



TEST REPORT

Test report no.: 1-4254/12-16-10-A



Testing laboratory

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Accredited Testing Laboratory:

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

Applicant

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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
 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: GSM Mobile Phone GPRS/EGPRS 850/900/1800/1900; UMTS FDDI/FDDII/FDDIV/FDDV; HSPA; LTE Band 2/4/5/17; BT3.1; WLAN a/b/g/n; AGPS; RFID, FM Rx
Model name: PM-0140-BV
FCC ID: PY7PM-0140
IC: 4170B-PM0140
Frequency: ISM 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 & n HT20 – mode)
Antenna: Integrated antenna
Power Supply: 3.7 V DC by Li - polymer
Temperature Range: -20°C to +55 °C

Test report authorised:

2012-08-30 Stefan Bös
 Senior Testing Manager

Test performed:

2012-08-30 Marco Bertolino
 Testing Manager

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2 General information

2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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In no case this test report can be considered as a Letter of Approval.

2.2 Application details

Date of receipt of order:	2012-03-14
Date of receipt of test item:	2012-06-25
Start of test:	2012-06-28
End of test:	2012-07-09
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 15	2010-10	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	2012-01	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}	+55 °C during high temperature tests
	T_{min}	-20 °C during low temperature tests
Relative humidity content:		56 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	3.7 V DC by Li - polymer
	V_{max}	4.2 V
	V_{min}	3.3 V

5 Test item

Kind of test item	:	GSM Mobile Phone GPRS/EGPRS 850/900/1800/1900; UMTS FDDI/FDDII/FDDIV/FDDV; HSPA; LTE Band 2/4/5/17; BT3.1; WLAN a/b/g/n; AGPS; RFID, FM Rx
Type identification	:	PM-0140-BV
S/N serial number	:	Radiated units: CB511Z7M8J, CB511Z7M8M Conducted units: CB511Z7M6M, CB511Z7MKT
HW hardware status	:	AP1.2
SW software status	:	7.0.A.1.68 7.0.B.0.102
Frequency band [MHz]	:	ISM band 2400 MHz to 2483.5 MHz (lowest channel 01 – 2412 MHz, highest channel 11 – 2462 MHz)
Type of radio transmission	:	DSSS & OFDM
Use of frequency spectrum	:	
Channel access method	:	FDMA
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
Temperature range	:	-20°C to +55 °C

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	2012-08-30	-/-

Test specification clause	Test case	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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(e) RSS 210 / A8.2(b)	Power spectral density	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth - 6dB bandwidth	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth - 20dB bandwidth	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(b)(3) RSS-210 / A8.4(4)	Maximum output power	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.205 RSS-210 / A8.5	Band edge compliance radiated	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.109 RSS-Gen	RX spurious emissions radiated	Nominal	Nominal	-/-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.209(a) RSS-Gen	TX spurious emissions radiated < 30 MHz	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies
§15.107(a)	Conducted emissions < 30 MHz	Nominal	Nominal	DSSS OFDM g & n	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	complies

Note: NA = Not Applicable; NP = Not Performed

8 RF measurements

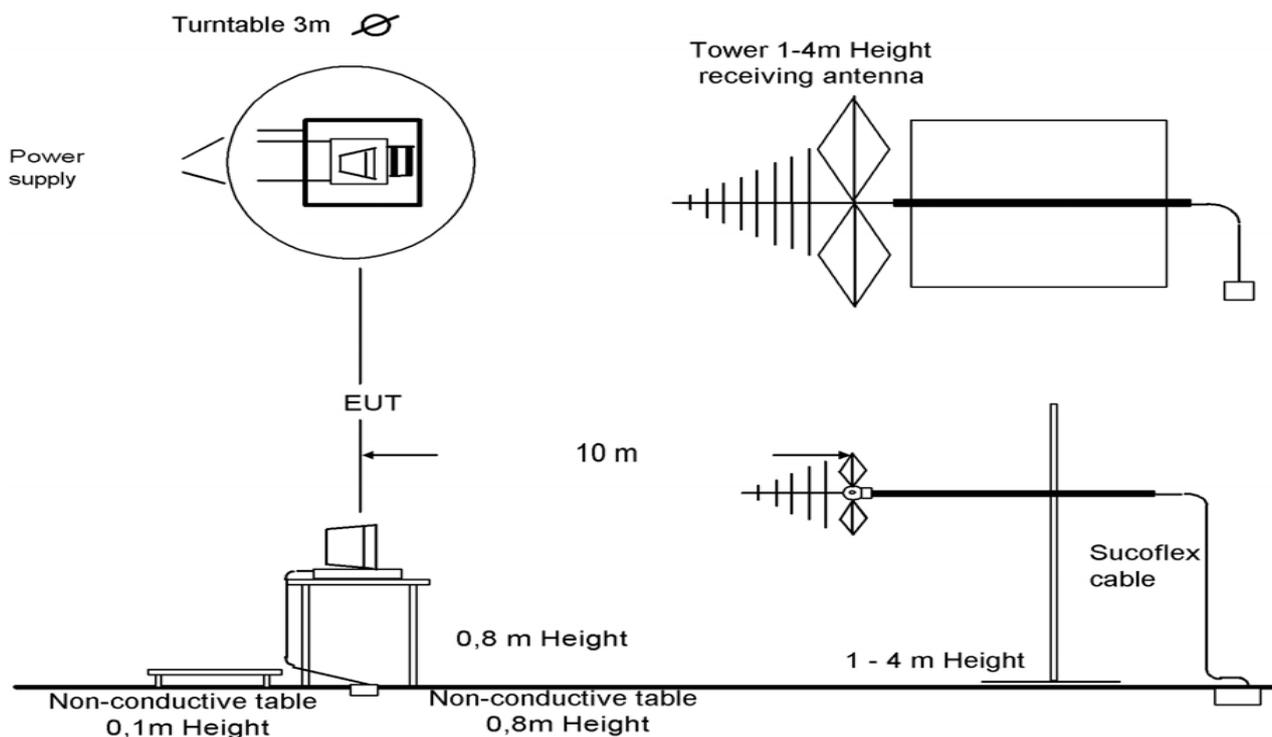
8.1 Description of test setup

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. The receiving antennas are confirmed with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2009 clause 4.1.5. 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 C63-4-2009 clause 4.2.

Antennas are confirmed with ANSI C63.2-1996 item 15.

Semi anechoic chamber



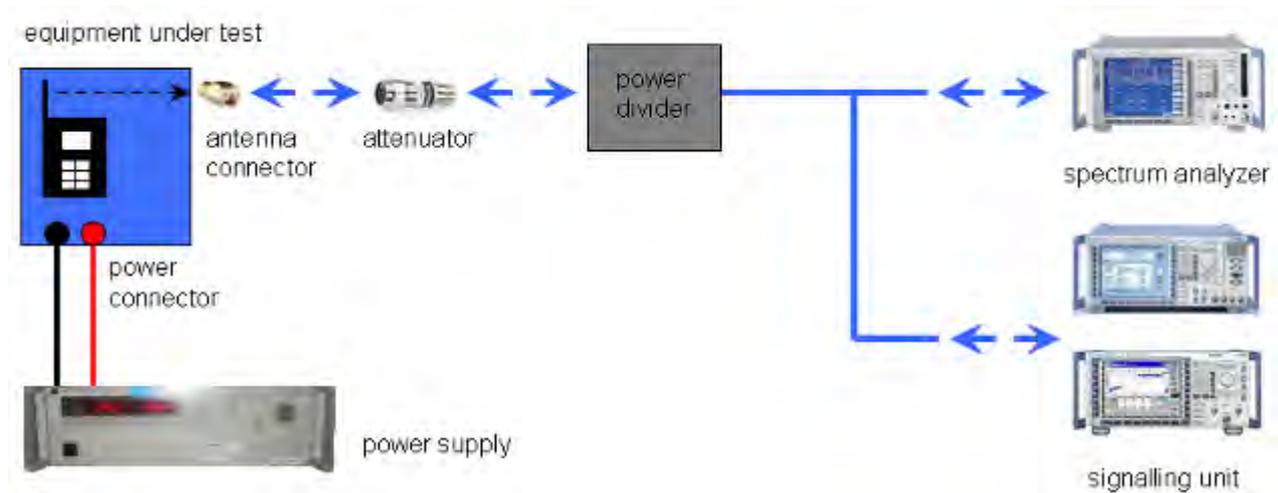
Picture 1: Diagram radiated measurements

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: None

Special test descriptions: None

Configuration descriptions: None

- Test mode:
- No test mode available.
lperf 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	:	1-4254/12-16-10-A
Equipment model number	:	PM-0140-BV
Certification number	:	4170B-PM0140
Manufacturer (complete address)	:	Sony Mobile Communications AB Nya Vattentorget 22188 Lund / SWEDEN
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 (lowest channel 01 – 2412 MHz, highest channel 11 – 2462 MHz)
RF-power (max.)	:	Conducted output power: 131.22 mW (DSSS / b – mode) 204.17 mW (OFDM / g – mode) 177.42 mW (OFDM / n – mode) Radiated output power: 138.68 mW (DSSS / b – mode) 224.39 mW (OFDM / g – mode) 187.50 mW (OFDM / n – mode)
Occupied bandwidth (99%-BW)	:	DSSS / b – mode: 13.70 MHz OFDM / g – mode: 18.03 MHz OFDM / n – mode: 18.51 MHz
Type of modulation	:	DSSS & OFDM technology with BPSK, QPSK, 16 – and 64 – QAM modulation.
Emission designator (TRC-43)	:	13M7G1D (DSSS / b – mode) 18M0G7D (OFDM / g – mode) 18M5G7D (OFDM / n – mode)
Antenna information	:	Integrated antenna
Transmitter spurious (worst case) [dB μ V/m @ 3m]:		50 @ 12.5 GHz (noise floor) Peak
Receiver spurious (worst case) [dB μ V/m @ 3m]:		50 @ 12.5 GHz (noise floor) 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:

2012-08-30
Date

Marco Bertolino
Name


Signature

9 Measurement results

9.1 Output power verification (conducted)

Description:

Measurement of the maximum output power conducted. This measurement is performed only at the middle channel in both modes and all data rates to determine the data rate per mode which results in the highest output power. This mode will be selected for all further measurements.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	> EBW
Video bandwidth:	≥ 3 x RBW (or the maximum of the analyzer)
Span:	Zero span
Trace-Mode:	Max hold (allow trace to fully stabilize)

Results:

DSSS / b – mode Data Rate [MBit/s]	Maximum Output Power Conducted [dBm]			
	1	2	5.5	11
Ch 6 - 2437 MHz	21.17	21.18	20.99	21.00
Measurement uncertainty	± 0.5 dB			

OFDM / g – mode Data Rate [MBit/s]	Maximum Output Power Conducted [dBm]							
	6	9	12	18	24	36	48	54
Ch 6 - 2437 MHz	23.10	23.04	21.68	22.30	21.69	21.74	22.17	21.73
Measurement uncertainty	± 0.5 dB							

OFDM / n – mode Data Rate [MBit/s]	Maximum Output Power Conducted [dBm]							
	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Ch 6 - 2437 MHz	22.49	22.36	22.36	21.98	21.55	21.61	21.67	20.59
Measurement uncertainty	± 0.5 dB							

Result: Selected data rate for all measurements:

DSSS / b – mode:

OFDM / g – mode:

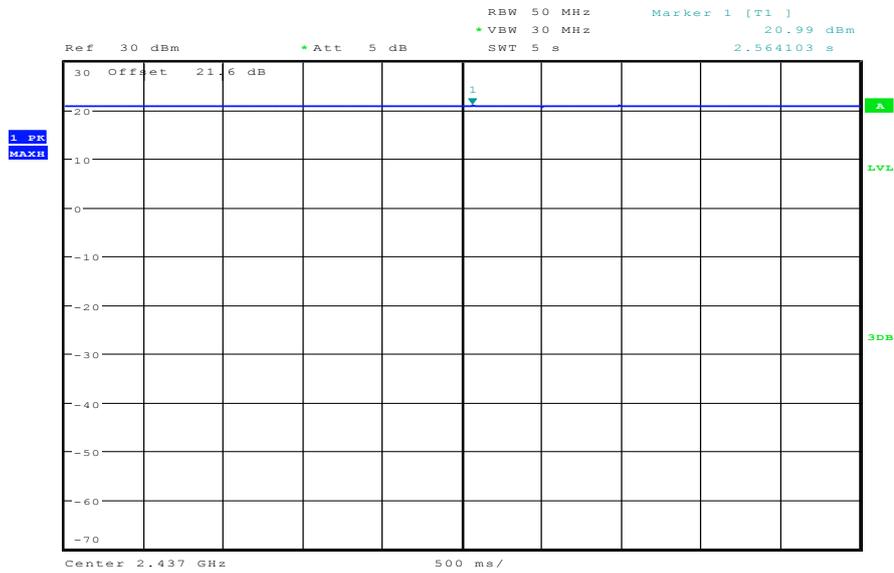
OFDM / n – mode:

2 MBit/s

6 MBit/s

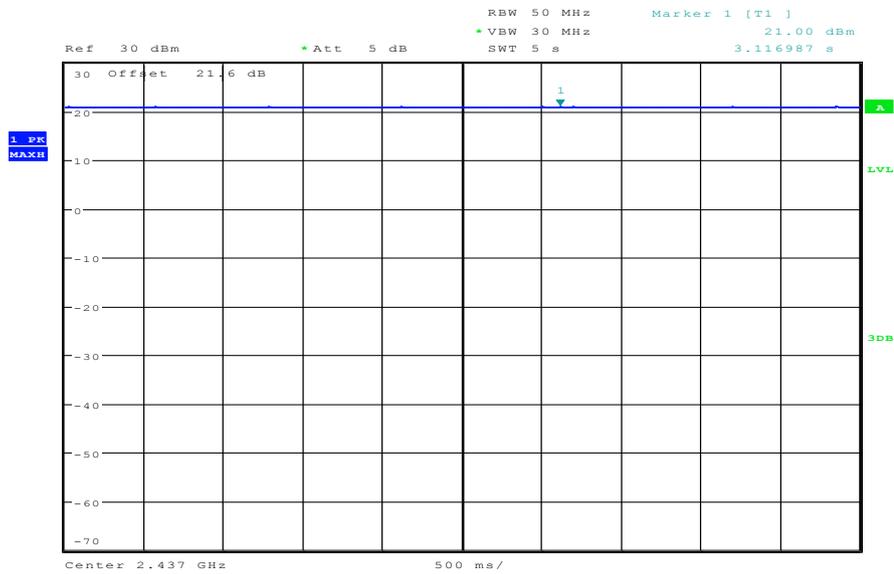
MCS0

Plot 3: TX mode, middle channel, 5.5 MBit/s



Date: 28.JUN.2012 15:54:26

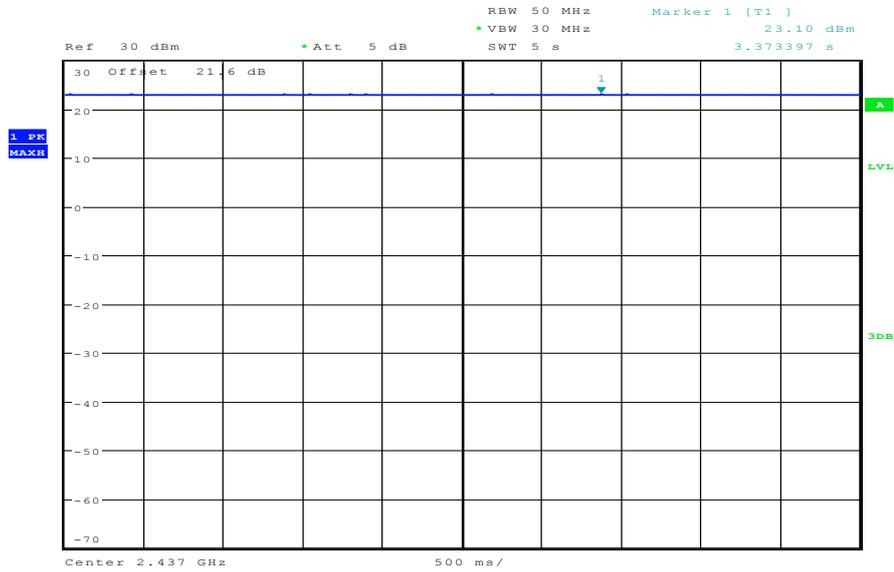
Plot 4: TX mode, middle channel, 11 MBit/s



Date: 28.JUN.2012 15:56:23

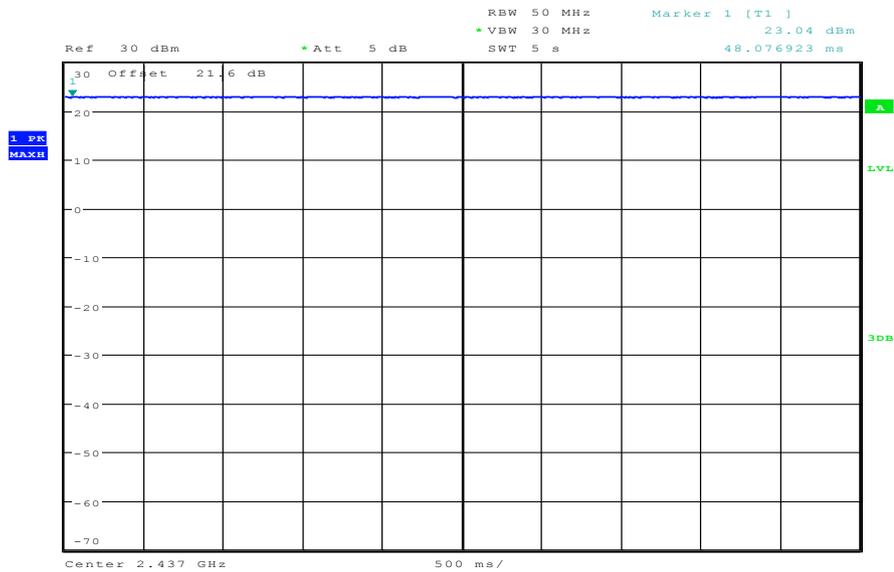
Plots: OFDM / g - mode

Plot 1: TX mode, middle channel, 6 MBit/s



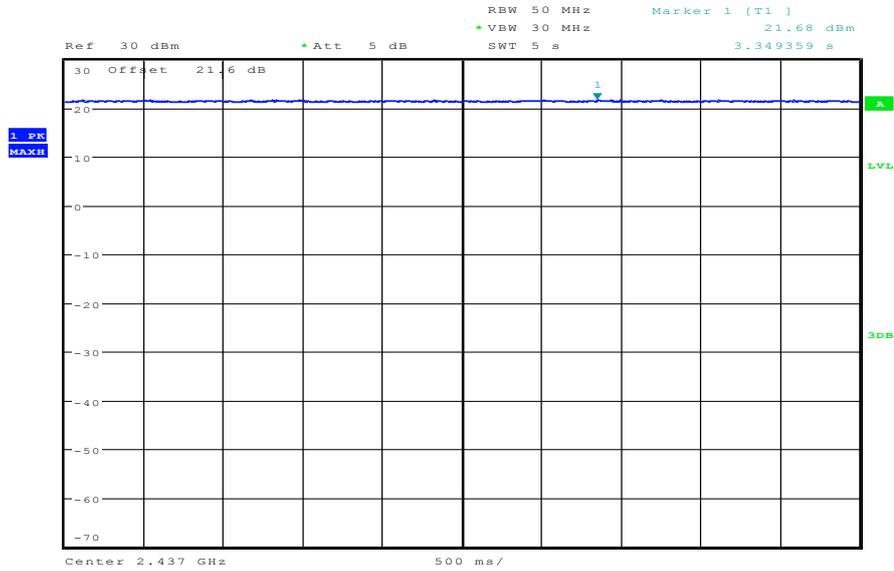
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Plot 2: TX mode, middle channel, 9 MBit/s



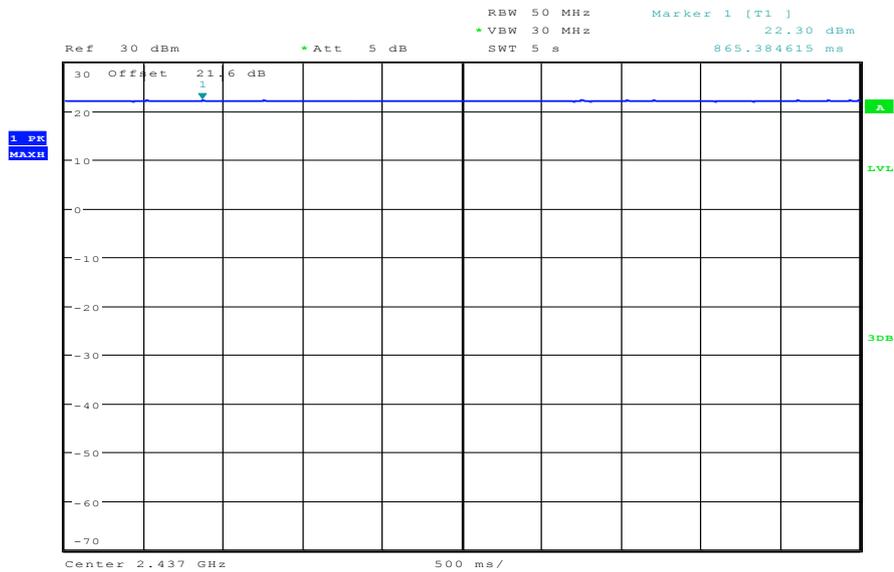
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Plot 3: TX mode, middle channel, 12 MBit/s



