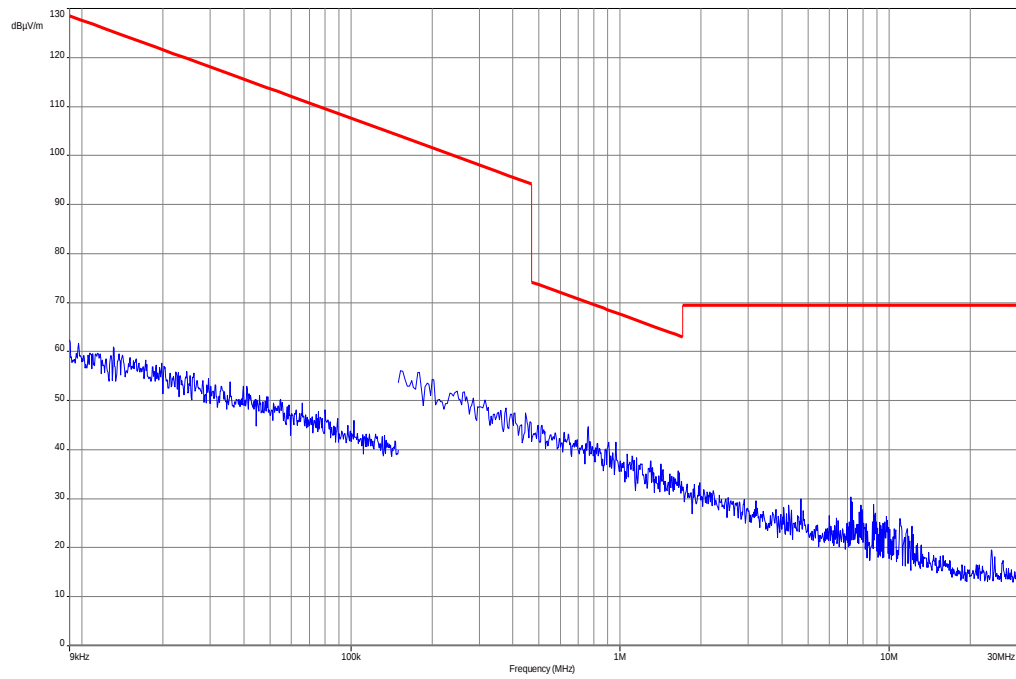


Plot 2: 9 kHz to 30 MHz, QPSK



Plots: RX / Idle – mode

Plot 1: 9 kHz to 30 MHz



9.12 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

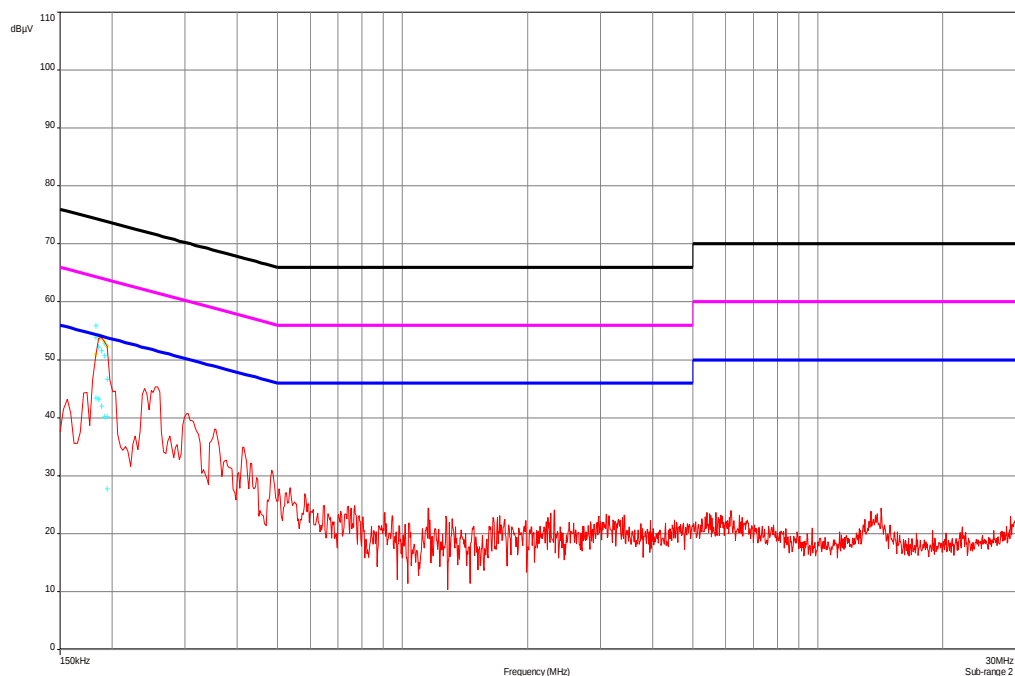
Results:

TX Spurious Emissions Conducted < 30 MHz [dBμV/m]		
F [MHz]	Detector	Level [dBμV/m]
All detected peak values are below the average limits.		
Measurement uncertainty	± 3 dB	