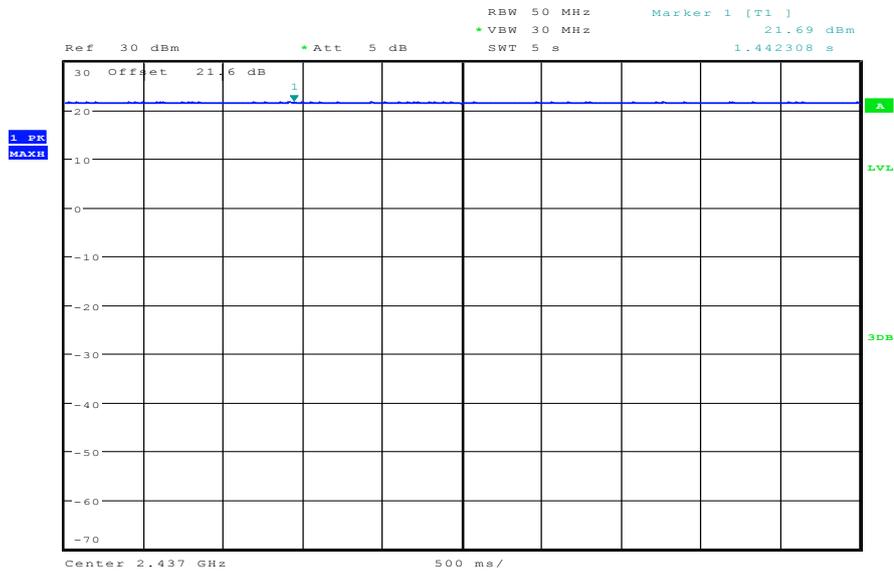
Date: 29.JUN.2012 07:02:21

Plot 4: TX mode, middle channel, 18 MBit/s



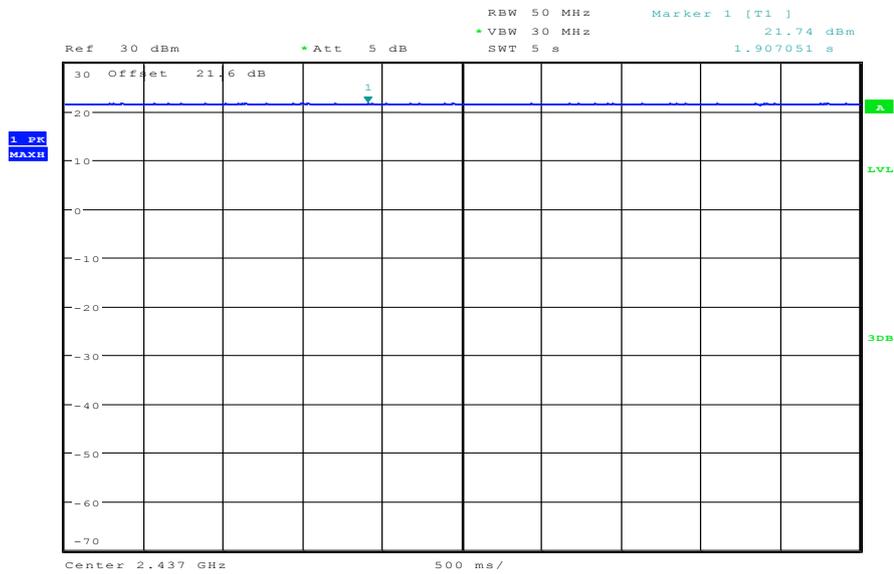
Date: 29.JUN.2012 07:04:22

Plot 5: TX mode, middle channel, 24 MBit/s



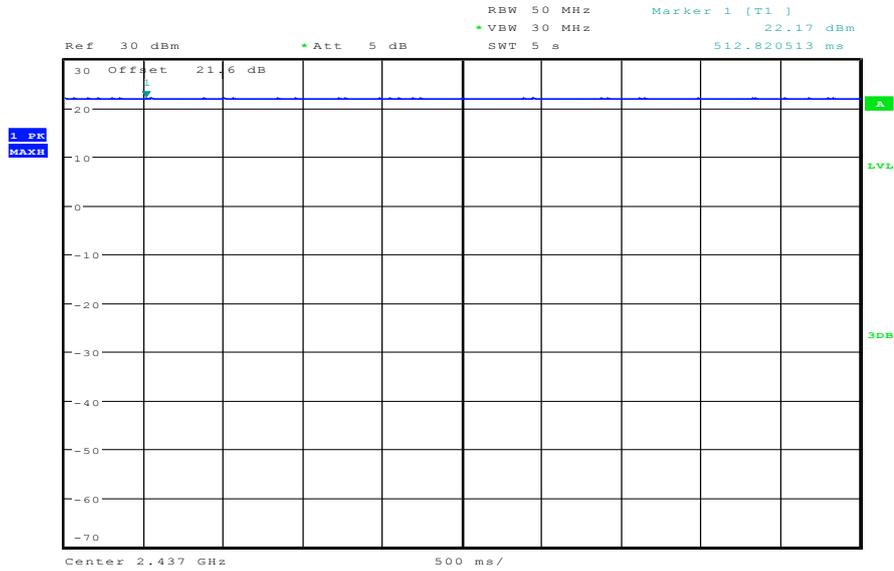
Date: 29.JUN.2012 07:06:12

Plot 6: TX mode, middle channel, 36 MBit/s



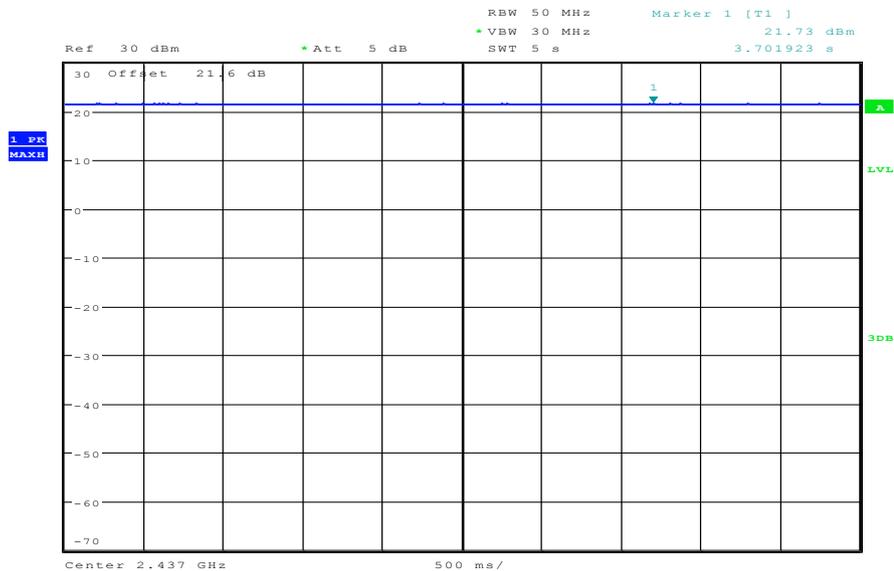
Date: 29.JUN.2012 07:08:04

Plot 7: TX mode, middle channel, 48 MBit/s



Date: 29.JUN.2012 07:09:57

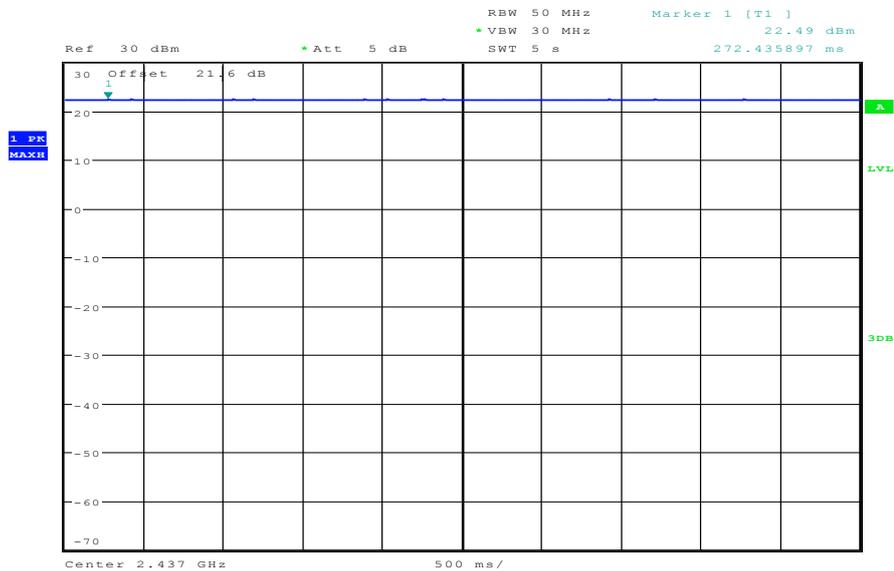
Plot 8: TX mode, middle channel, 54 MBit/s



Date: 29.JUN.2012 07:11:22

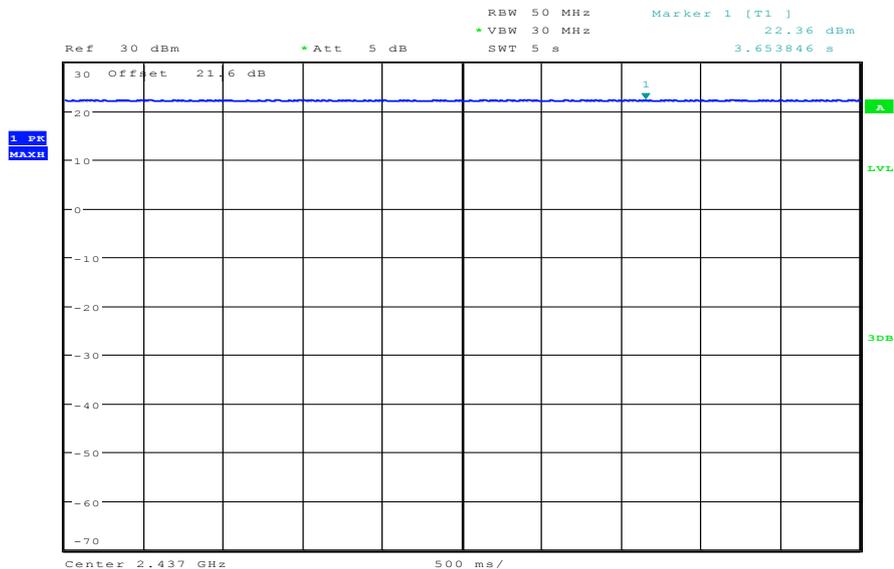
Plots: OFDM / n - mode

Plot 1: TX mode, middle channel, MCS0



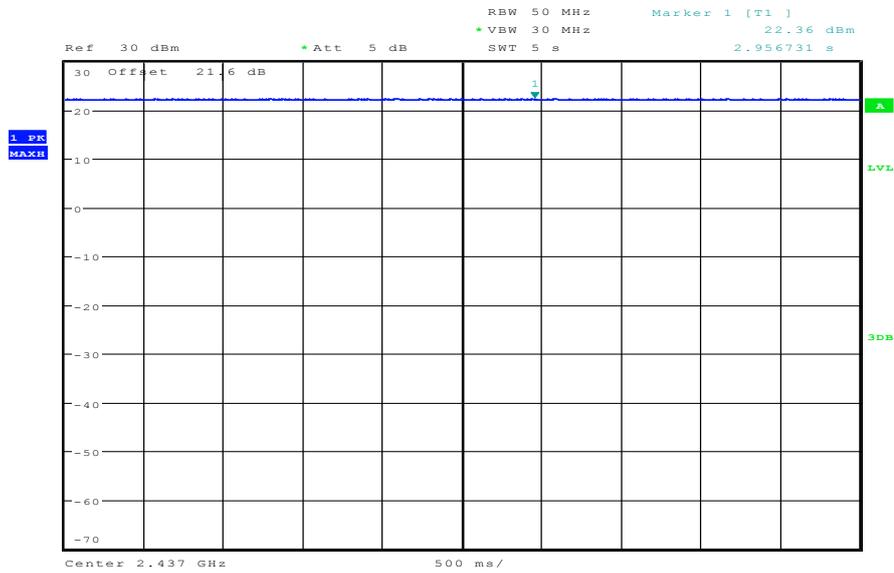
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Plot 2: TX mode, middle channel, MCS1



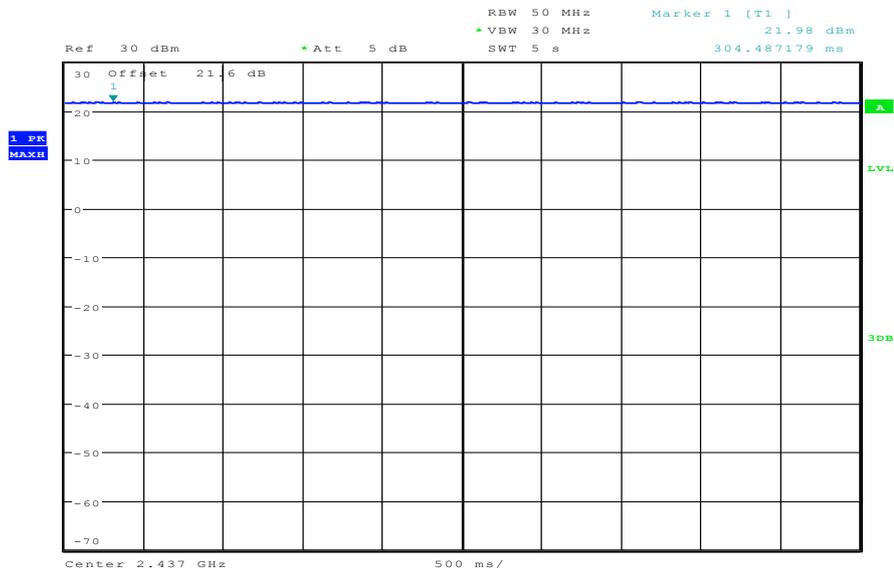
Date: 29.JUN.2012 07:28:01

Plot 3: TX mode, middle channel, MCS2



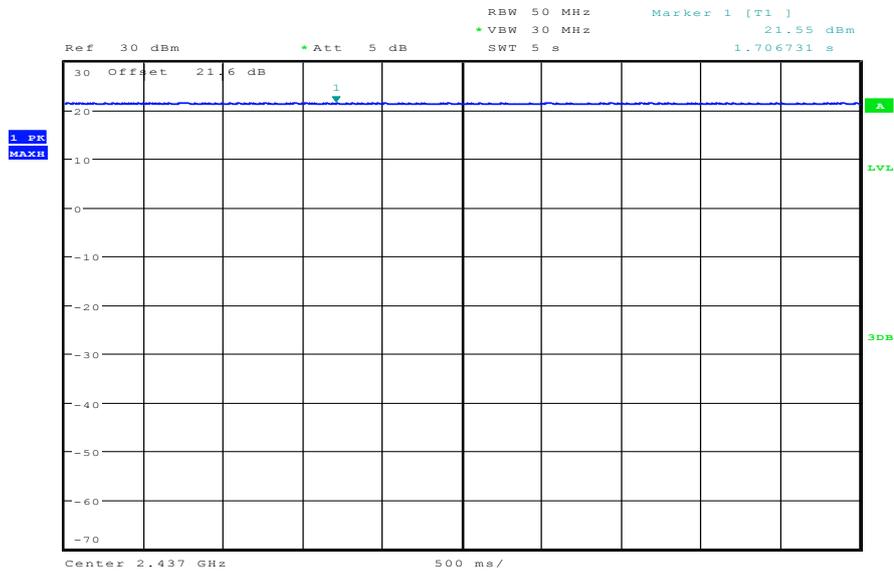
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Plot 4: TX mode, middle channel, MCS3



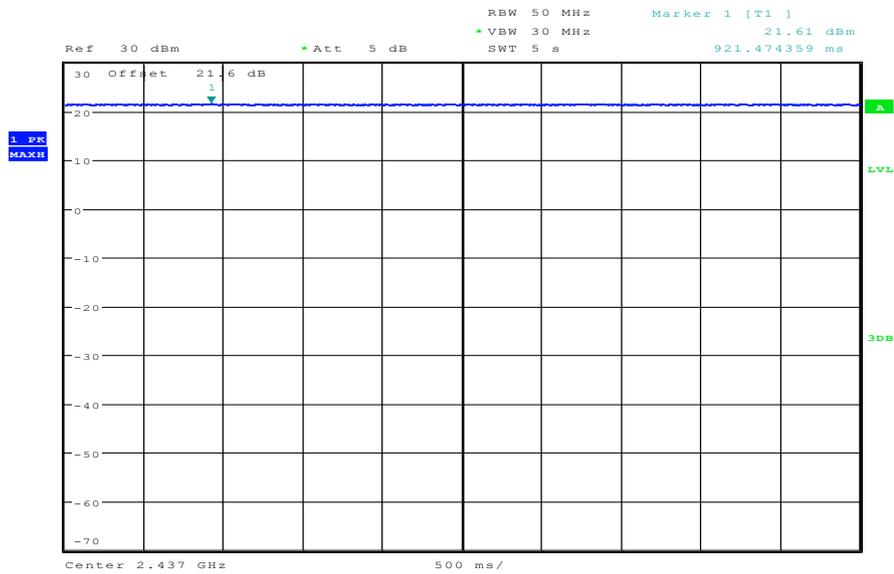
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Plot 5: TX mode, middle channel, MCS4



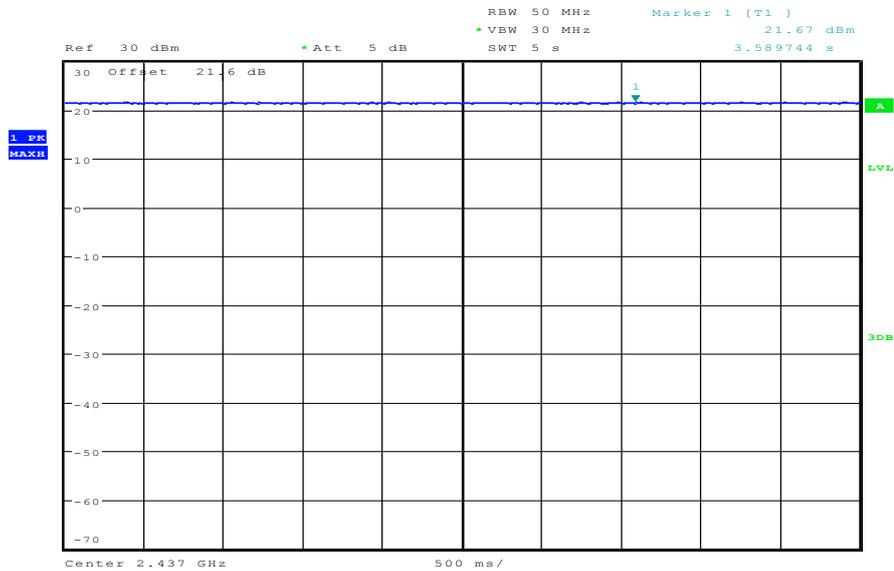
Date: 29.JUN.2012 07:37:06

Plot 6: TX mode, middle channel, MCS5



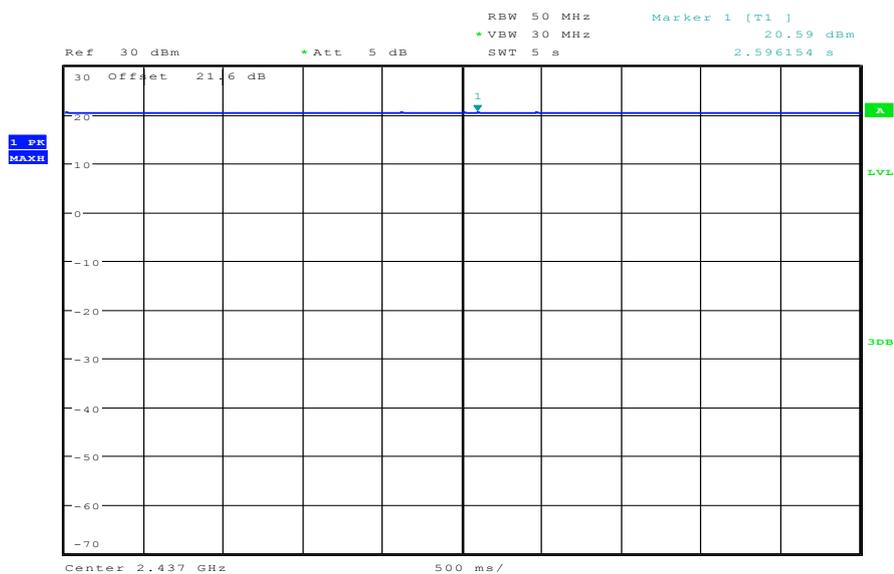
Date: 29.JUN.2012 07:38:29

Plot 7: TX mode, middle channel, MCS6



Date: 29.JUN.2012 07:39:51

Plot 8: TX mode, middle channel, MCS7



Date: 29.JUN.2012 07:41:47

9.2 Antenna gain

Measurement:

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

Measurement parameters:

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

Limits:

FCC	IC
Antenna Gain	
6 dBi	

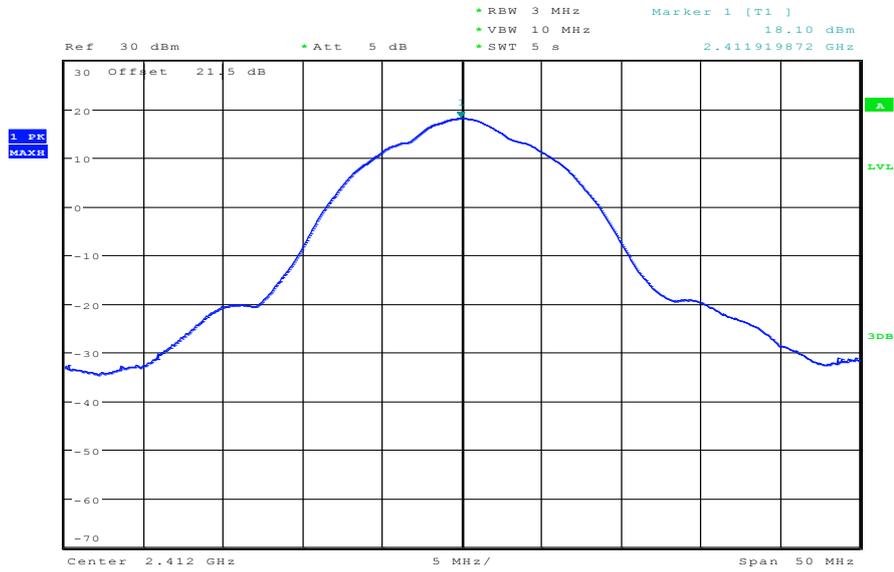
Results:

T _{nom}	V _{nom}	lowest channel 2412 MHz	middle channel 2437 MHz	highest channel 2462 MHz
Conducted power [dBm] Measured with DSSS modulation		18.10	18.07	18.06
Radiated power [dBm] Measured with DSSS modulation		19.29	18.31	16.66
Gain [dBi] Calculated		+1.19	+0.24	-1.40
Measurement uncertainty			± 1.5 dB (cond.) / ± 3 dB (rad.)	

Result: **Passed**

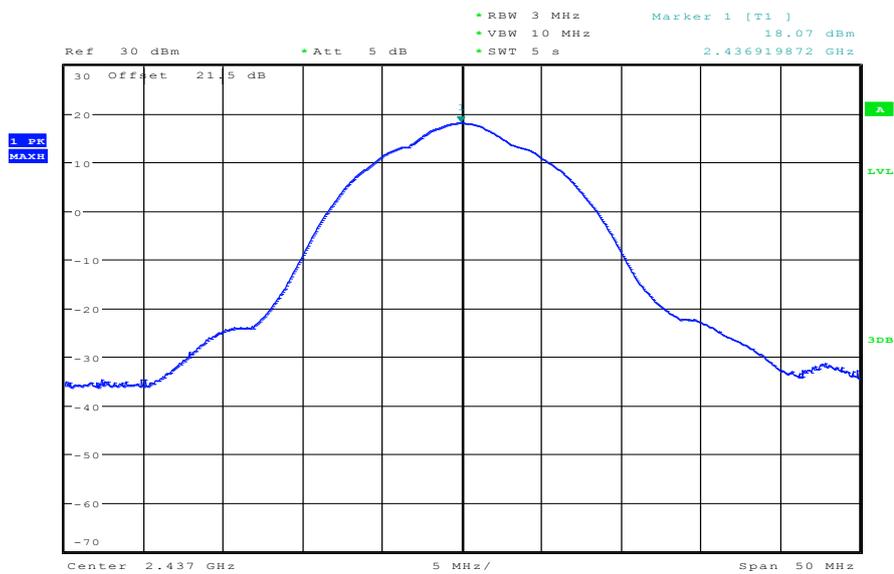
Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel



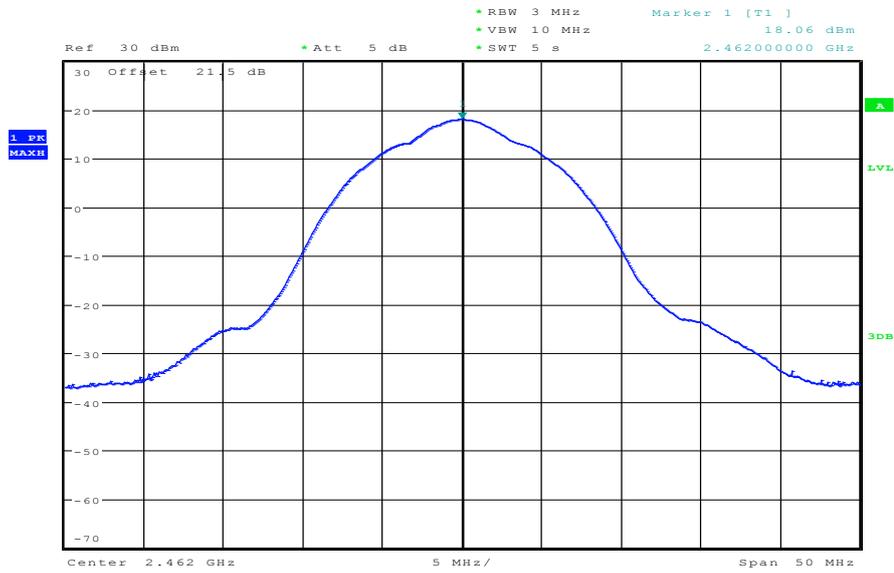
Date: 5.JUL.2012 08:03:18

Plot 2: TX mode, middle channel



Date: 5.JUL.2012 08:05:57

Plot 3: TX mode, highest channel



Date: 5.JUL.2012 08:16:35

9.3 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. The determination of these data rates was performed at the beginning of the tests.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	> EBW
Video bandwidth:	≥ 3 x RBW (or the maximum of the analyzer)
Span:	Zero span
Trace-Mode:	Max hold (allow trace to fully stabilize)

Limits:

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

Results: DSSS / b – mode

DSSS / b – mode Frequency	Maximum Output Power [dBm]		
	2412 MHz	2437 MHz	2462 MHz
Peak Output Power Conducted	20.03	21.18	20.39
Output Power Radiated – EIRP*)	21.22	21.42	18.99
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: Passed

Results: OFDM / g – mode

OFDM / g – mode Frequency	Maximum Output Power [dBm]		
	2412 MHz	2437 MHz	2462 MHz
Peak Output Power Conducted	22.32	23.10	22.92
Output Power Radiated – EIRP*)	23.51	23.34	21.52
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

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

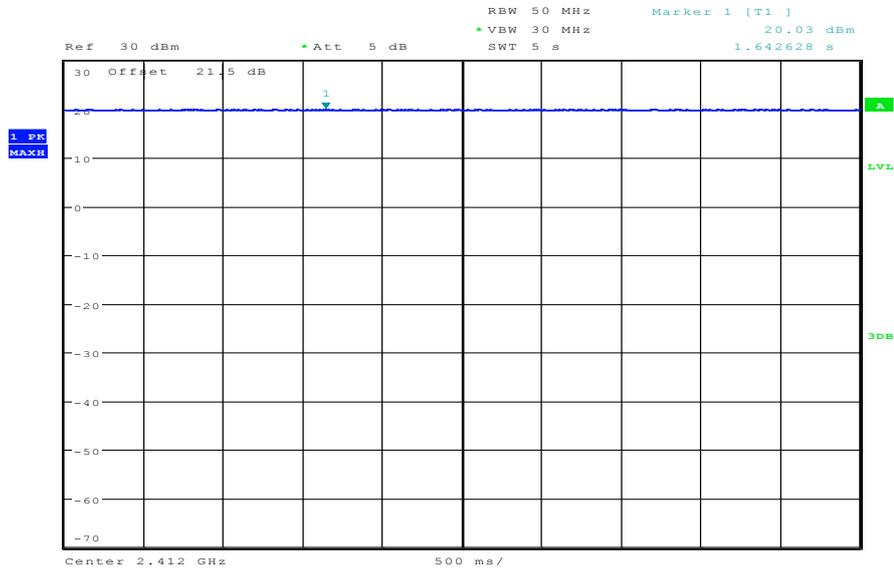
OFDM / n – mode Frequency	Maximum Output Power [dBm]		
	2412 MHz	2437 MHz	2462 MHz
Peak Output Power Conducted	21.30	22.49	22.06
Output Power Radiated – EIRP*)	22.49	22.73	20.66
Measurement uncertainty	± 1.5 dB (cond.) / ± 3 dB (rad.)		

*) calculated with Antenna gain

Result: Passed

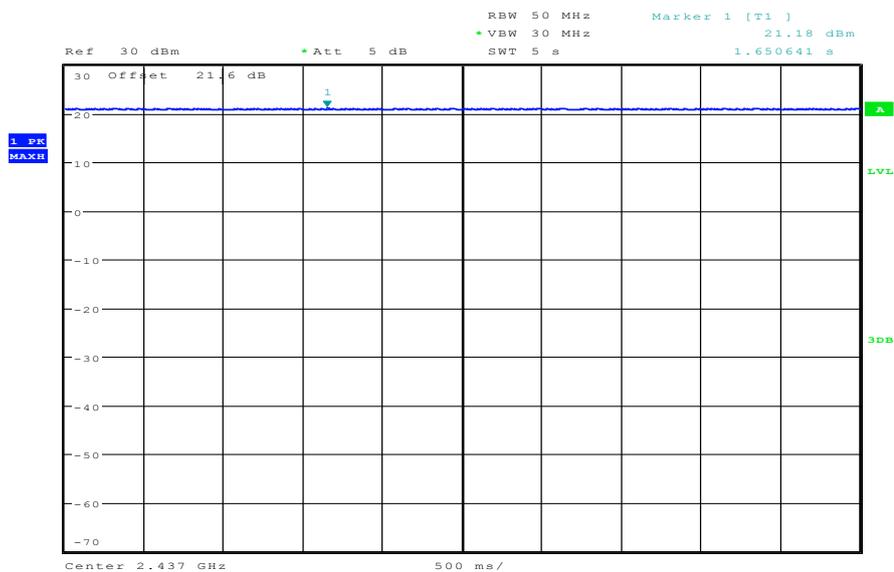
Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel



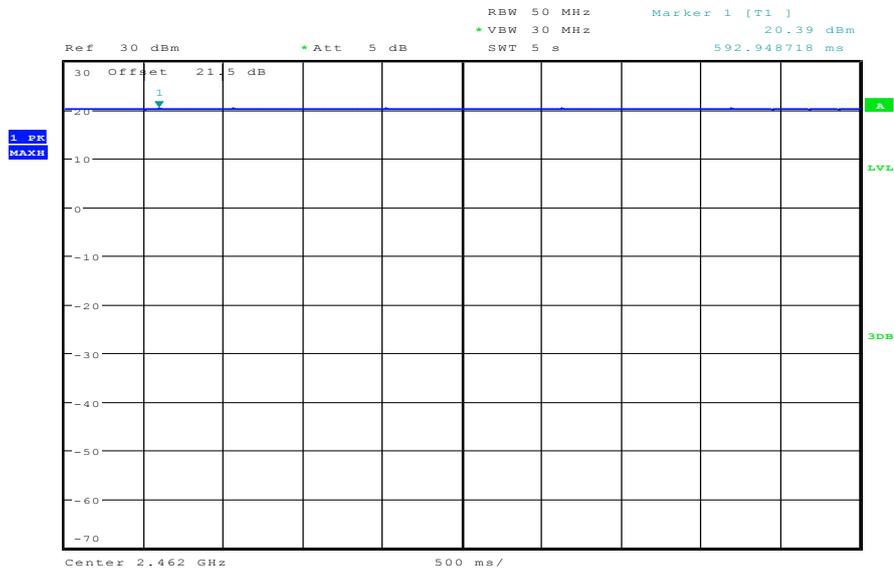
Date: 5.JUL.2012 08:56:42

Plot 2: TX mode, middle channel



Date: 28.JUN.2012 15:52:11

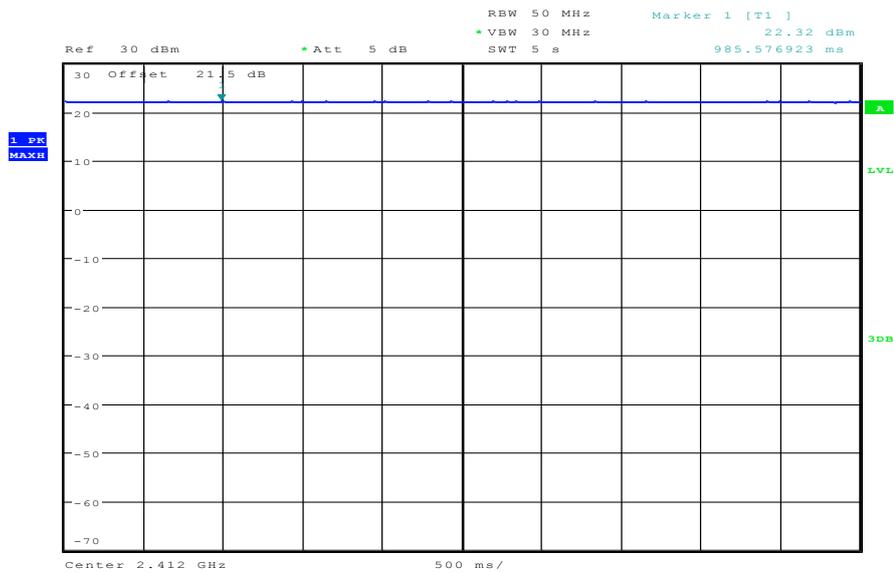
Plot 3: TX mode, highest channel



Date: 5.JUL.2012 08:58:06

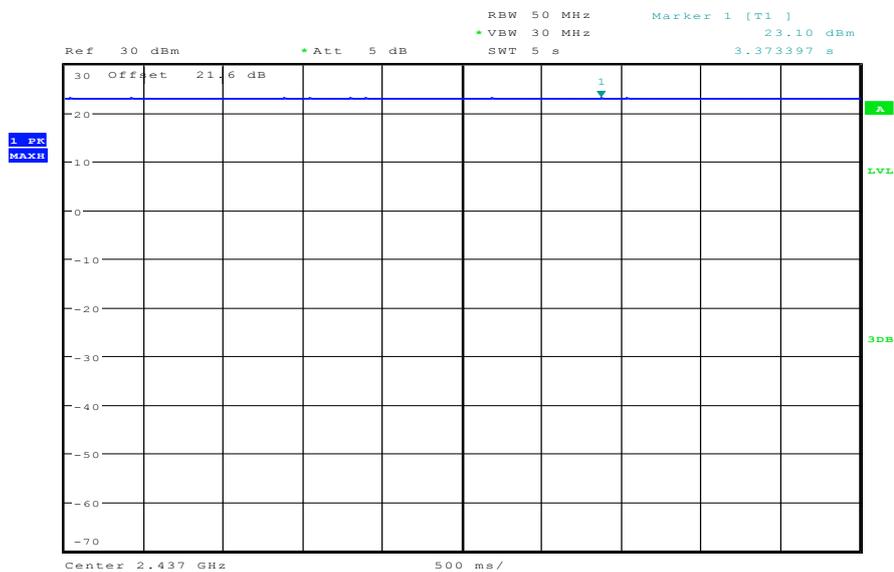
Plots: OFDM / g – mode

Plot 1: TX mode, lowest channel



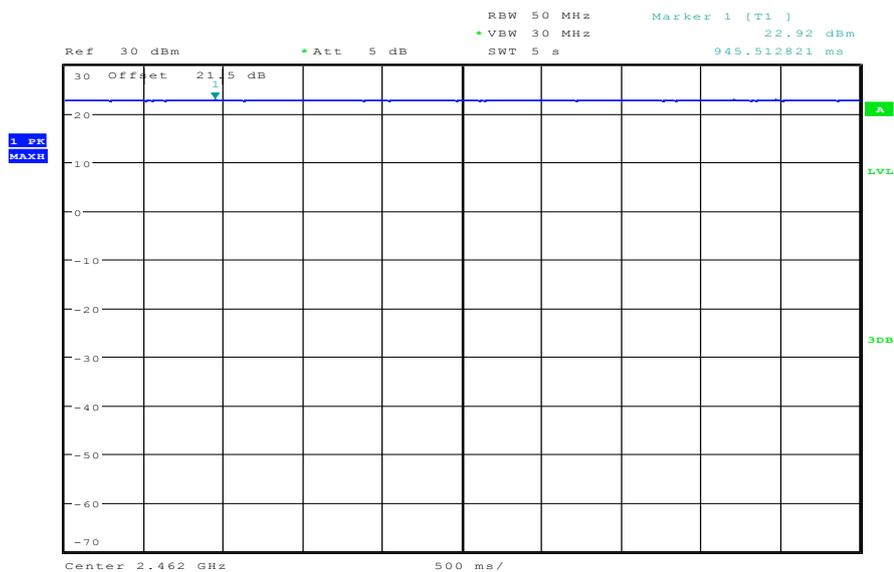
Date: 5.JUL.2012 09:21:25

Plot 2: TX mode, middle channel



Date: 29.JUN.2012 06:57:48

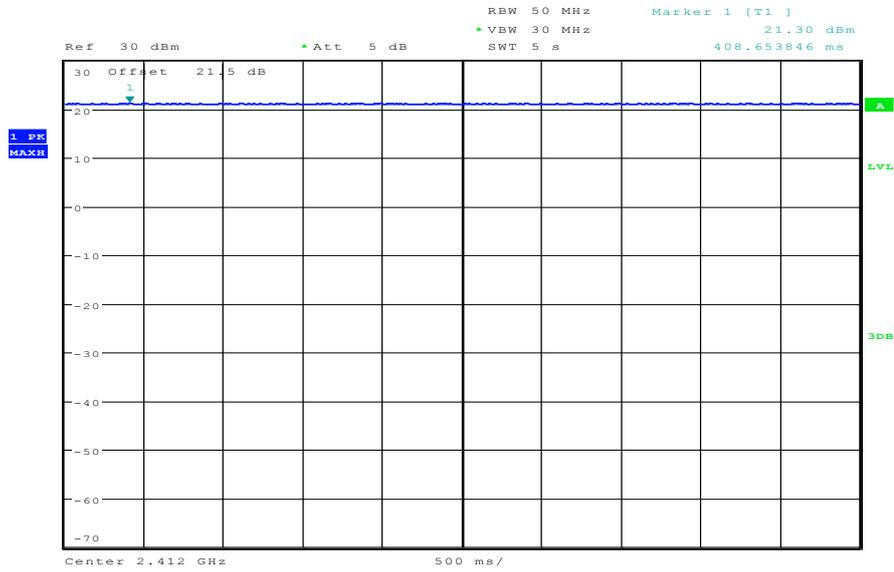
Plot 3: TX mode, highest channel



Date: 5.JUL.2012 09:23:46

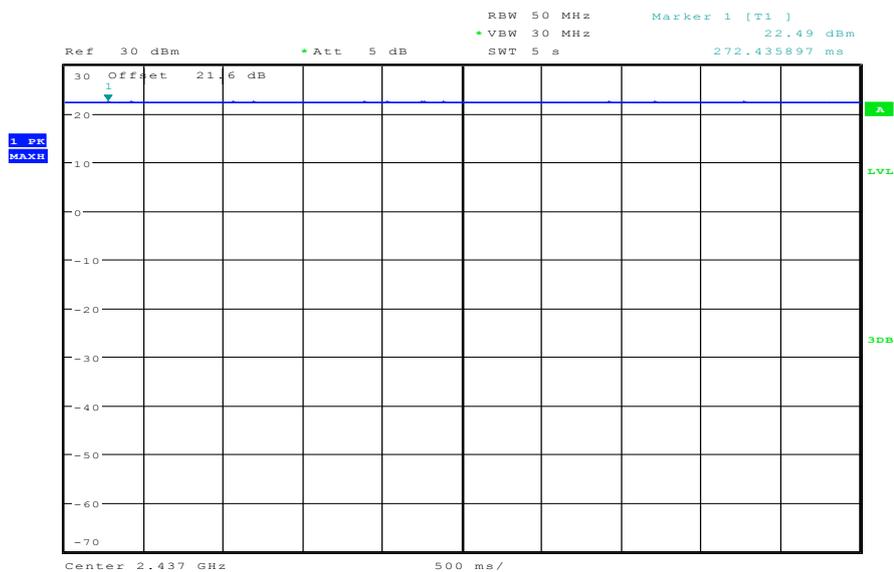
Plots: OFDM / n – mode

Plot 1: TX mode, lowest channel



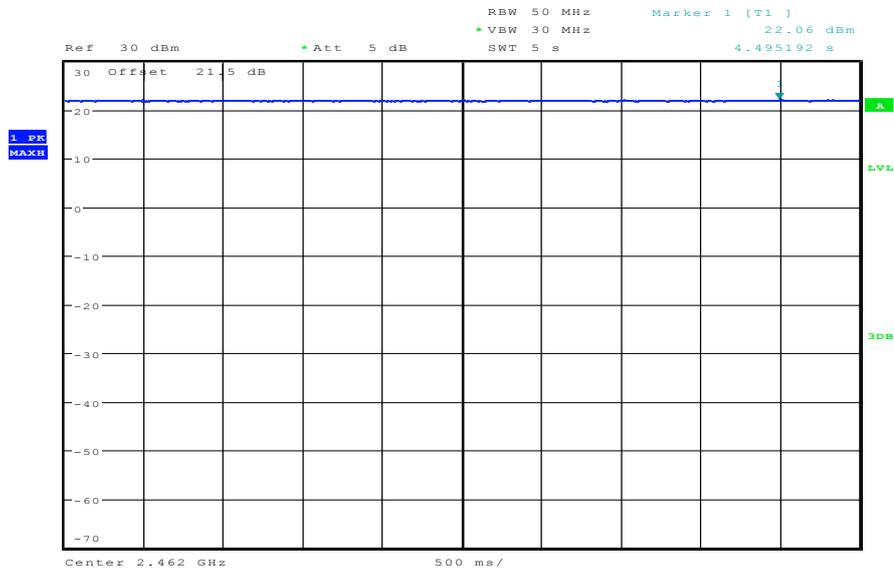
Date: 5.JUL.2012 09:25:57

Plot 2: TX mode, middle channel



Date: 29.JUN.2012 07:23:51

Plot 3: TX mode, highest channel



Date: 5.JUL.2012 09:27:58

9.4 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	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	100 kHz
Video bandwidth:	≥ 300 kHz
Span:	5 - 30 % greater than the EBW
Trace-Mode:	Max hold (allow trace to fully stabilize)
Bandwidth correction:	$10 \log (3\text{kHz} / 100\text{kHz}) = -15.2 \text{ dB}$

Limits:

FCC	IC
Power Spectral Density	
8 dBm (conducted)	

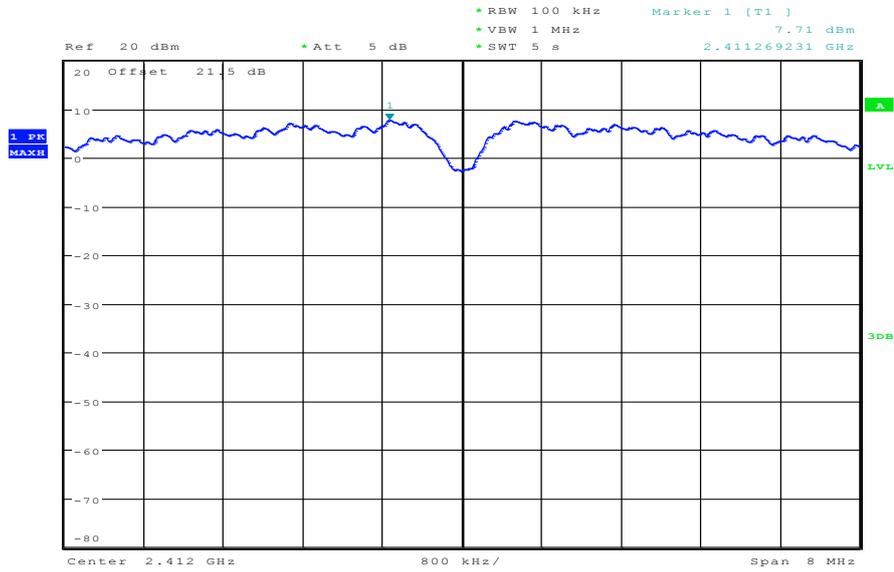
Results:

Modulation Frequency	Power Spectral density [dBm]		
	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode measured value (100 kHz)	7.71	8.07	8.12
DSSS / b – mode re-calculated value (to 3 kHz)	-7.49	-7.13	-7.08
OFDM / g – mode measured value (100 kHz)	4.27	3.89	3.83
OFDM / g – mode re-calculated value (to 3 kHz)	-10.93	-11.31	-11.37
OFDM / n – mode measured value (100 kHz)	2.81	2.53	2.46
OFDM / n – mode re-calculated value (to 3 kHz)	-12.39	-12.67	-12.74
Measurement uncertainty	± 1.5 dB		

Result: Passed

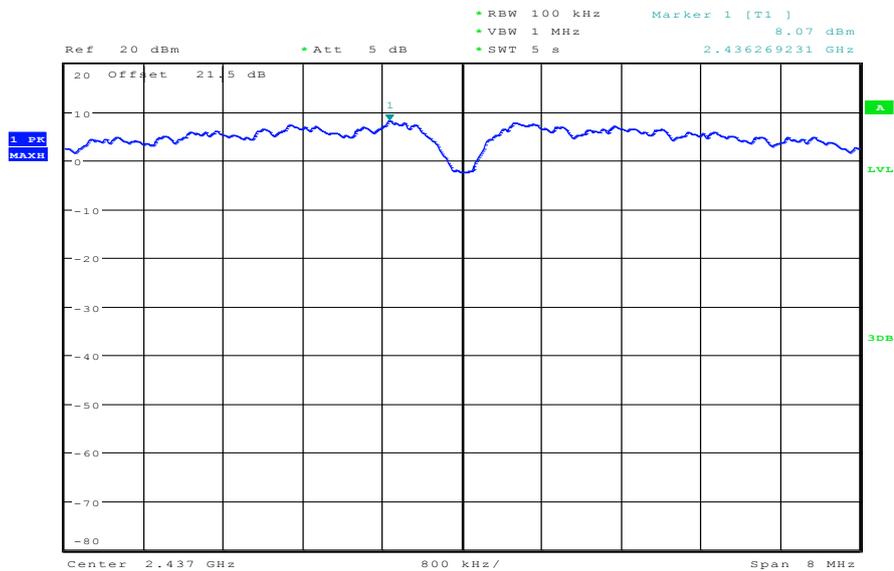
Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel