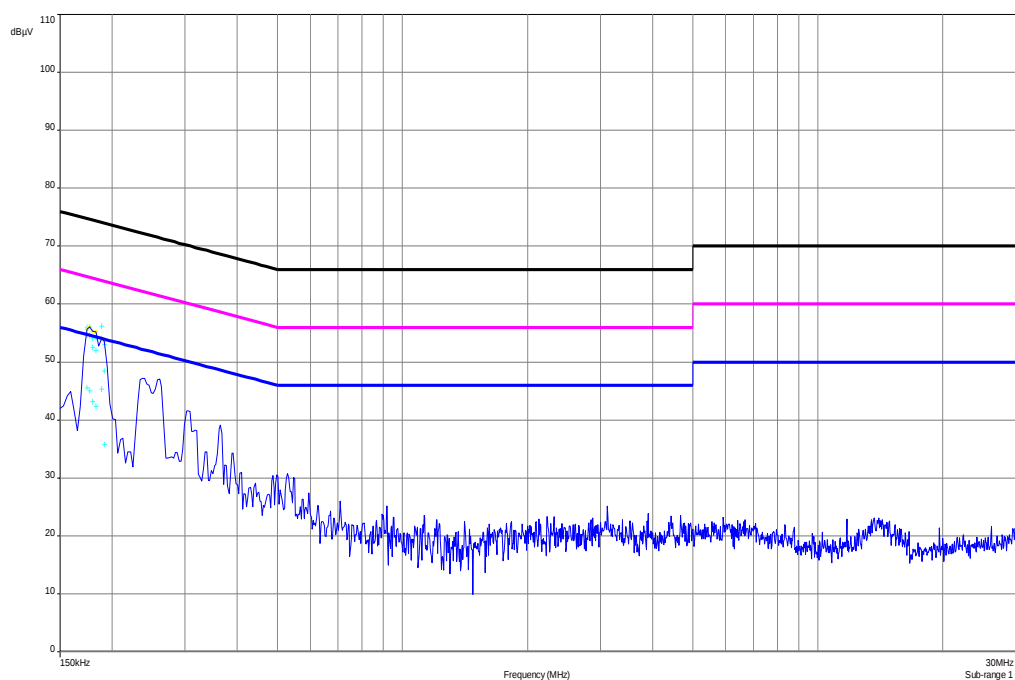
Result: Passed

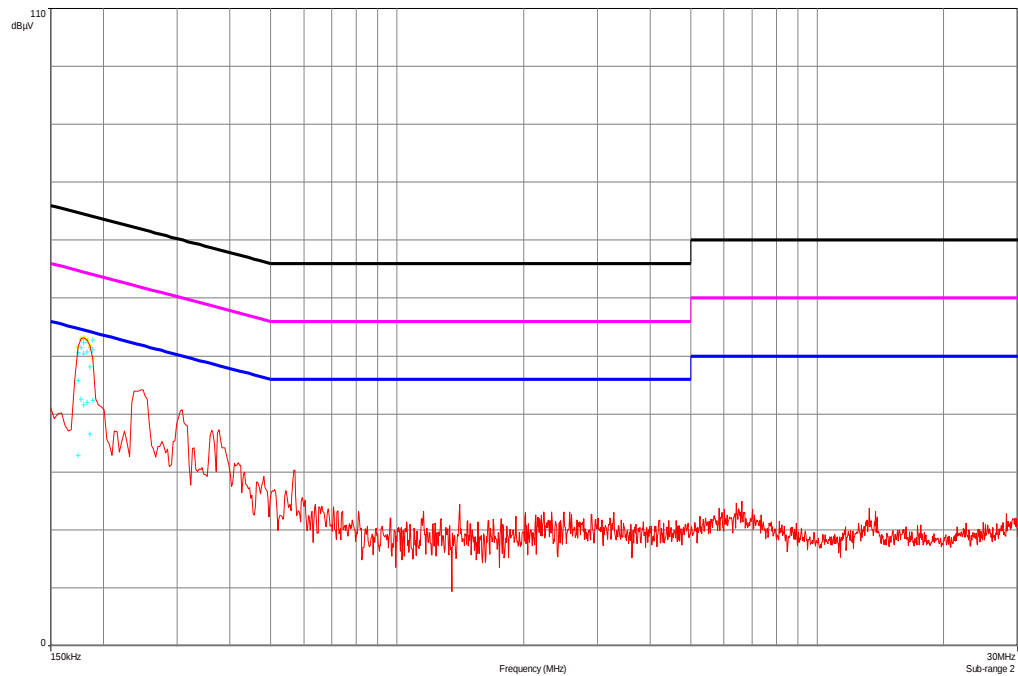
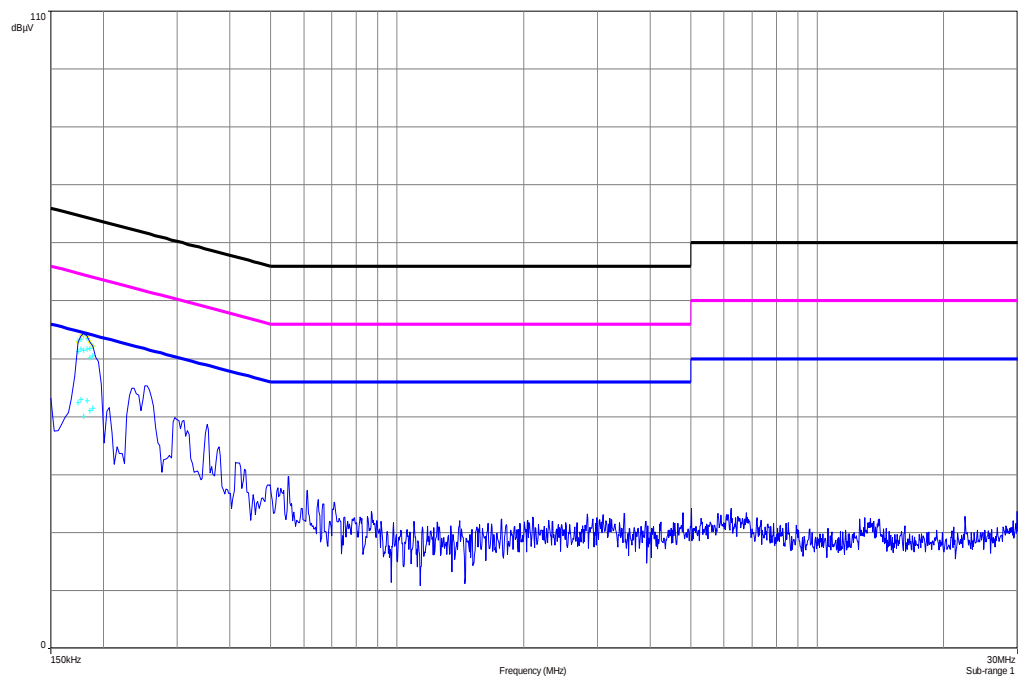
Plots:

Plot 1: TX mode, 150 kHz to 30 MHz, phase line (valid for both modulations)



Plot 2: TX mode, 150 kHz to 30 MHz, neutral line (valid for both modulations)



Plot 3: RX / Idle – mode, 150 kHz to 30 MHz, phase line**Plot 4:** RX / Idle – mode, 150 kHz to 30 MHz, neutral line

10 Test equipment and ancillaries used for tests

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

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

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
2	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
3	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081; B5979	300000210	ne		
4	n. a.	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	09.01.2013	09.01.2014
5	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	14.07.2011	14.07.2013
6	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
7	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
8	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
9	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
10	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	12.04.2012	12.04.2014
11	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	16.01.2013	16.01.2014
12	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	12.01.2012	12.01.2015
13	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	08.05.2013	08.05.2015
14	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
15	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
16	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	*	300000199	ne		
17	n. a.	Switch / Control Unit	3488A	HP Meßtechnik	2719A15013	300001156	ne		
18	9	Isolating Transformer	MPL IEC625 Bus Regeltrennt ravo	Erfi	91350	300001155	ne		
19	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
20	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
21	n. a.	Band Reject filter	WRCG240 0/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
22	n. a.	TRILOG Broadband Test-Antenna	VULB9163	Schwarzbeck	371	300003854	vIKI!	14.10.2011	14.10.2014

		30 MHz - 3 GHz							
23	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	21.02.2013	21.02.2014
24	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
25	A025	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda		300000786	ne		
26	A027	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300000486	ne		
27	n. a.	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.10.2012	22.10.2013
28	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
 ne not required (k, ev, izw, zw not required)
 ev periodic self verification
 Ve long-term stability recognized
 vki! Attention: extended calibration interval
 NK! Attention: not calibrated

EK limited calibration
 zw cyclical maintenance (external cyclical maintenance)
 izw internal cyclical maintenance
 g blocked for accredited testing
 *) next calibration ordered / currently in progress

11 Observations

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

Annex A Document history

Version	Applied changes	Date of release
1.0	Initial release	2013-05-17
A	RSP100 changed	2013-06-17
B	Additional modulation added	2013-10-28

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



Deutsche Akkreditierungsstelle GmbH

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

Akkreditierung



Die Deutsche Akkreditierungsstelle GmbH bestätigt hiermit, dass das Prüflaboratorium

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

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

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

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

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

Frankfurt am Main, 18.01.2013
Seite 11 von 11 auf der Rückseite

Impfstr.
Dilling, (FH) J. Eigner
Abteilungsleiter

Back side of certificate

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Standort Berlin
Spittelmarkt 10
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38116 Braunschweig

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

Es darf nicht der Anschein erweckt werden, dass sich die Akkreditierung auch auf Bereiche erstreckt, die über den durch die DAKS 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 (Abt. L 218 vom 9. Juli 2008, S. 30). Die DAKS 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>