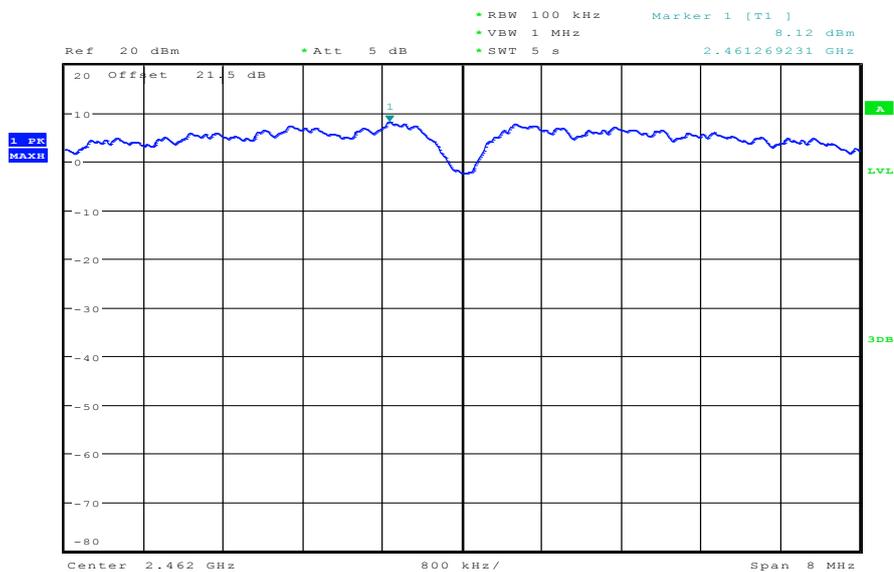
Date: 5.JUL.2012 10:44:50

Plot 2: TX mode, middle channel



Date: 5.JUL.2012 10:42:56

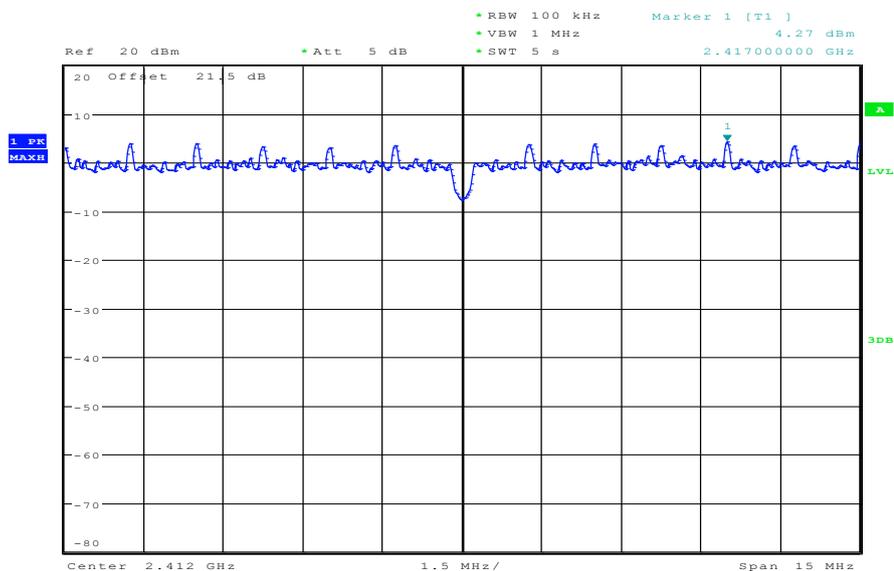
Plot 3: TX mode, highest channel



Date: 5.JUL.2012 10:46:51

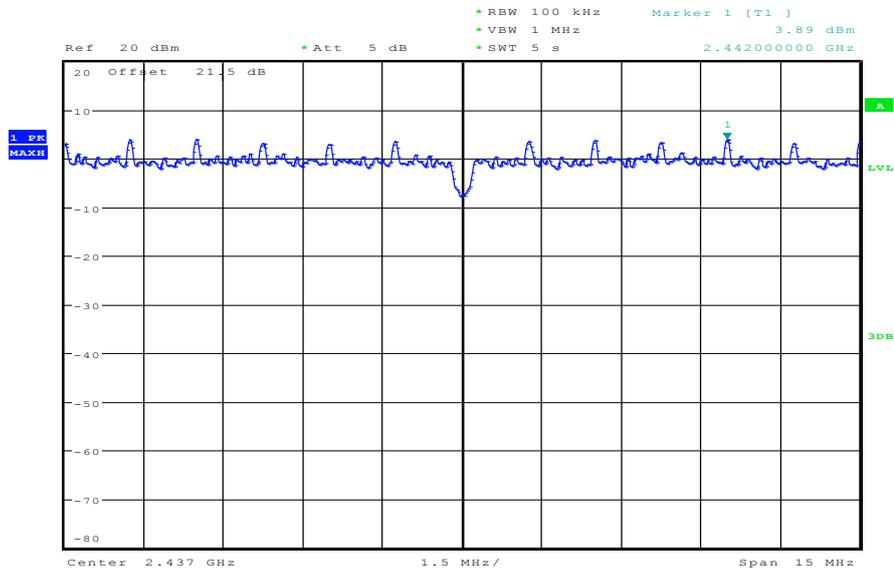
Plots: OFDM / g – mode

Plot 1: TX mode, lowest channel



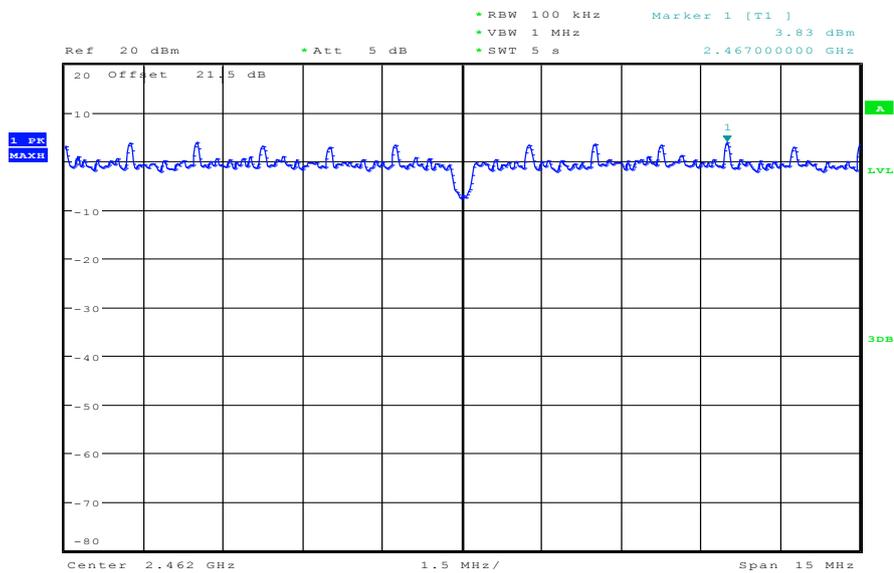
Date: 5.JUL.2012 11:16:14

Plot 2: TX mode, middle channel



Date: 5.JUL.2012 11:17:47

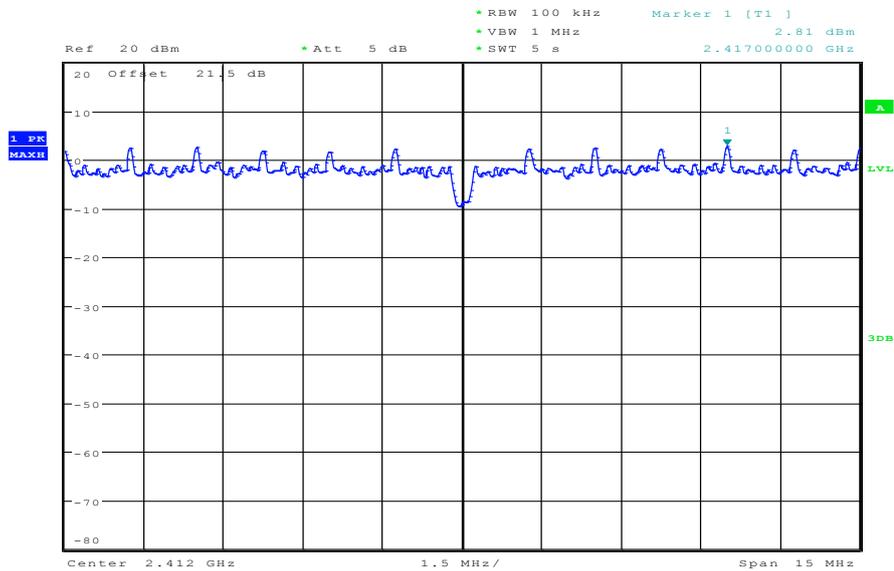
Plot 3: TX mode, highest channel



Date: 5.JUL.2012 11:19:25

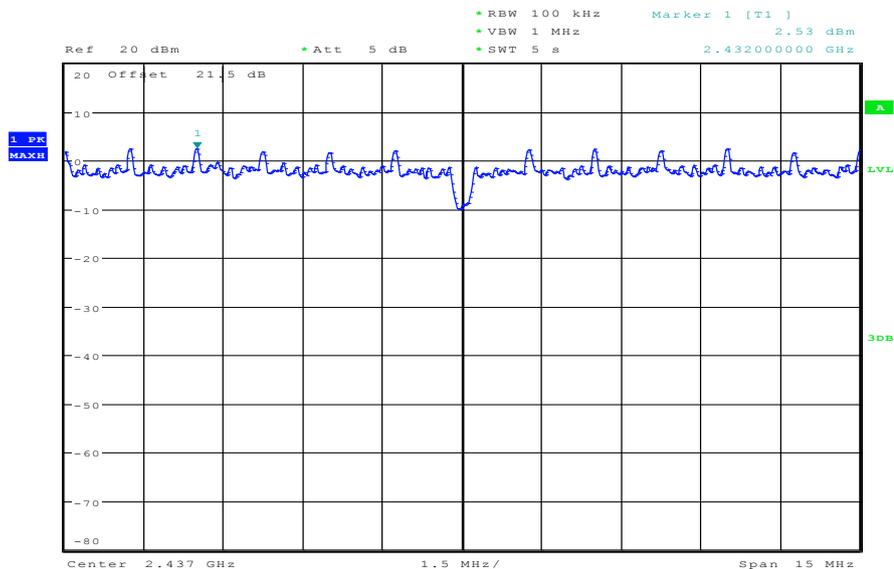
Plots: OFDM / n – mode

Plot 1: TX mode, lowest channel



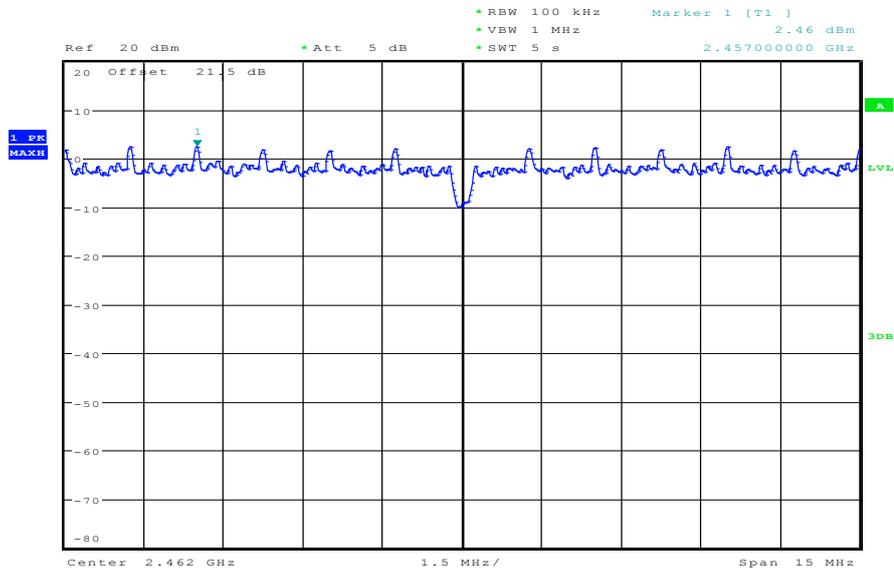
Date: 5.JUL.2012 11:21:18

Plot 2: TX mode, middle channel



Date: 5.JUL.2012 11:22:45

Plot 3: TX mode, highest channel



Date: 5.JUL.2012 11:24:29

9.5 Spectrum bandwidth – 6 dB / 75 % power bandwidth (EBW)

Description:

Measurement of the 6 dB / 75 % power bandwidth of the modulated signal.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 - 5% of emission bandwidth
Video bandwidth:	≥ 3 x RBW
Span:	> complete emission
Trace-Mode:	Max hold (allow trace to stabilize)
Measurement option:	Automatic bandwidth measurement (75% power)

Limits:

FCC	IC
Spectrum Bandwidth – 6 dB / 75 % power bandwidth (EBW)	
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.	

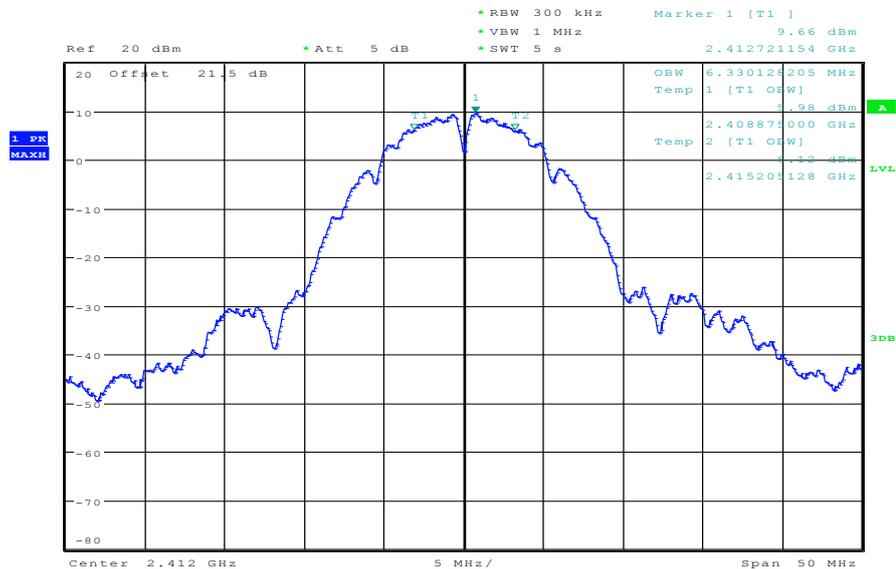
Results:

Modulation	6 dB / 75 % power bandwidth [MHz] (EBW)		
	2412 MHz	2437 MHz	2462 MHz
Frequency			
DSSS / b – mode	6.33	6.25	6.25
OFDM / g – mode	12.26	12.26	12.26
OFDM / n – mode	13.38	13.38	13.30
Measurement uncertainty	± RBW		

Result: Passed

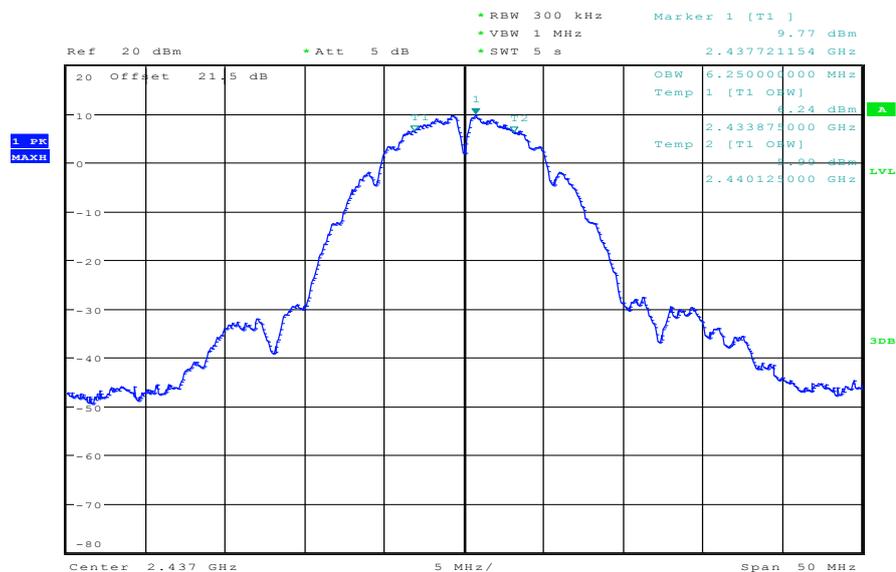
Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel



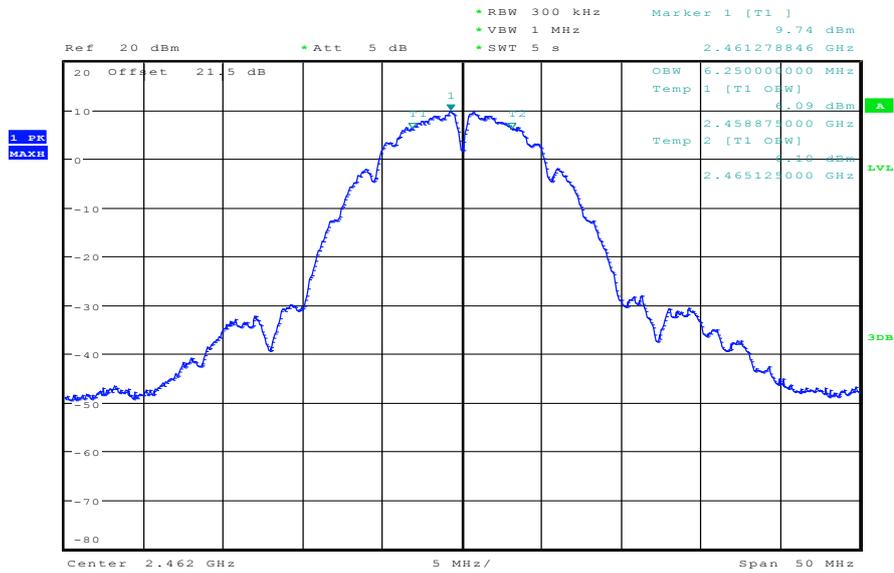
Date: 5.JUL.2012 09:47:39

Plot 2: TX mode, middle channel



Date: 5.JUL.2012 09:53:53

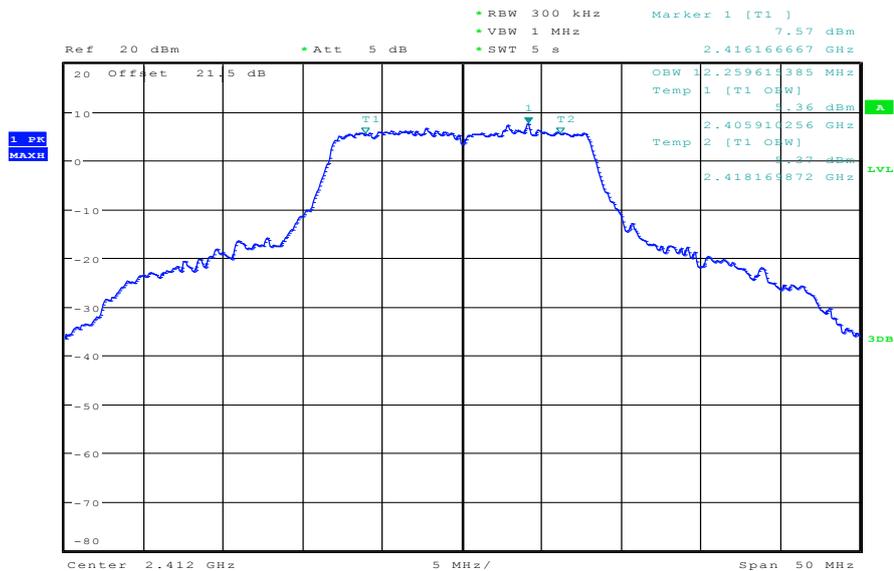
Plot 3: TX mode, highest channel



Date: 5.JUL.2012 09:56:49

Plots: OFDM / g – mode

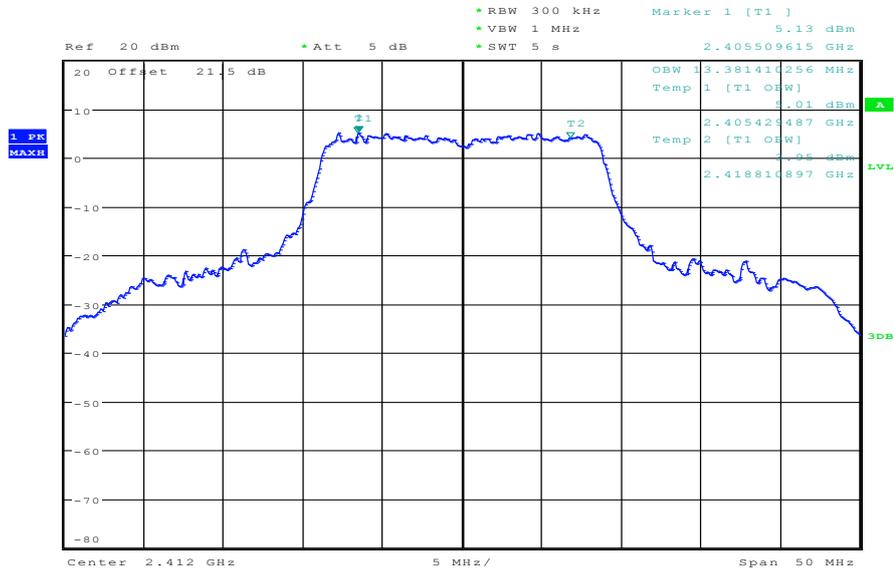
Plot 1: TX mode, lowest channel



Date: 5.JUL.2012 10:01:25

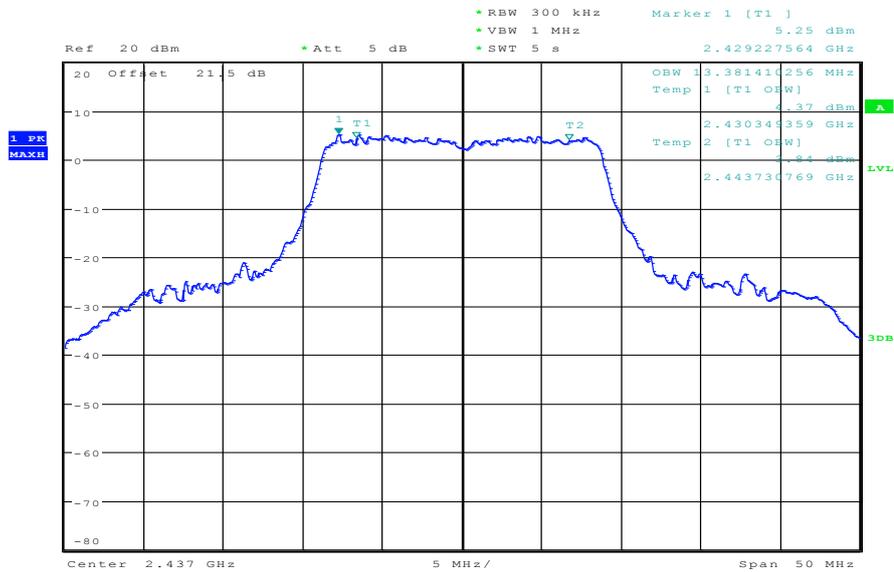
Plots: OFDM / n – mode

Plot 1: TX mode, lowest channel



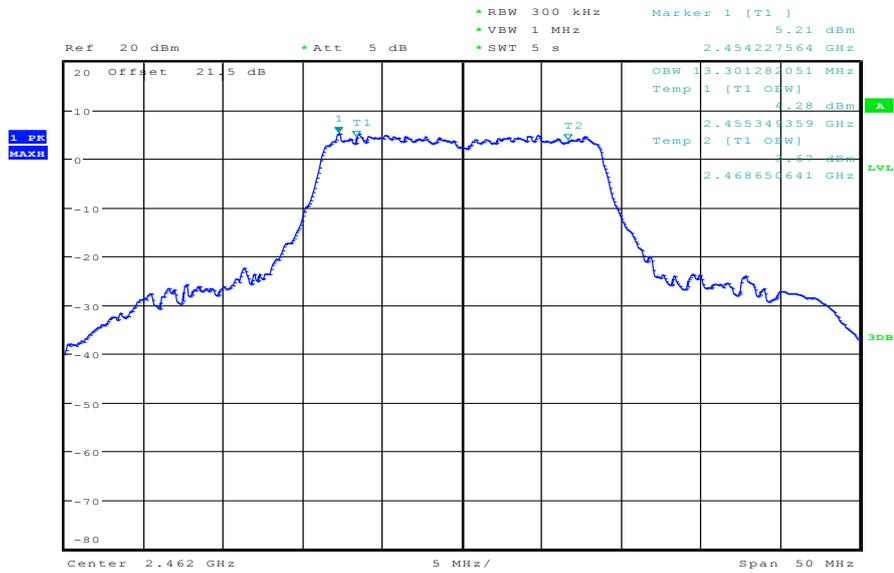
Date: 5.JUL.2012 10:09:47

Plot 2: TX mode, middle channel



Date: 5.JUL.2012 10:12:50

Plot 3: TX mode, highest channel



Date: 5.JUL.2012 10:14:20

9.6 Spectrum bandwidth – 20 dB / 99 % power bandwidth

Description:

Measurement of the 20 dB / 99% power bandwidth of the modulated signal.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 - 5% of emission bandwidth
Video bandwidth:	≥ 3 x RBW
Span:	> complete emission
Trace-Mode:	Max hold (allow trace to stabilize)
Measurement option:	Automatic bandwidth measurement (99% power)

Limits:

FCC	IC
Spectrum Bandwidth – 20 dB / 99 % power bandwidth	
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.	

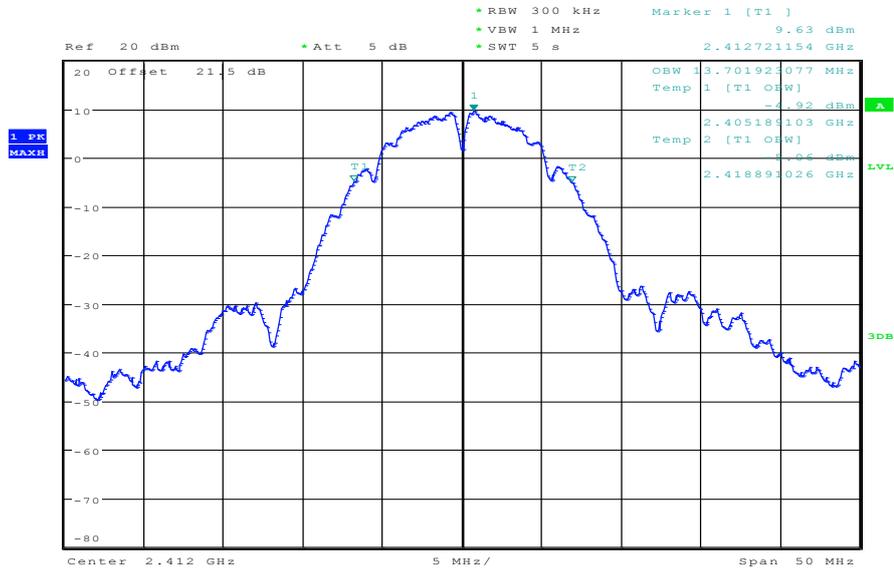
Results:

Modulation Frequency	20 dB / 99 % power bandwidth [MHz]		
	2412 MHz	2437 MHz	2462 MHz
DSSS / b – mode	13.70	13.46	13.46
OFDM / g – mode	18.03	17.63	17.63
OFDM / n – mode	18.51	18.35	18.35
Measurement uncertainty	± RBW		

Result: Passed

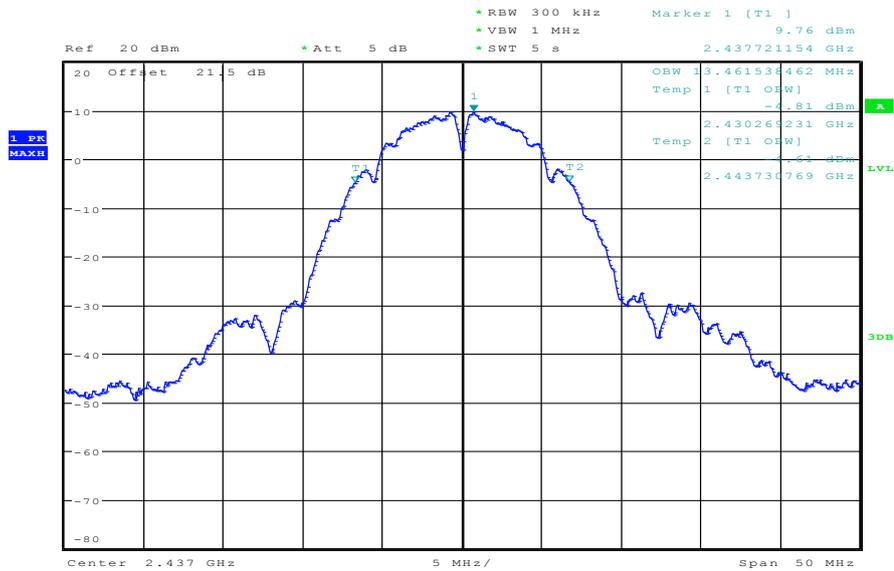
Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel



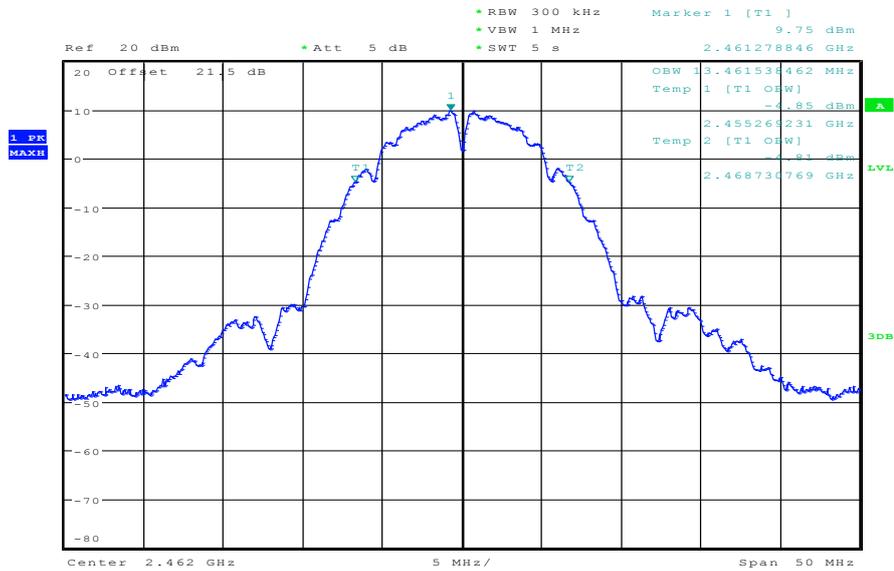
Date: 5.JUL.2012 09:48:41

Plot 2: TX mode, middle channel



Date: 5.JUL.2012 09:52:54

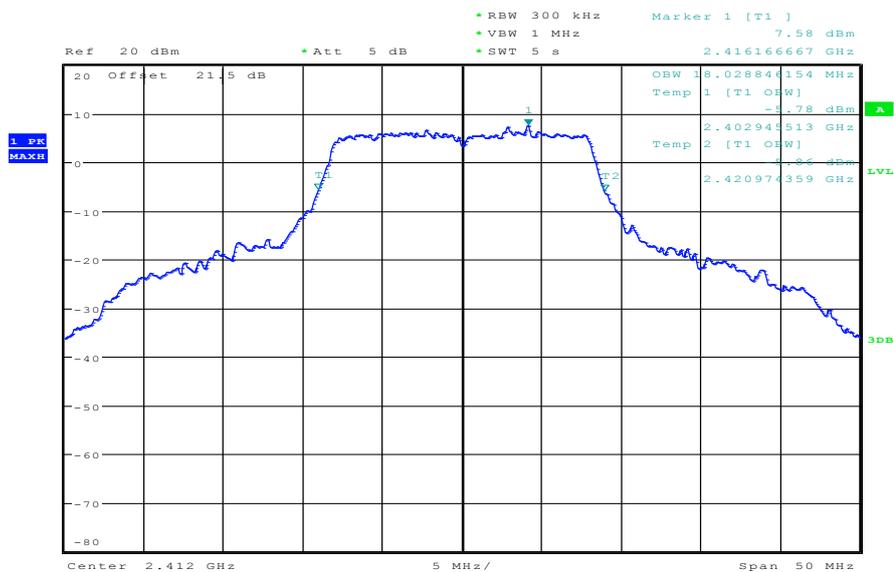
Plot 3: TX mode, highest channel



Date: 5.JUL.2012 09:58:09

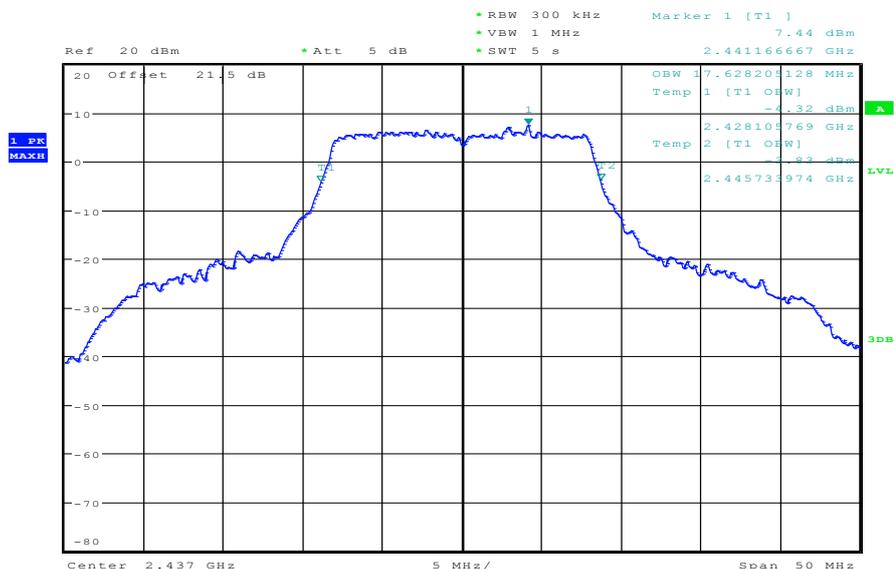
Plots: OFDM / g - mode

Plot 1: TX mode, lowest channel



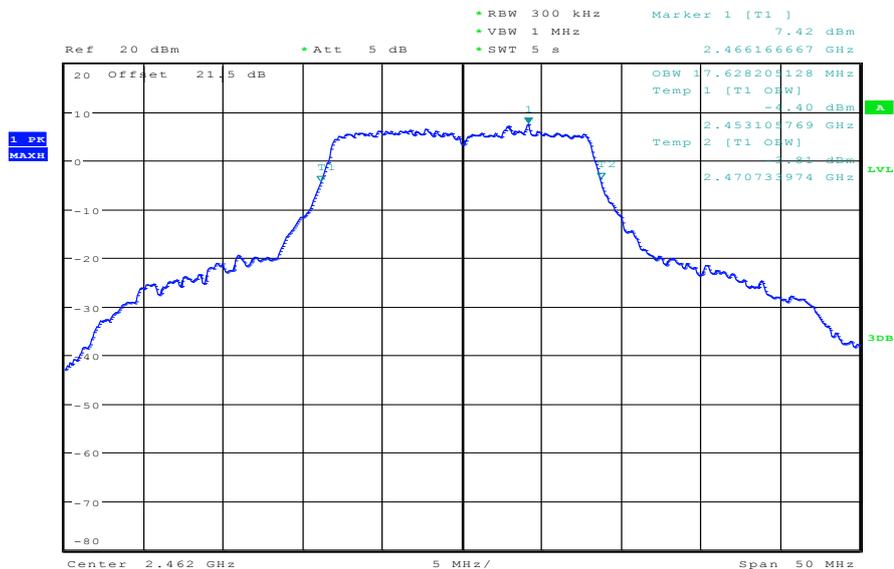
Date: 5.JUL.2012 10:00:33

Plot 2: TX mode, middle channel



Date: 5.JUL.2012 10:04:40

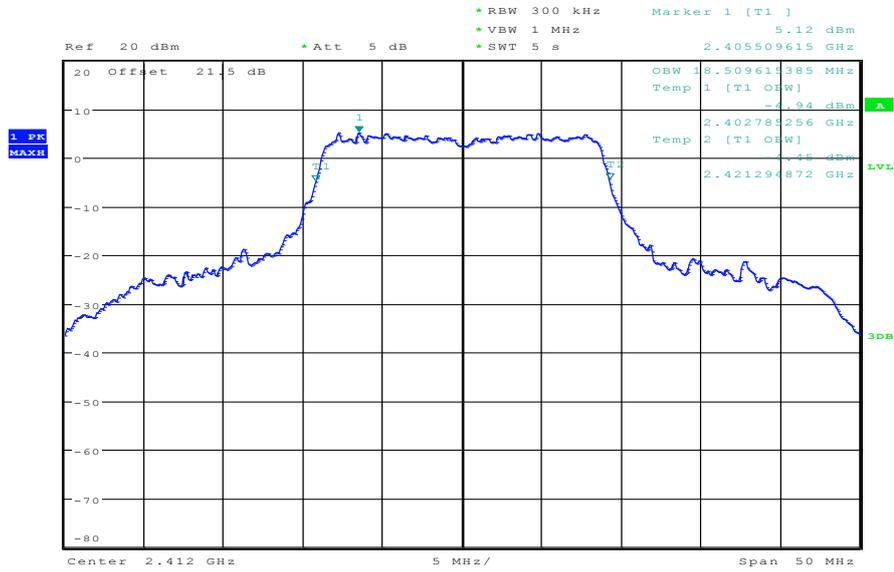
Plot 3: TX mode, highest channel



Date: 5.JUL.2012 10:07:09

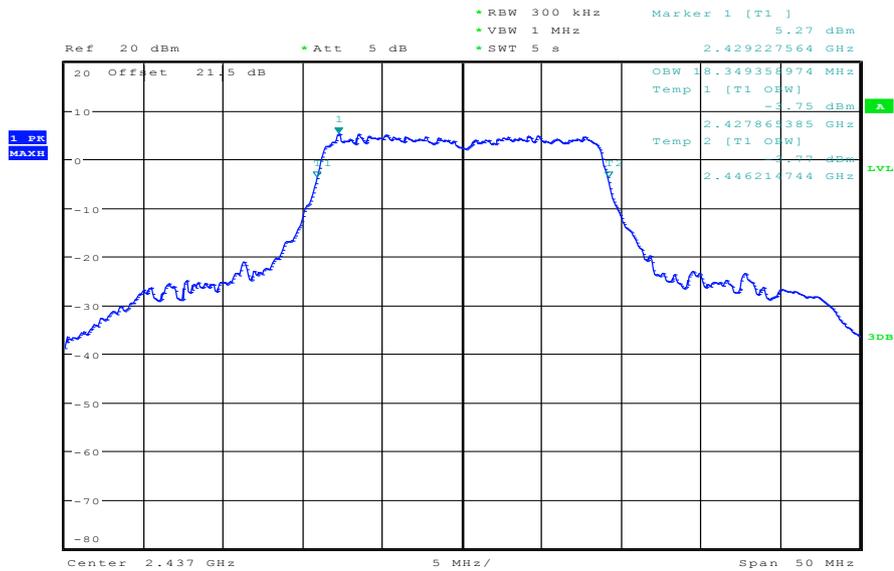
Plots: OFDM / n – mode

Plot 1: TX mode, lowest channel



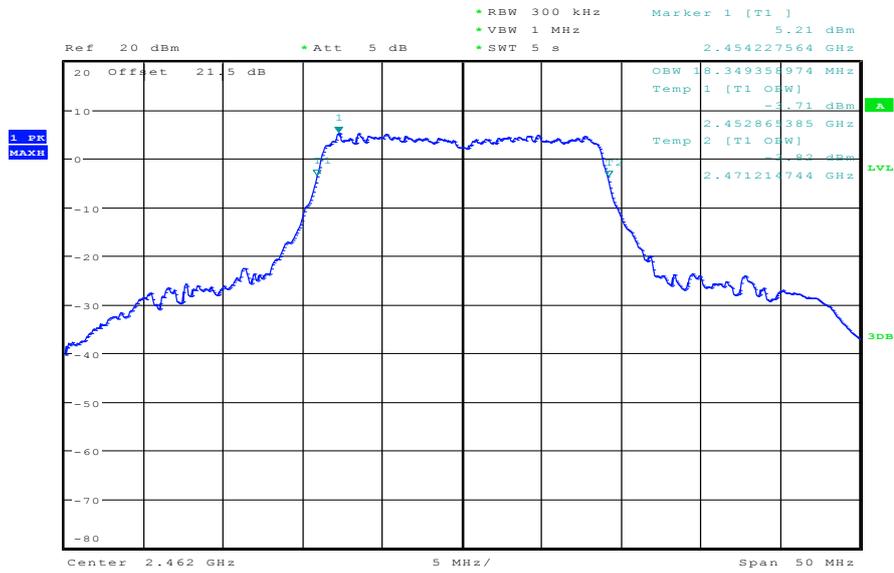
Date: 5.JUL.2012 10:10:27

Plot 2: TX mode, middle channel



Date: 5.JUL.2012 10:12:05

Plot 3: TX mode, highest channel



Date: 5.JUL.2012 10:15:02

9.7 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	
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	
<p>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.</p>	

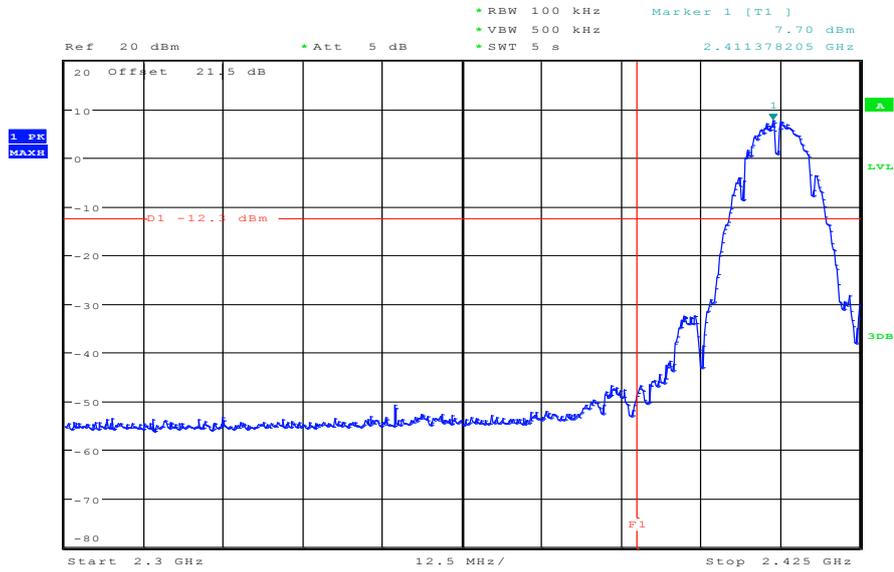
Results:

Scenario Modulation	Band Edge Compliance Conducted [dB]		
	DSSS / b – mode	OFDM / g – mode	OFDM / n – mode
Lower Band Edge – Channel 1	> 20 dB (see plot 1)	> 20 dB (see plot 3)	> 20 dB (see plot 5)
Upper Band Edge – Channel 11	> 20 dB (see plot 2)	> 20 dB (see plot 4)	> 20 dB (see plot 6)
Measurement uncertainty	± 1.5 dB		

Result: Passed

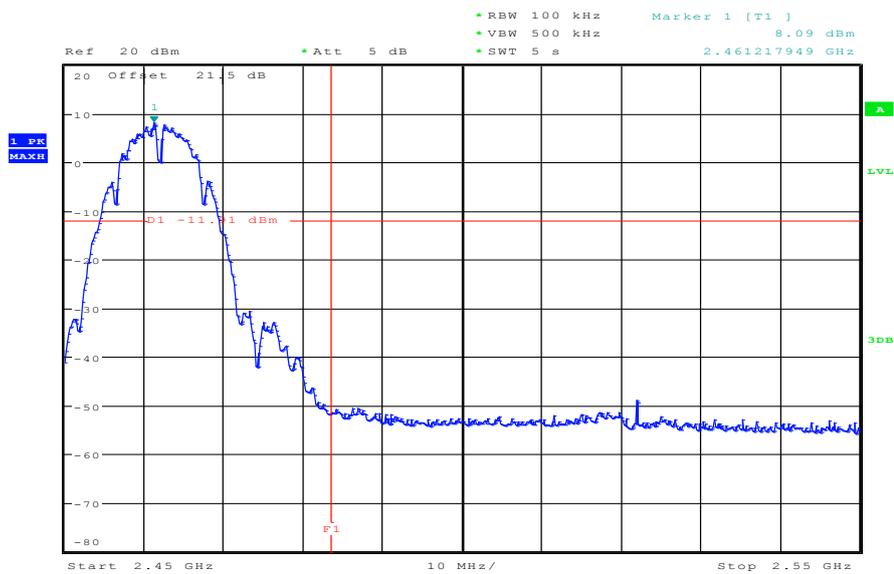
Plots: DSSS / b – mode

Plot 1: TX mode, lower band edge



Date: 5.JUL.2012 11:53:25

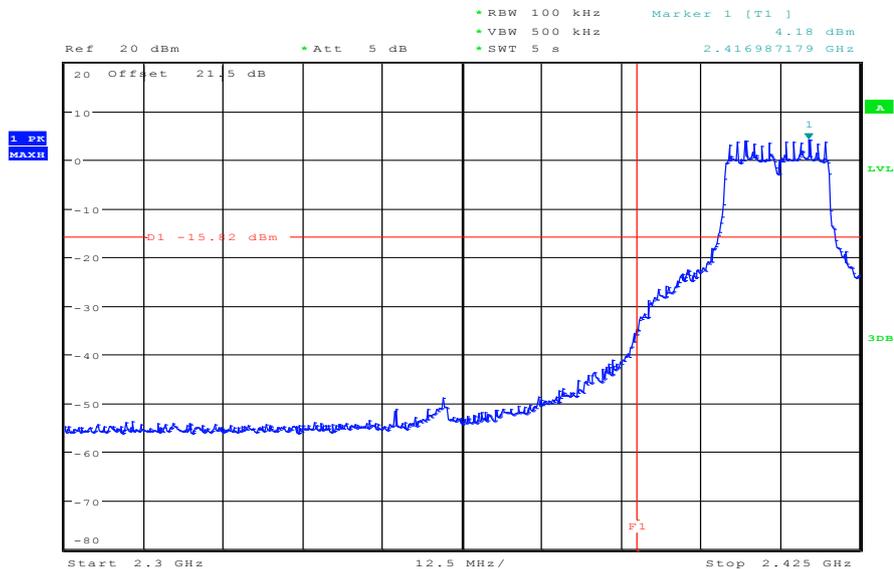
Plot 2: TX mode, upper band edge



Date: 5.JUL.2012 12:00:27

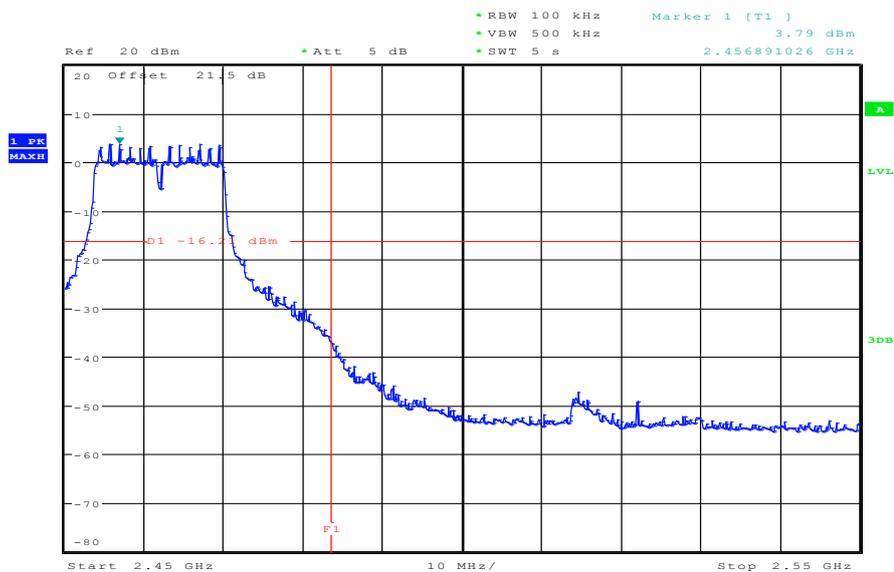
Plots: OFDM / g – mode

Plot 1: TX mode, lower band edge



Date: 5.JUL.2012 11:55:20

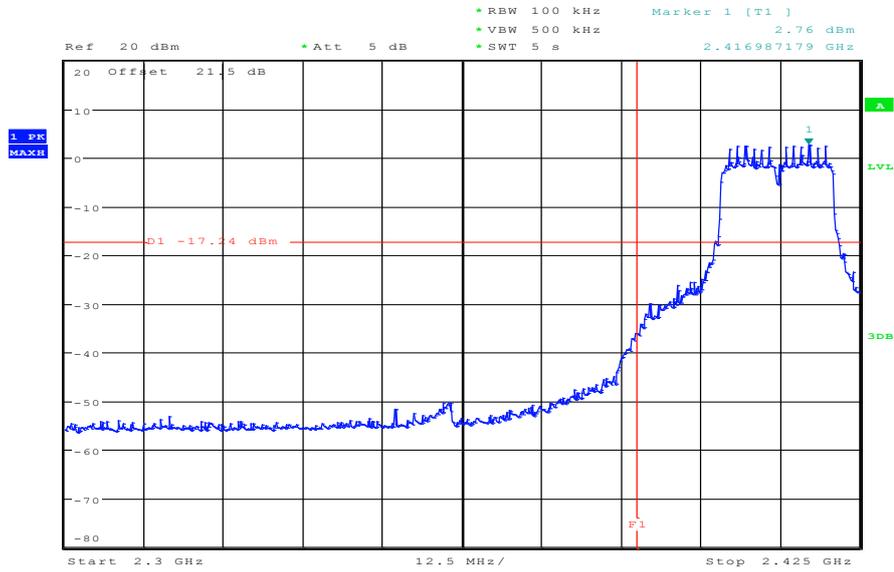
Plot 2: TX mode, upper band edge



Date: 5.JUL.2012 12:02:44

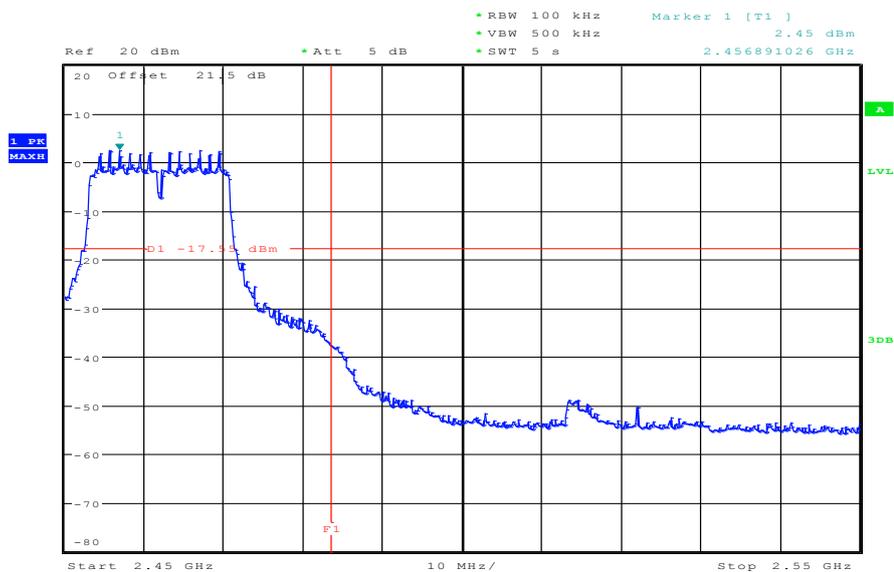
Plots: OFDM / n – mode

Plot 1: TX mode, lower band edge



Date: 5.JUL.2012 11:57:08

Plot 2: TX mode, upper band edge



Date: 5.JUL.2012 12:04:46

9.8 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
Video bandwidth:	10 Hz
Resolution bandwidth:	1 MHz
Span:	See plots!
Trace-Mode:	Max Hold

Limits:

FCC	IC
Band Edge Compliance Radiated	
<p>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)).</p>	
54 dBµV/m AVG	

Results:

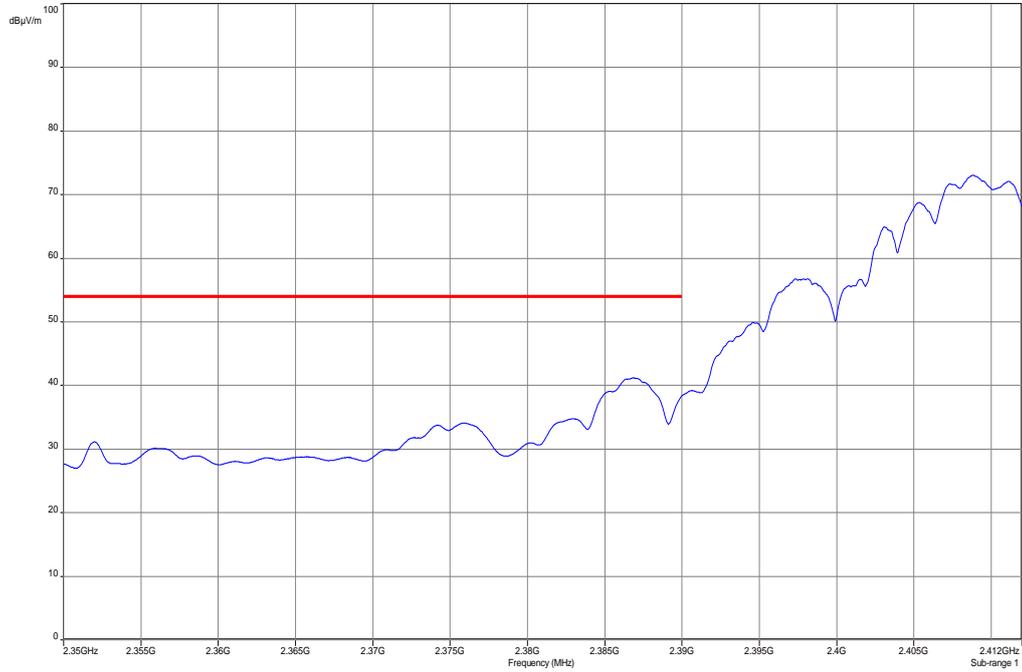
Scenario Modulation	Band Edge Compliance Conducted [dB]		
	DSSS / b – mode	OFDM / g – mode	OFDM / n – mode
Lower Band Edge – Channel 1	> 20 dB	> 20 dB	> 20 dB
Upper Band Edge – Channel 11	> 20 dB	> 20 dB	> 20 dB
Measurement uncertainty	± 3 dB		

Result: Passed

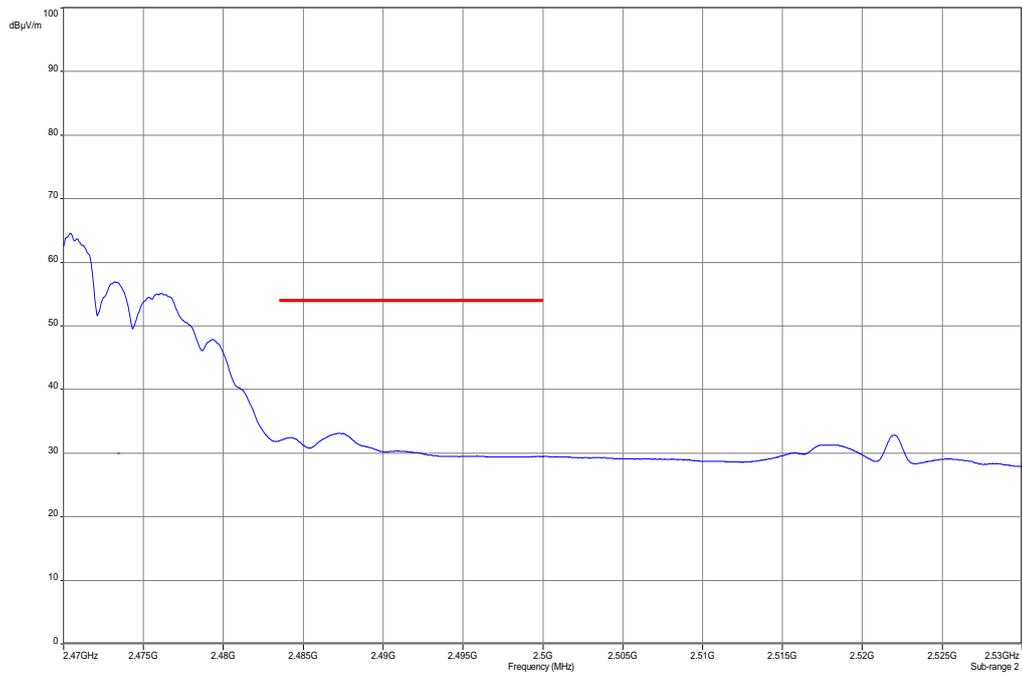
Note: Results of OFDM g – mode are added to show the compliance with the standard for all OFDM modes.

Plots: DSSS / b – mode

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

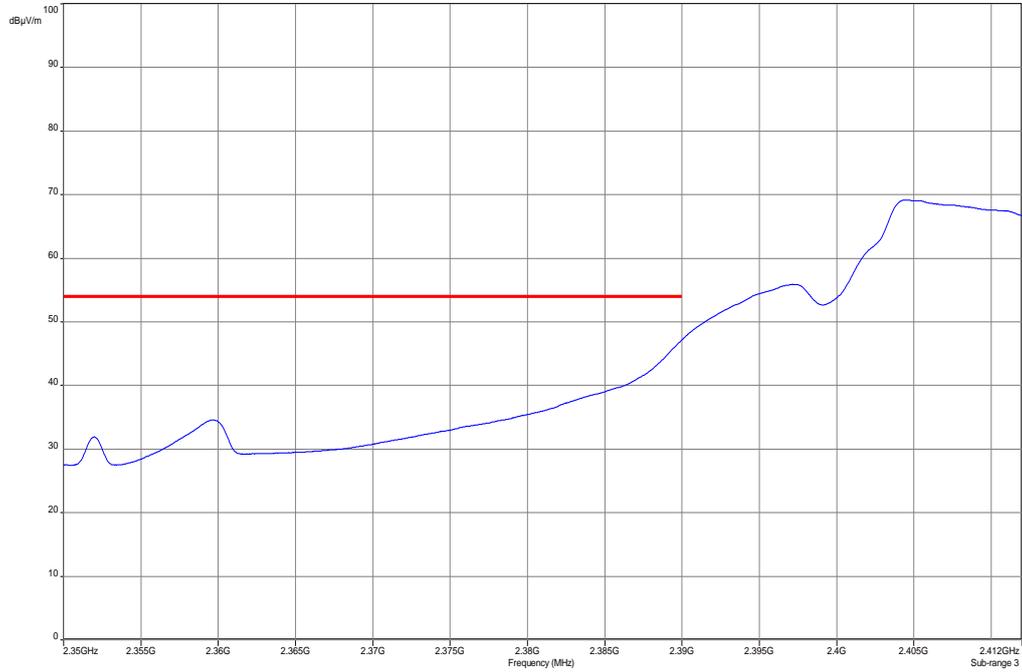


Plot 2: TX mode, upper band edge, vertical & horizontal polarization

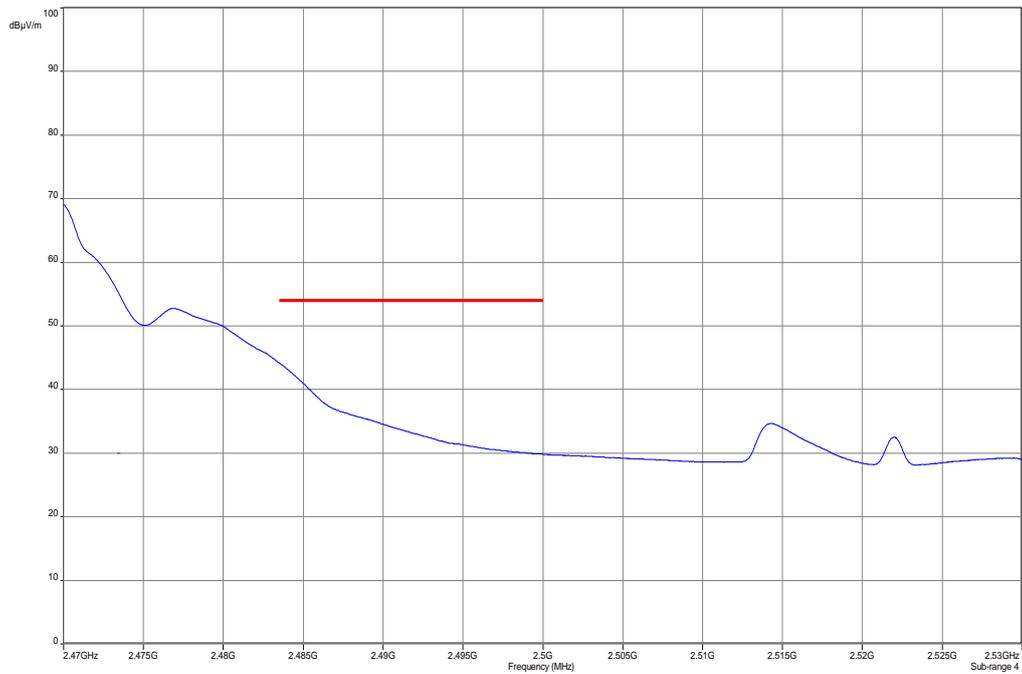


Plots: OFDM / g – mode

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



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



9.9 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	
Detector:	Peak
Sweep time:	1s / 100 MHz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 100 kHz
Video bandwidth:	F < 1 GHz: 500 kHz F > 1 GHz: 500 kHz
Span:	9 kHz to 25 GHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
TX Spurious Emissions Conducted	
<p>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</p>	

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		8.57	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2437		8.76	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2462		8.40	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: Passed

Results: OFDM / g – mode

TX Spurious Emissions Conducted					
OFDM / g – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		4.88	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2437		4.77	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2462		4.45	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: Passed

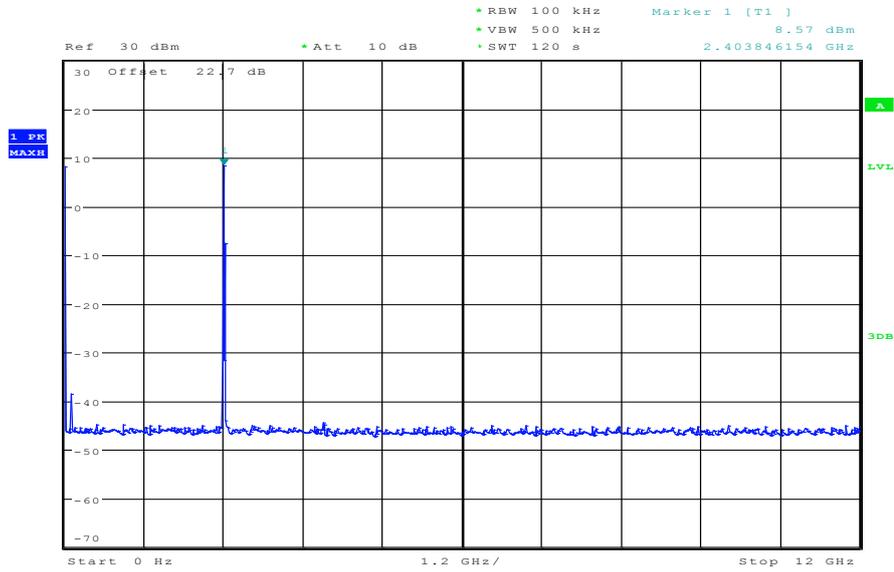
Results: OFDM / n – mode

TX Spurious Emissions Conducted					
OFDM / n – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		3.64	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2437		3.68	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
2462		3.70	30 dBm		Operating frequency
No critical peaks detected. All detected emissions are below the -20 dBc criteria.			-20 dBc (peak) -30 dBc (average)		complies
Measurement uncertainty		± 3 dB			

Result: Passed

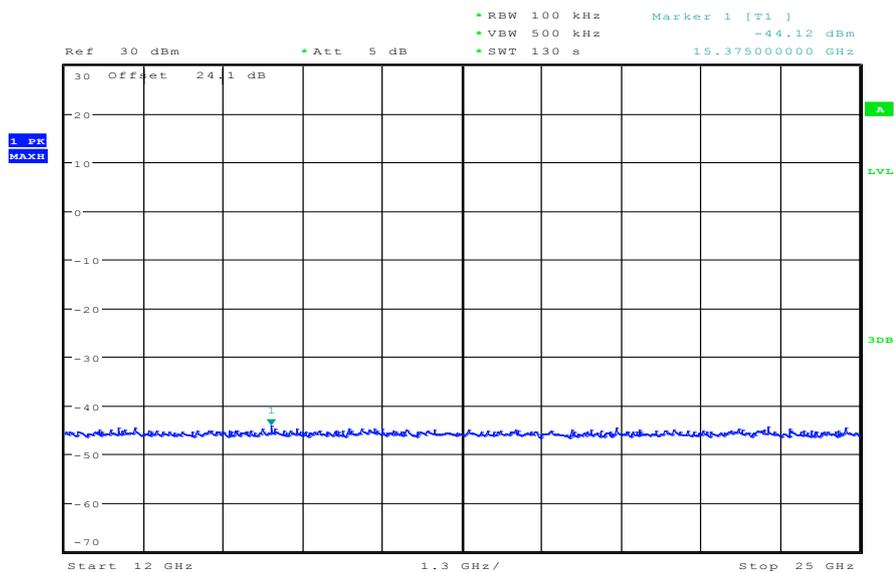
Plots: DSSS / b – mode

Plot 1: TX mode, lowest channel, up to 12 GHz



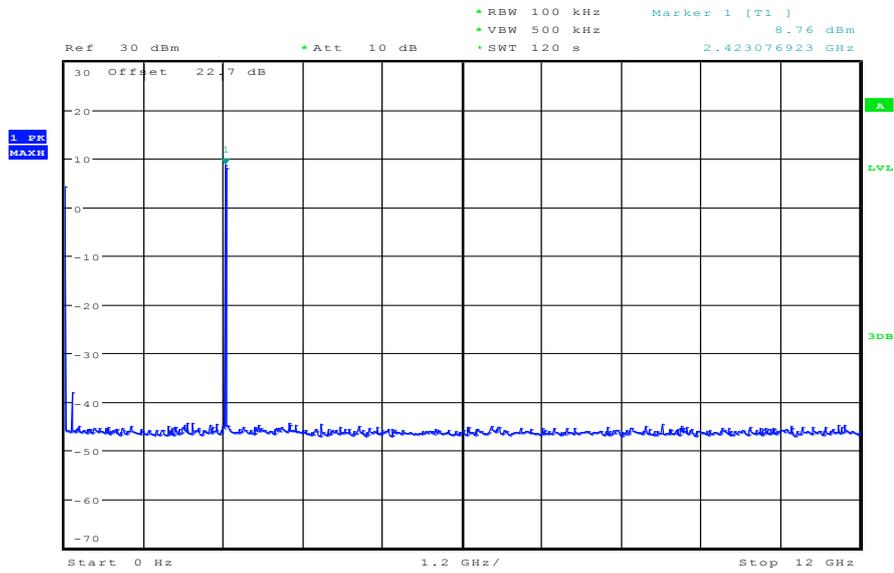
Date: 5.JUL.2012 13:06:28

Plot 2: TX mode, lowest channel, 12 to 25 GHz



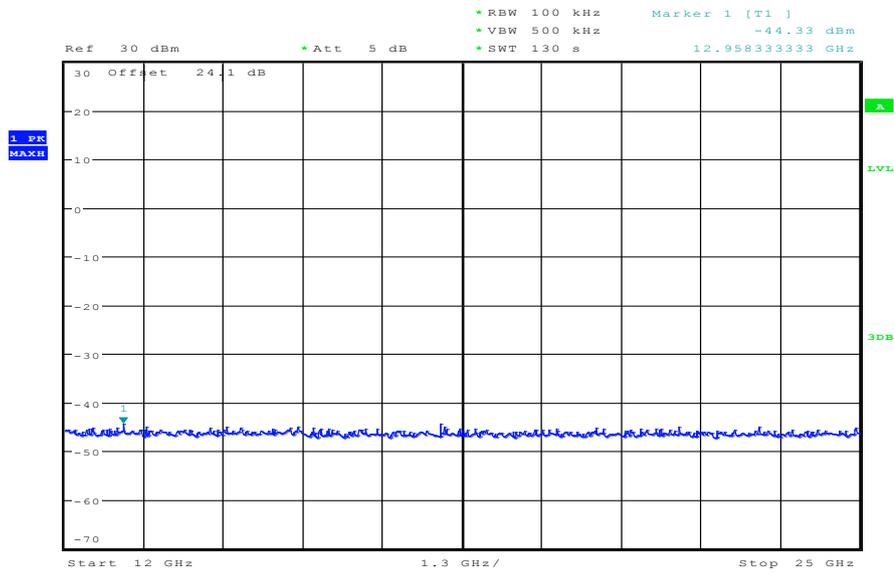
Date: 5.JUL.2012 14:24:26

Plot 3: TX mode, middle channel, up to 12 GHz



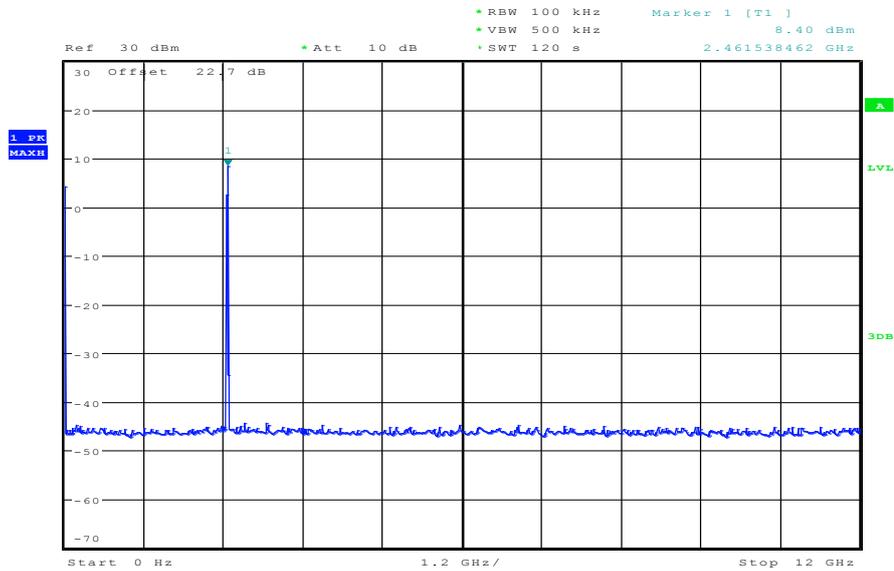
Date: 5.JUL.2012 13:09:27

Plot 4: TX mode, middle channel, 12 to 25 GHz



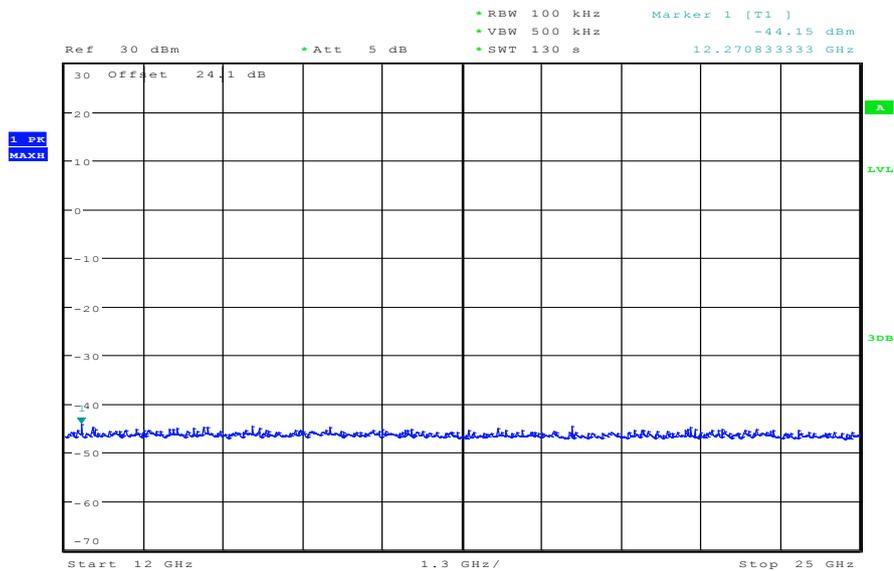
Date: 5.JUL.2012 14:27:53

Plot 5: TX mode, highest channel, up to 12 GHz



Date: 5.JUL.2012 13:12:32

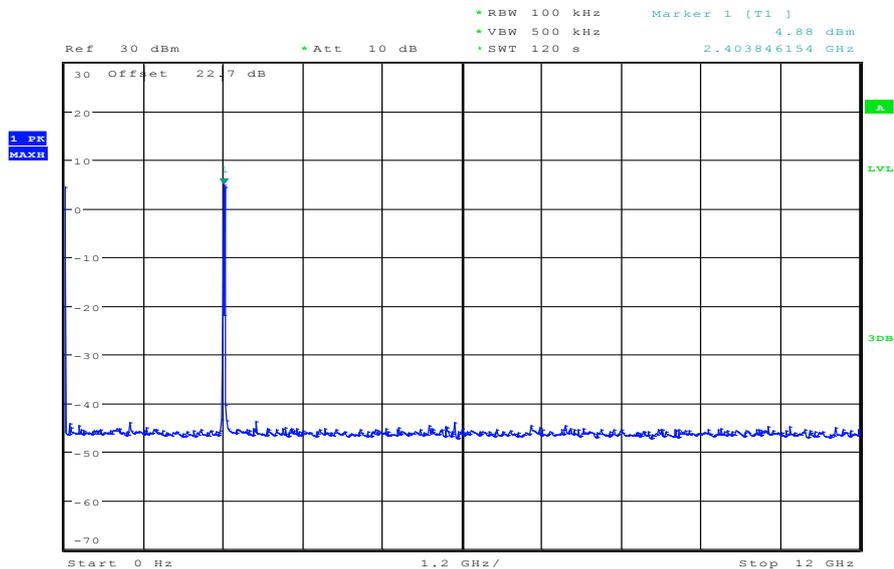
Plot 6: TX mode, highest channel, 12 to 25 GHz



Date: 5.JUL.2012 14:31:51

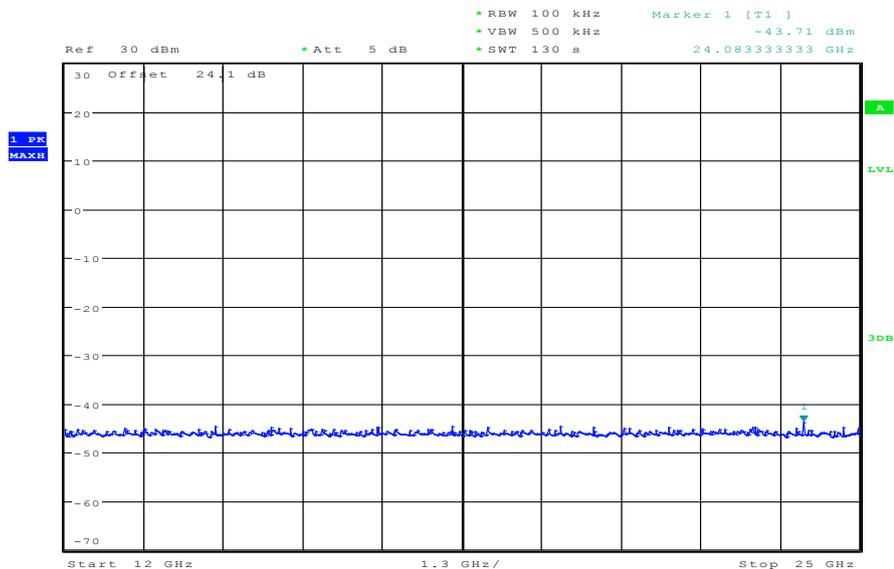
Plots: OFDM / g – mode

Plot 1: TX mode, lowest channel, up to 12 GHz



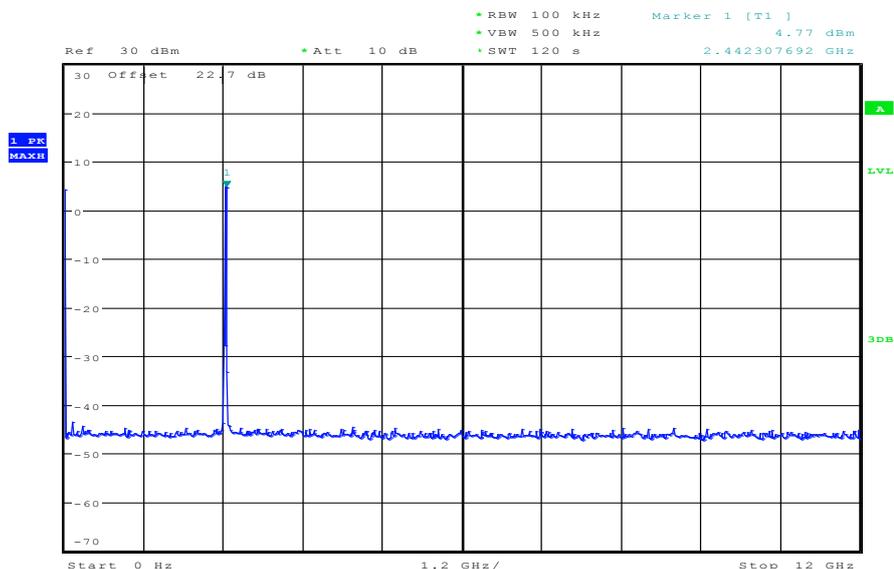
Date: 5.JUL.2012 13:15:40

Plot 2: TX mode, lowest channel, 12 to 25 GHz



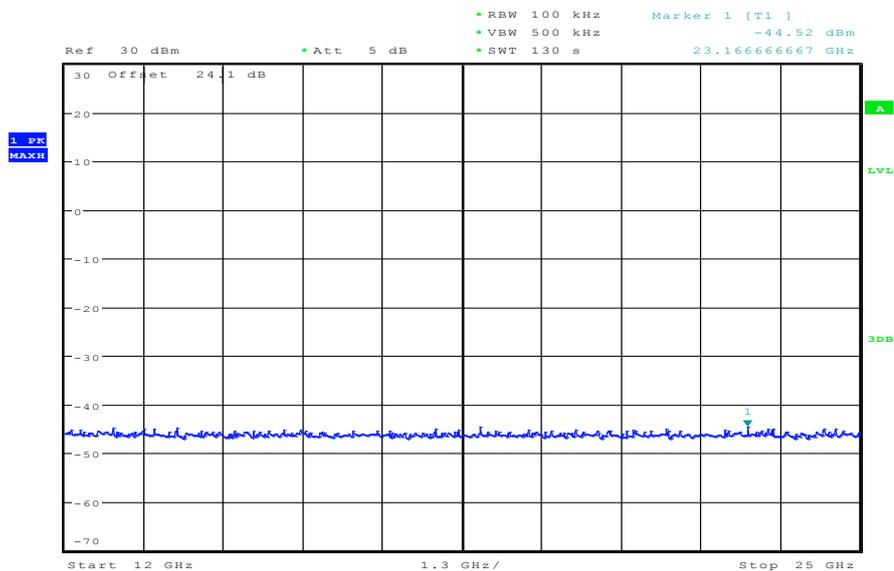
Date: 5.JUL.2012 14:00:44

Plot 3: TX mode, middle channel, up to 12 GHz



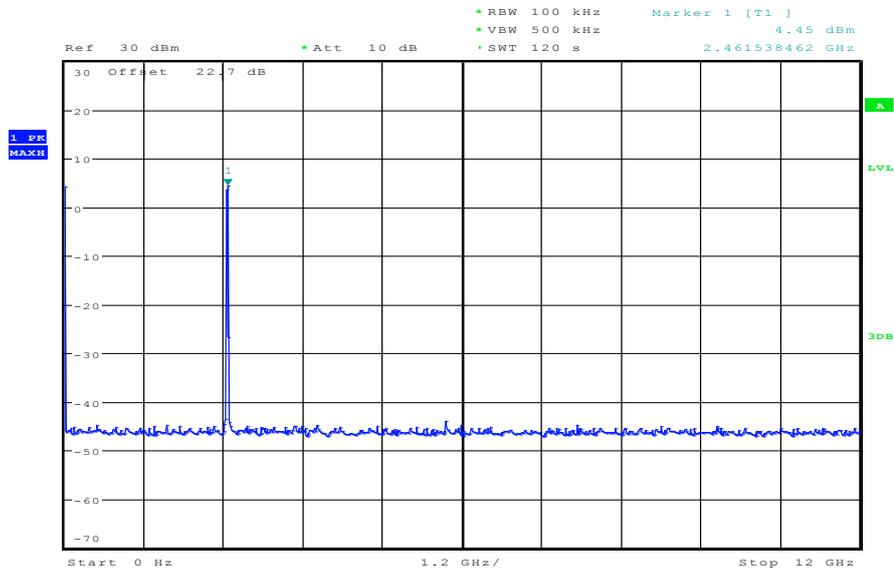
Date: 5.JUL.2012 13:19:03

Plot 4: TX mode, middle channel, 12 to 25 GHz



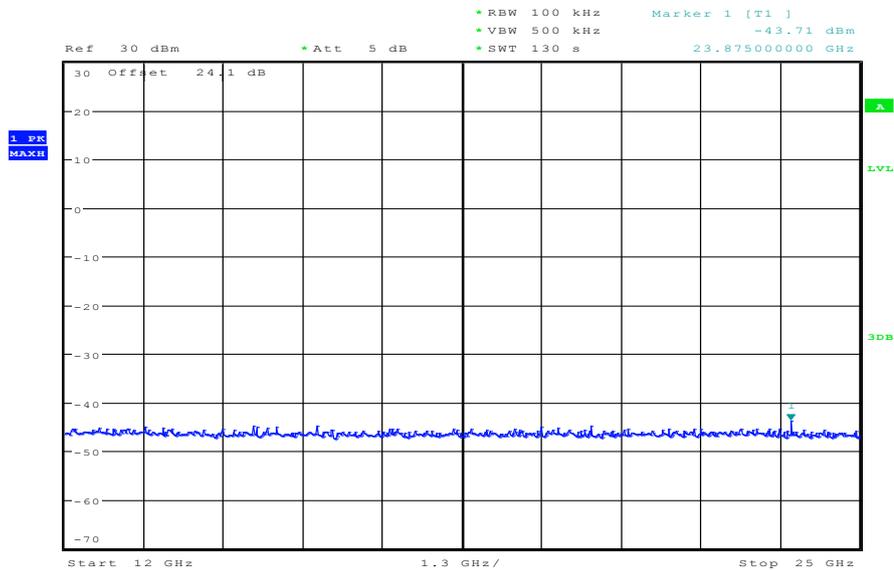
Date: 5.JUL.2012 14:06:04

Plot 5: TX mode, highest channel, up to 12 GHz



Date: 5.JUL.2012 13:23:09

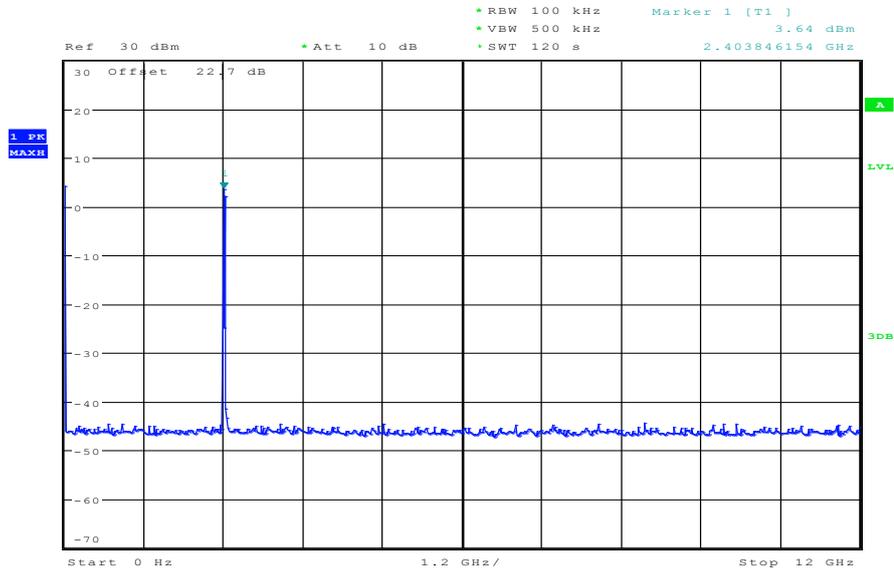
Plot 6: TX mode, highest channel, 12 to 25 GHz



Date: 5.JUL.2012 14:09:18

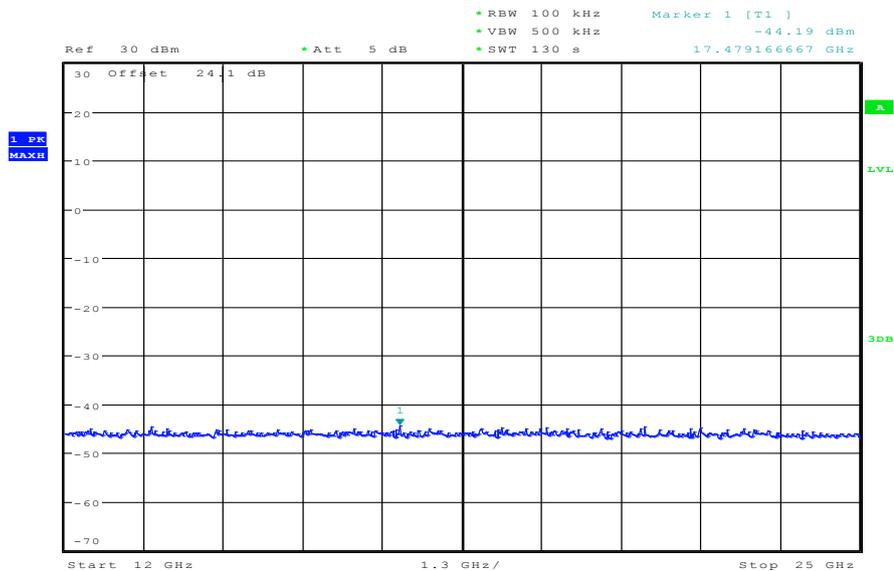
Plots: OFDM / n – mode

Plot 1: TX mode, lowest channel, up to 12 GHz



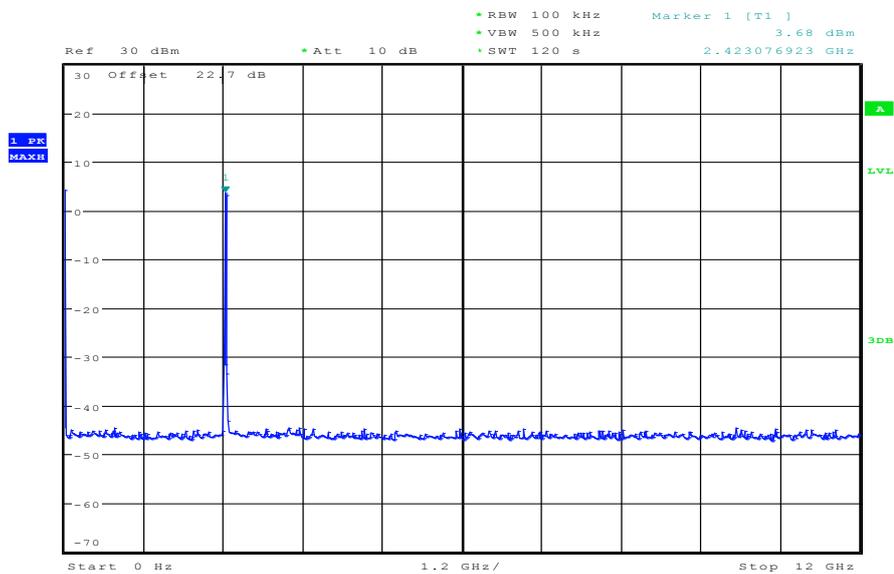
Date: 5.JUL.2012 13:26:19

Plot 2: TX mode, lowest channel, 12 to 25 GHz



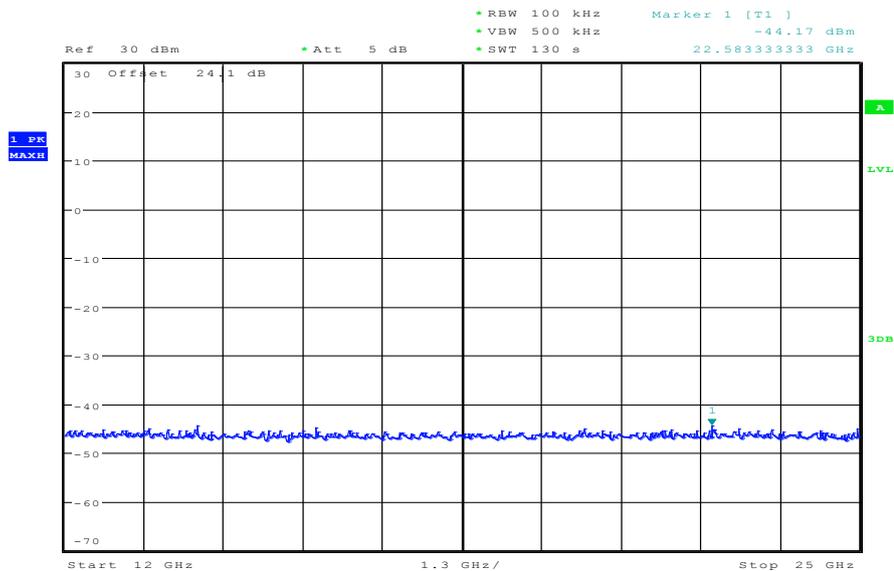
Date: 5.JUL.2012 13:53:19

Plot 3: TX mode, middle channel, up to 12 GHz



Date: 5.JUL.2012 13:29:21

Plot 4: TX mode, middle channel, 12 to 25 GHz



Date: 5.JUL.2012 13:46:57

9.10 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:	Sweep: 100 kHz Remeasurement: 10 Hz / 3 MHz
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold
Measured Modulation	<input checked="" type="checkbox"/> DSSS b – mode <input checked="" type="checkbox"/> OFDM g – mode <input checked="" type="checkbox"/> OFDM n – mode

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

Limits:

FCC	IC	
TX Spurious Emissions Radiated		
<p>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)).</p>		
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: DSSS / b – mode

TX Spurious Emissions Radiated [dB μ V/m]								
DSSS / b – mode								
2412 MHz			2437 MHz			2462 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 emissions are below the limit – see plots!			Above 1 GHz: All detected emissions are below the limit – see plots!			Above 1 GHz: All detected emissions are below the limit – see plots!		
Measurement uncertainty						± 3 dB		

Result: Passed

Results: OFDM / g – mode

TX Spurious Emissions Radiated [dB μ V/m]								
OFDM / g – mode								
2412 MHz			2437 MHz			2462 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 emissions are below the limit – see plots!			Above 1 GHz: All detected emissions are below the limit – see plots!			Above 1 GHz: All detected emissions are below the limit – see plots!		
Measurement uncertainty						± 3 dB		

Result: Passed

Results: OFDM / n – mode

TX Spurious Emissions Radiated [dB μ V/m]								
OFDM / n – mode								
2412 MHz			2437 MHz			2462 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 emissions are below the limit – see plots!			Above 1 GHz: All detected emissions are below the limit – see plots!			Above 1 GHz: All detected emissions are below the limit – see plots!		
Measurement uncertainty						± 3 dB		

Result: Passed

Note: Results of OFDM g – mode are added to show the compliance with the standard for all OFDM modes.

Plots: DSSS / b – mode

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

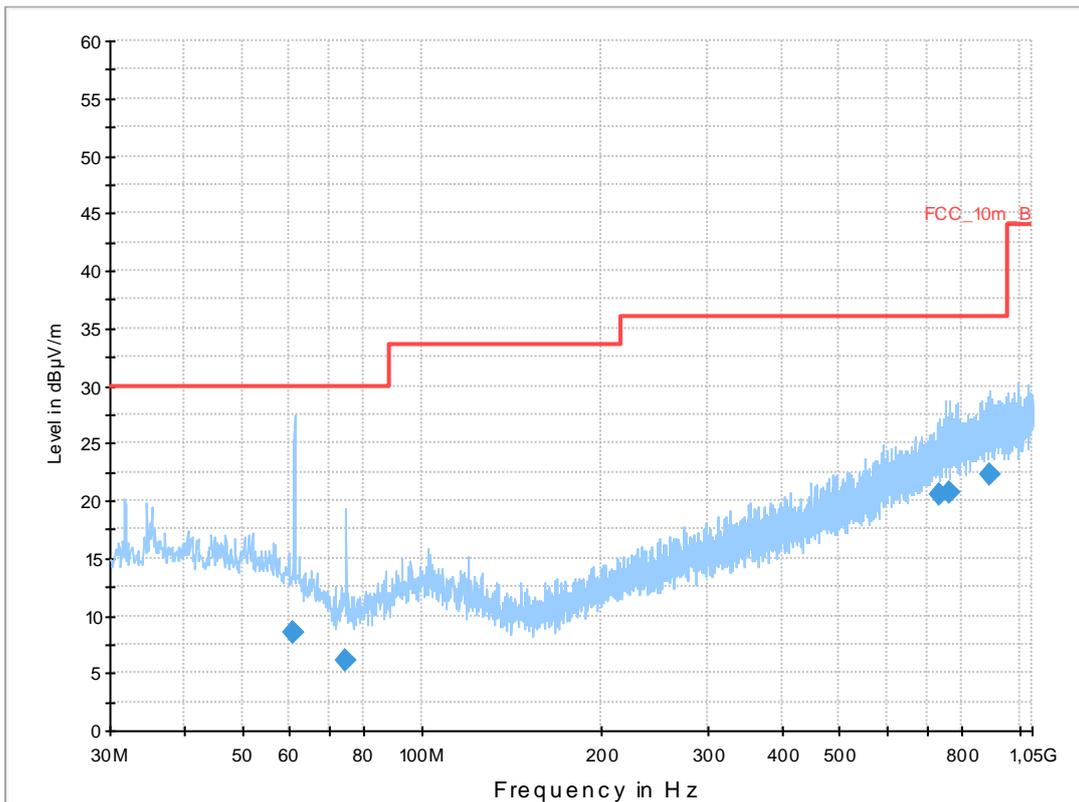
Common Information

EUT: PM-0140-BV
 Serial Number: CB511Z7M8M
 Test Description: FCC part 15 B class B @ 10 m
 Operating Conditions: W-LAN B_mode ch 1
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

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

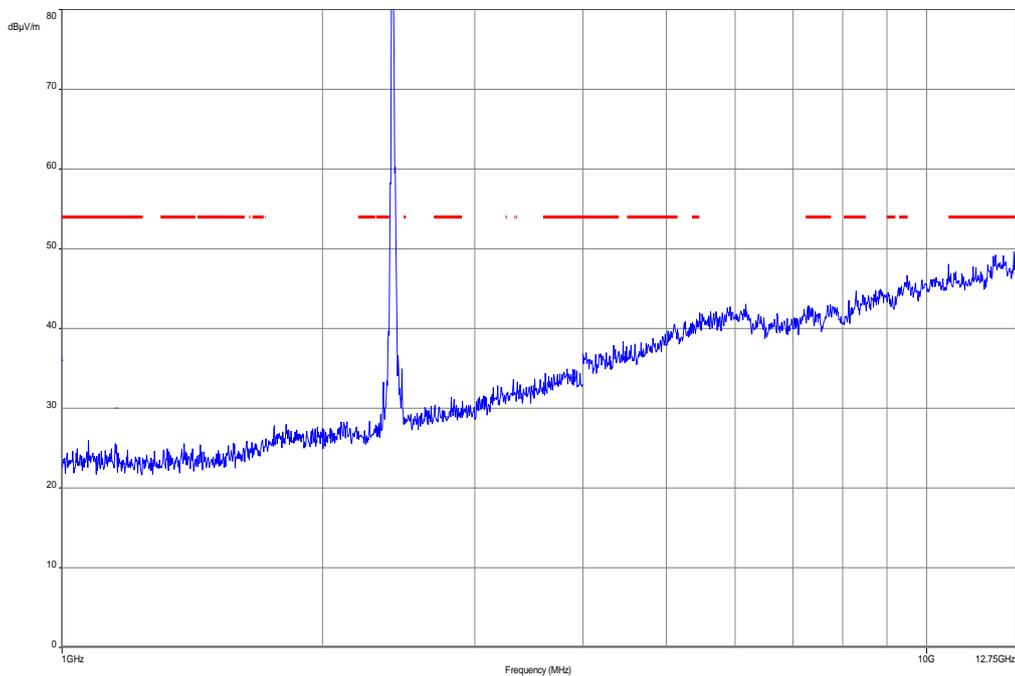
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



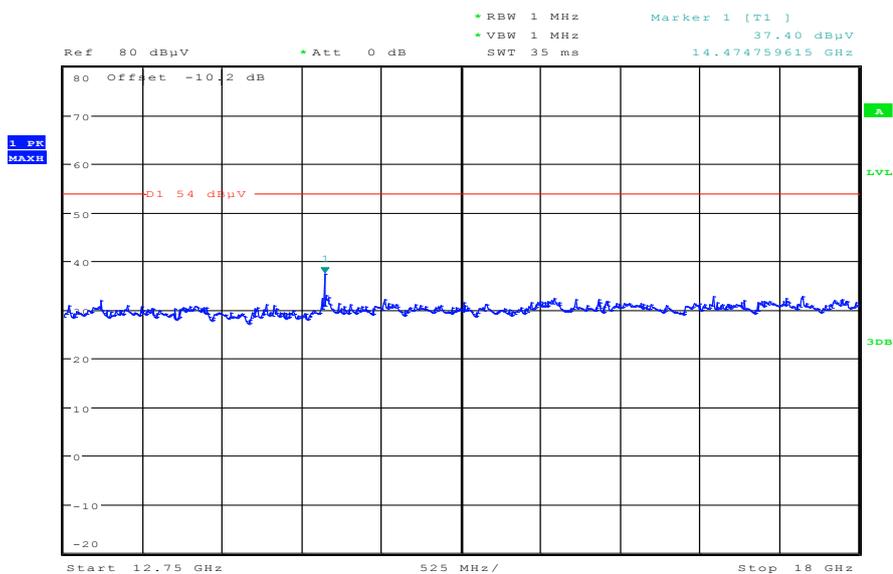
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
60.613800	8.5	1000.0	120.000	98.0	V	10.0	11.5	21.5	30.0	
61.000350	8.5	1000.0	120.000	170.0	V	-4.0	11.4	21.5	30.0	
74.603850	6.1	1000.0	120.000	170.0	V	175.0	9.2	23.9	30.0	
734.660550	20.6	1000.0	120.000	170.0	H	170.0	23.3	15.4	36.0	
763.361550	20.8	1000.0	120.000	170.0	H	267.0	23.7	15.2	36.0	
889.791150	22.3	1000.0	120.000	122.0	V	260.0	25.1	13.7	36.0	

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

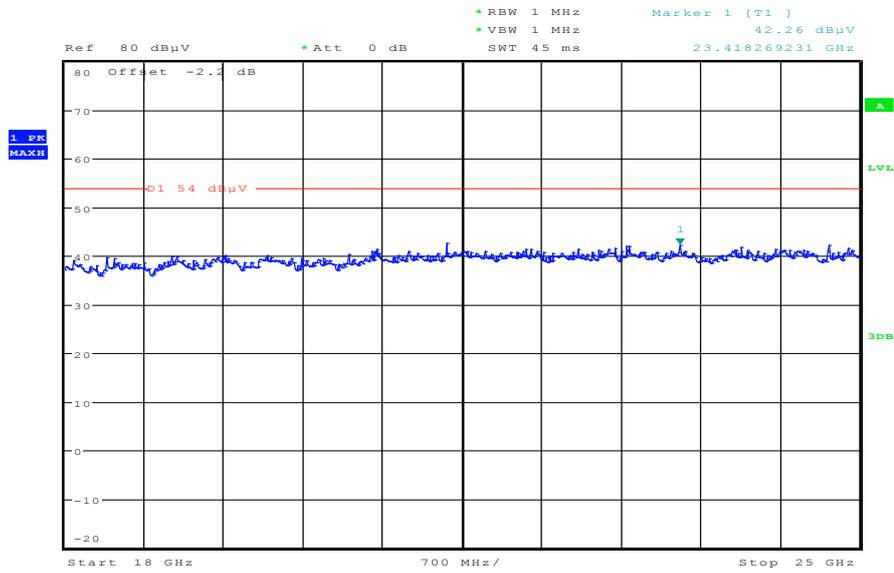


Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 5.JUL.2012 15:02:25

Plot 4: Lowest channel, 18 GHz to 25 GHz, vertical & horizontal polarization



Date: 5.JUL.2012 15:13:23

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

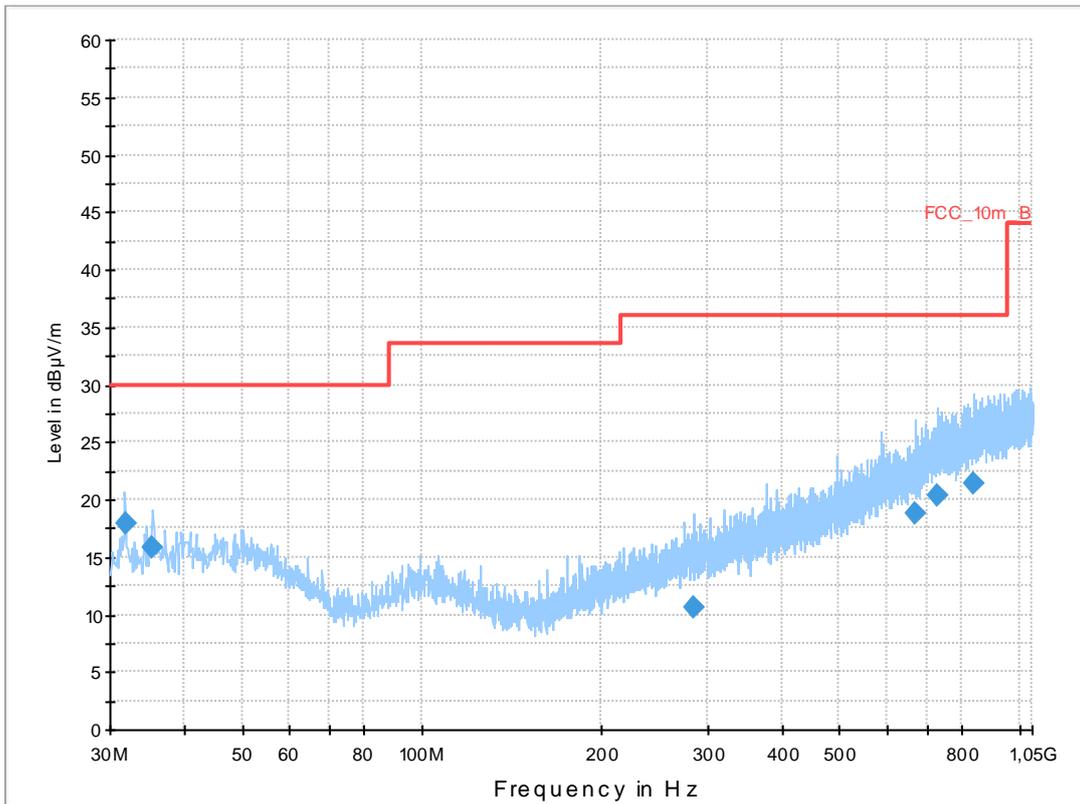
Common Information

EUT: PM-0140-BV
 Serial Number: CB511Z7M8M
 Test Description: FCC part 15 B class B @ 10 m
 Operating Conditions: W-LAN B_mode ch 6
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

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

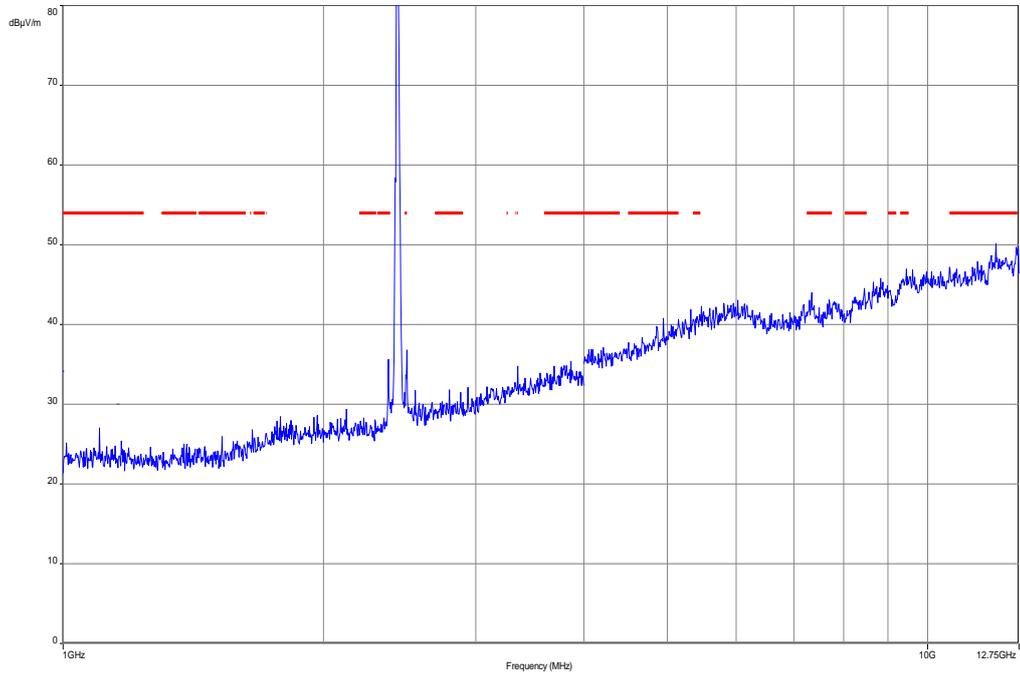
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



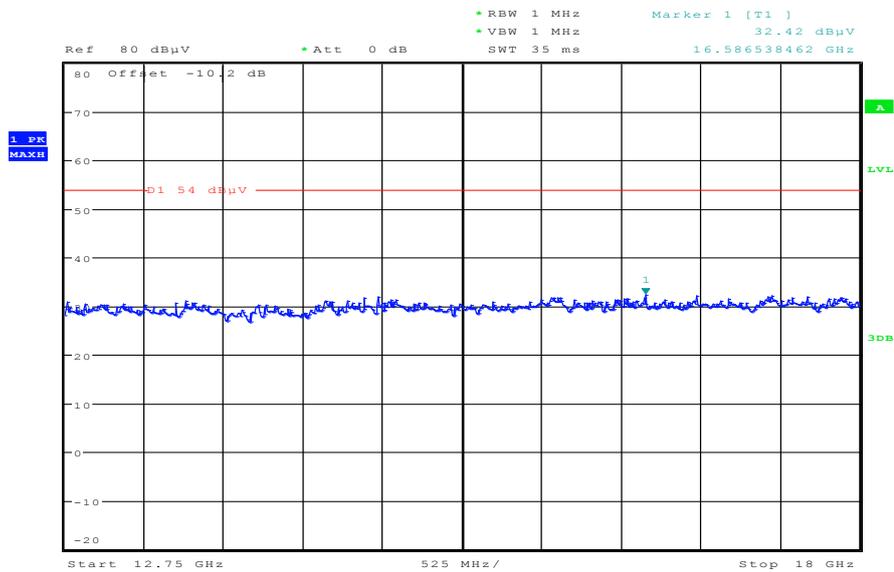
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.910850	17.9	1000.0	120.000	172.0	V	100.0	12.7	12.1	30.0	
35.266950	15.9	1000.0	120.000	172.0	V	10.0	13.0	14.1	30.0	
285.685800	10.6	1000.0	120.000	120.0	H	280.0	14.2	25.4	36.0	
670.241550	18.8	1000.0	120.000	172.0	H	100.0	21.7	17.2	36.0	
729.489450	20.3	1000.0	120.000	172.0	H	260.0	23.2	15.7	36.0	
835.571100	21.5	1000.0	120.000	172.0	H	100.0	24.3	14.5	36.0	

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

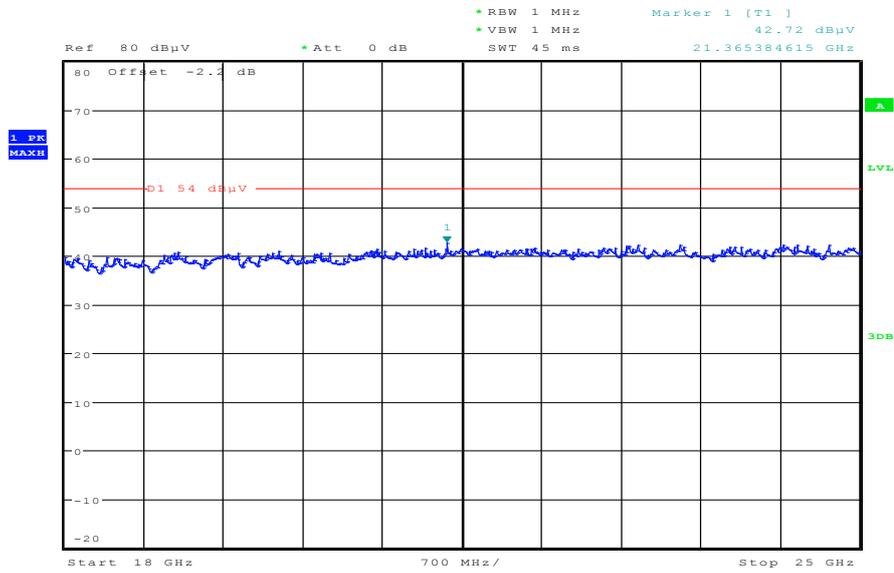


Plot 7: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 5.JUL.2012 15:03:59

Plot 8: Middle channel, 18 GHz to 25 GHz, vertical & horizontal polarization



Date: 5.JUL.2012 15:14:26

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

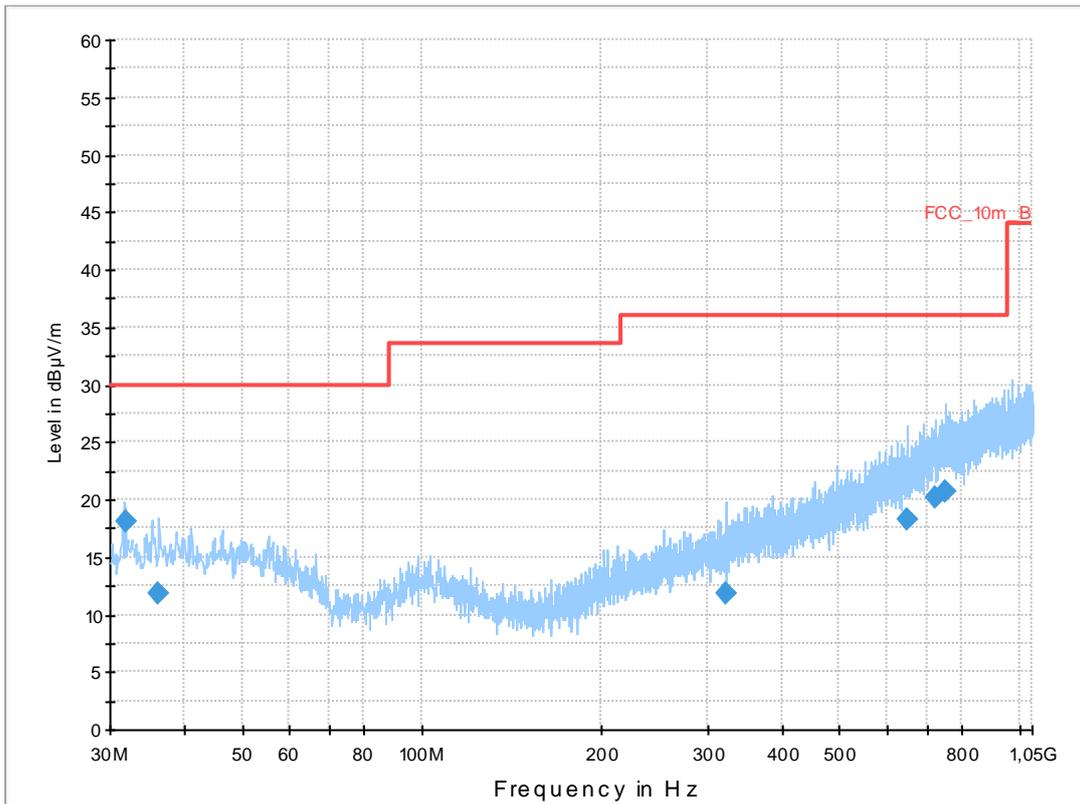
Common Information

EUT: PM-0140-BV
 Serial Number: CB511Z7M8M
 Test Description: FCC part 15 B class B @ 10 m
 Operating Conditions: W-LAN B_mode ch 11
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

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

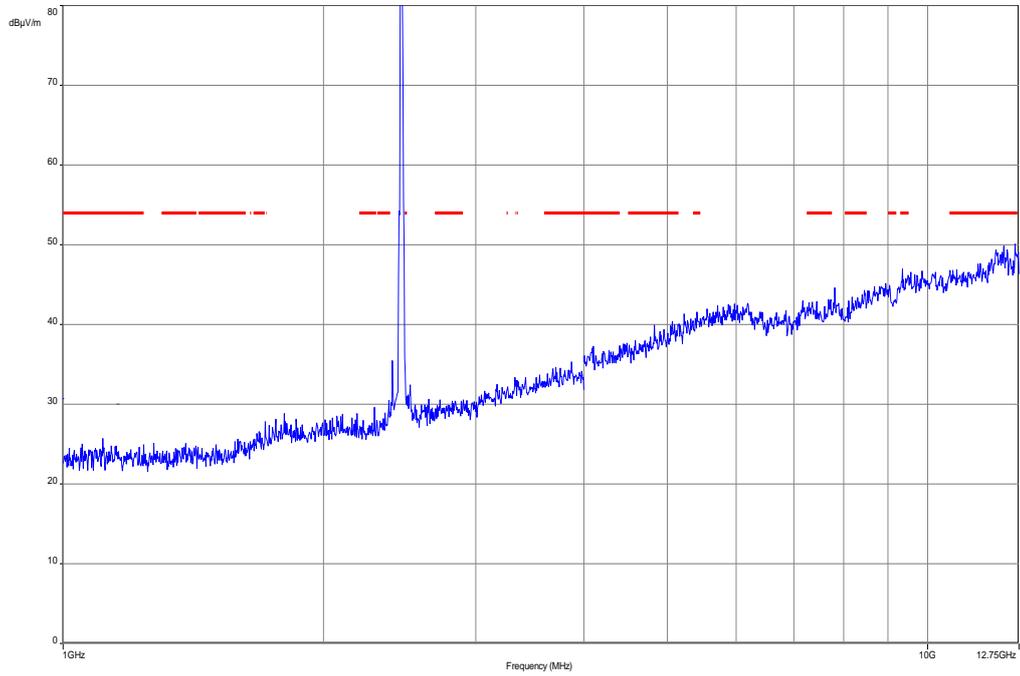
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



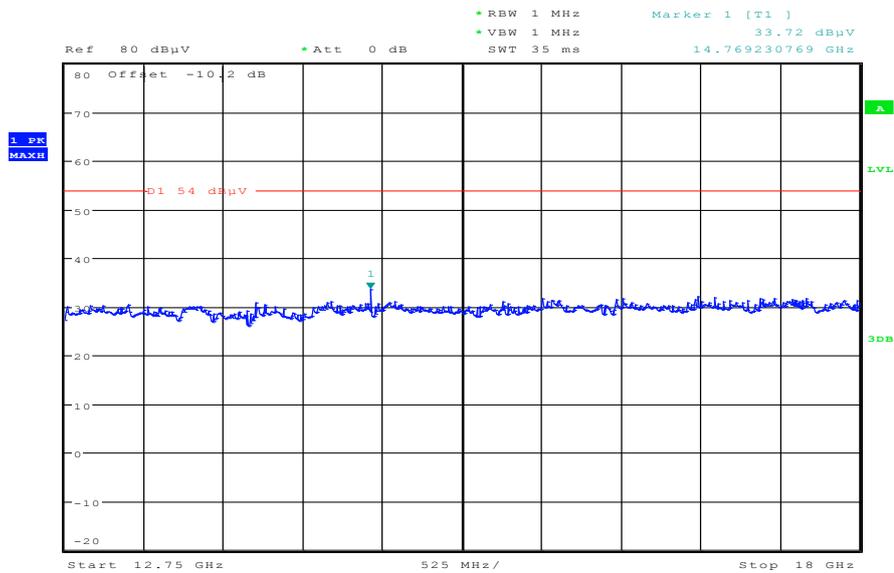
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.907850	18.1	1000.0	120.000	98.0	V	175.0	12.7	11.9	30.0	
36.274350	11.8	1000.0	120.000	98.0	V	280.0	13.1	18.2	30.0	
323.086500	11.8	1000.0	120.000	98.0	V	280.0	15.3	24.2	36.0	
651.180750	18.3	1000.0	120.000	170.0	H	10.0	21.1	17.7	36.0	
725.964300	20.2	1000.0	120.000	170.0	V	190.0	23.1	15.8	36.0	
754.375500	20.7	1000.0	120.000	170.0	V	280.0	23.7	15.3	36.0	

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

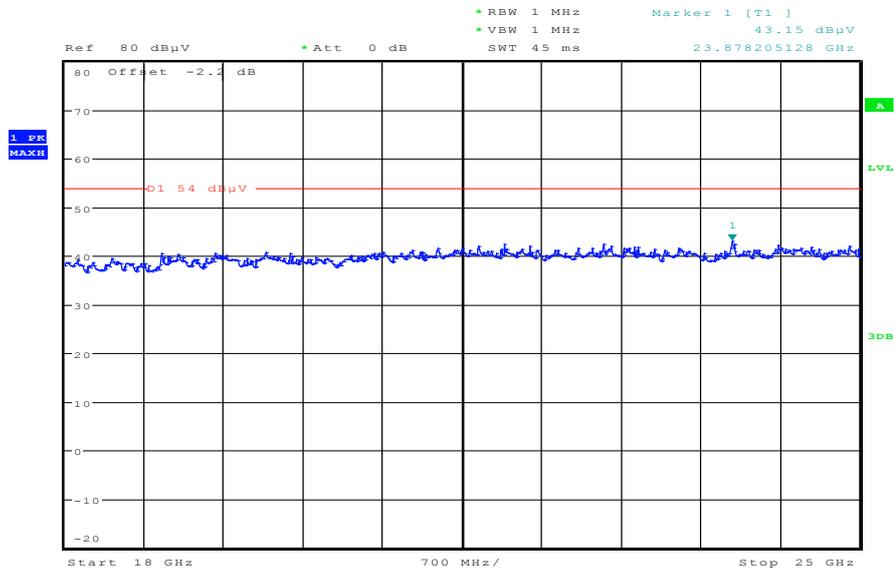


Plot 11: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 5.JUL.2012 15:05:31

Plot 12: Highest channel, 18 GHz to 25 GHz, vertical & horizontal polarization



Date: 5.JUL.2012 15:15:12

Plots: OFDM / g – mode

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

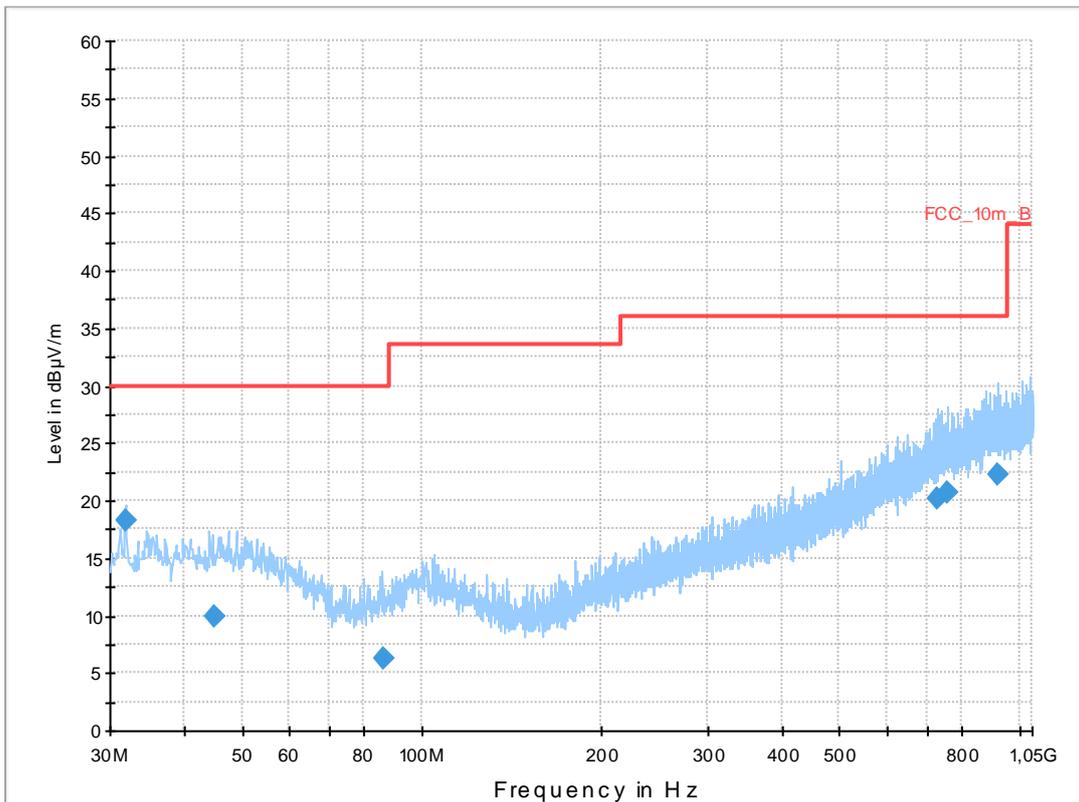
Common Information

EUT: PM-0140-BV
 Serial Number: CB511Z7M8M
 Test Description: FCC part 15 B class B @ 10 m
 Operating Conditions: W-LAN G_mode ch 1+charging
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

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

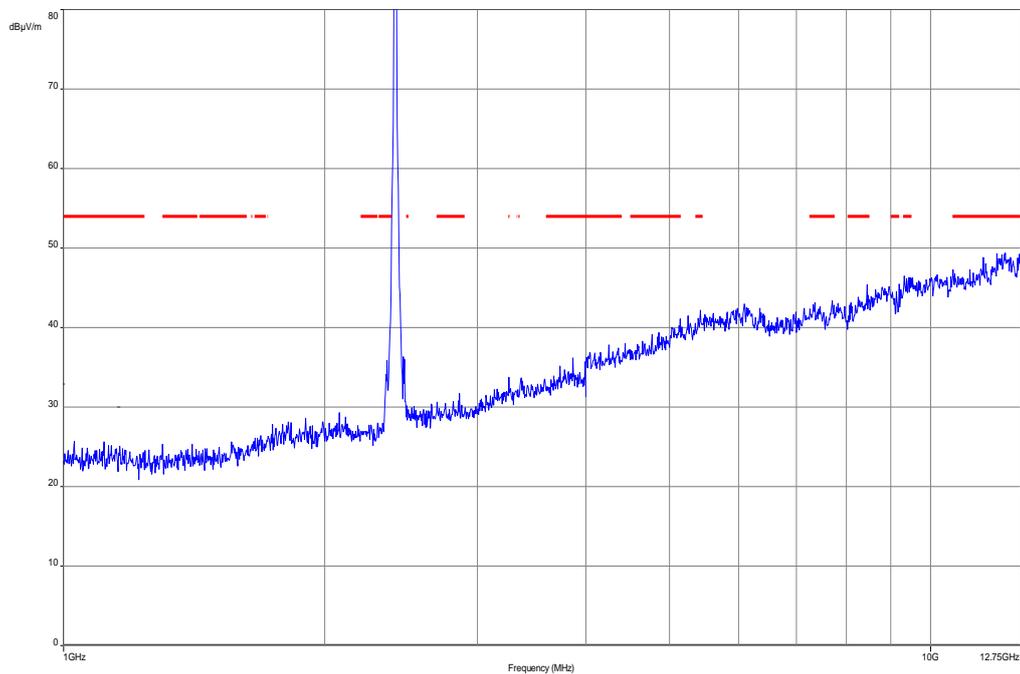
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



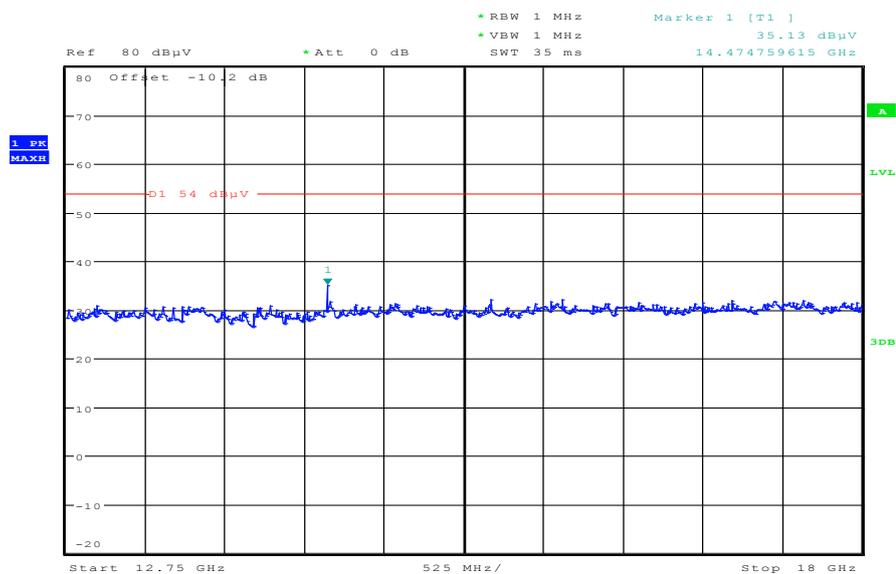
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.950750	18.3	1000.0	120.000	98.0	V	170.0	12.7	11.7	30.0	
44.852850	9.9	1000.0	120.000	170.0	H	100.0	13.3	20.1	30.0	
86.318850	6.3	1000.0	120.000	170.0	H	10.0	10.0	23.7	30.0	
727.020000	20.2	1000.0	120.000	170.0	V	90.0	23.1	15.8	36.0	
757.485600	20.7	1000.0	120.000	98.0	V	90.0	23.7	15.3	36.0	
922.855200	22.2	1000.0	120.000	170.0	V	-5.0	25.3	13.8	36.0	

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

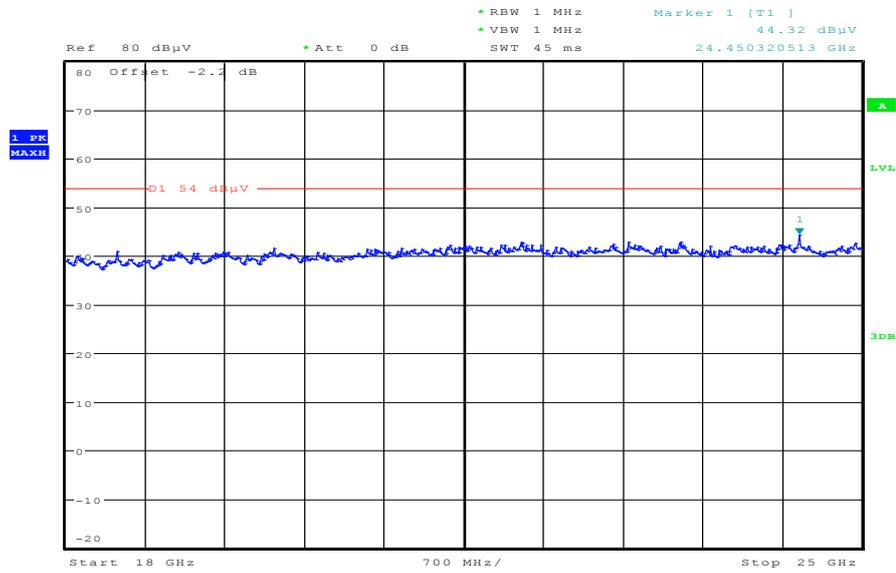


Plot 3: Lowest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 5.JUL.2012 15:06:56

Plot 4: Lowest channel, 18 GHz to 25 GHz, vertical & horizontal polarization



Date: 5.JUL.2012 15:20:04

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

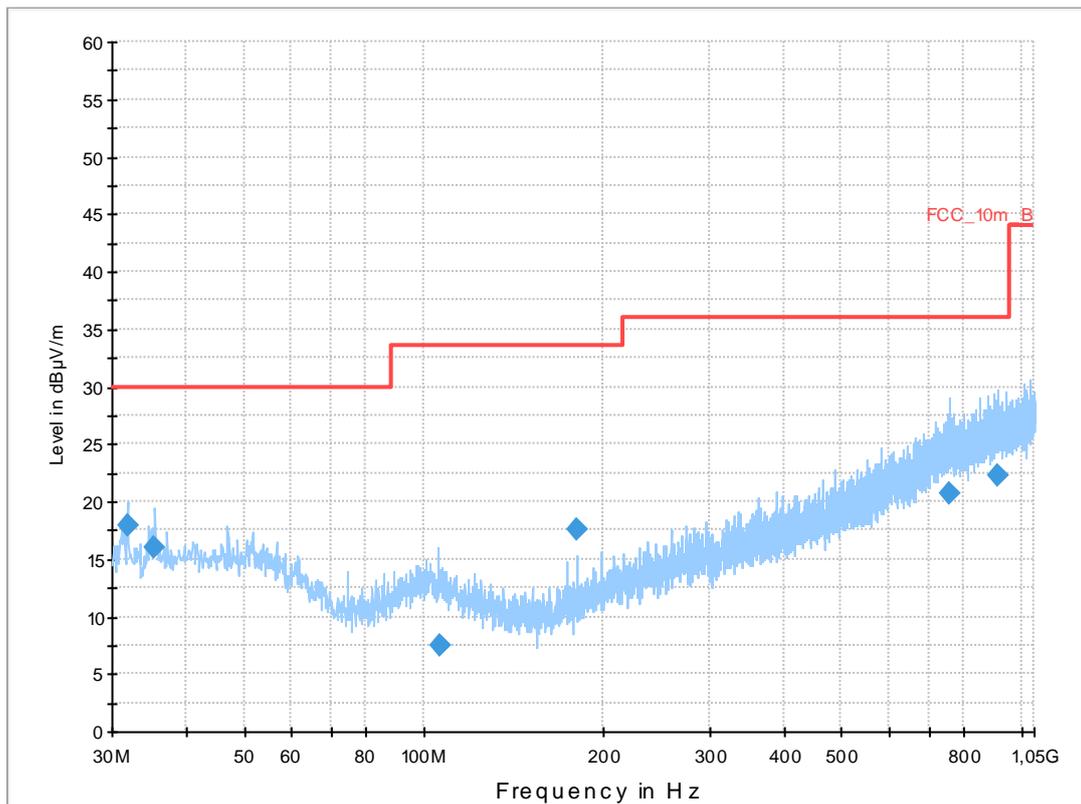
Common Information

EUT: PM-0140-BV
 Serial Number: CB511Z7M8M
 Test Description: FCC part 15 B class B @ 10 m
 Operating Conditions: W-LAN G_mode ch 6+charging
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

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

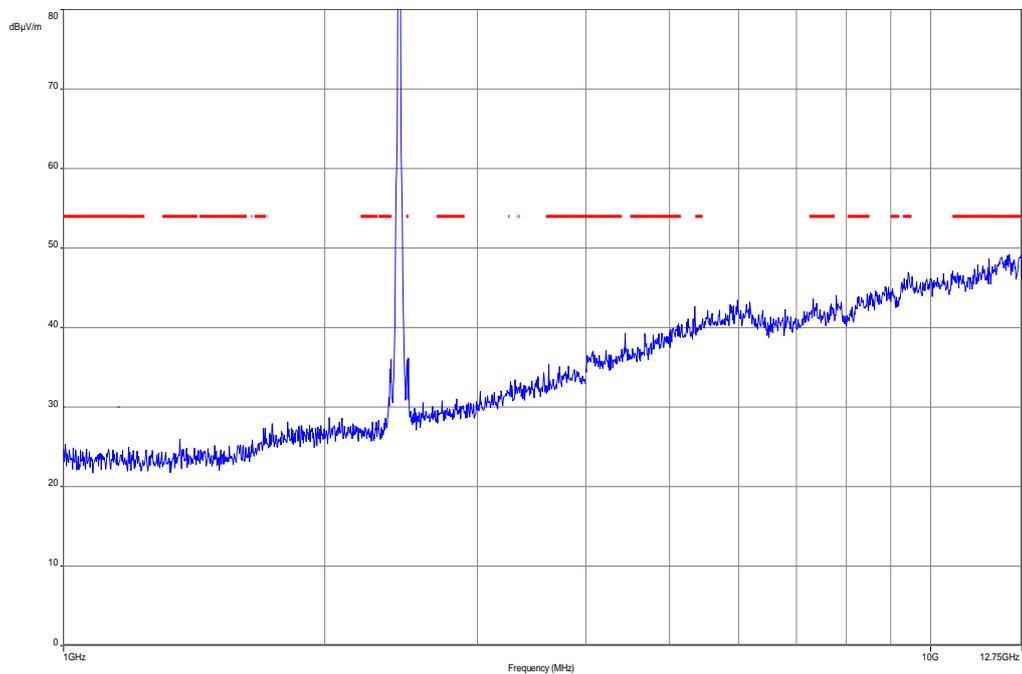
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



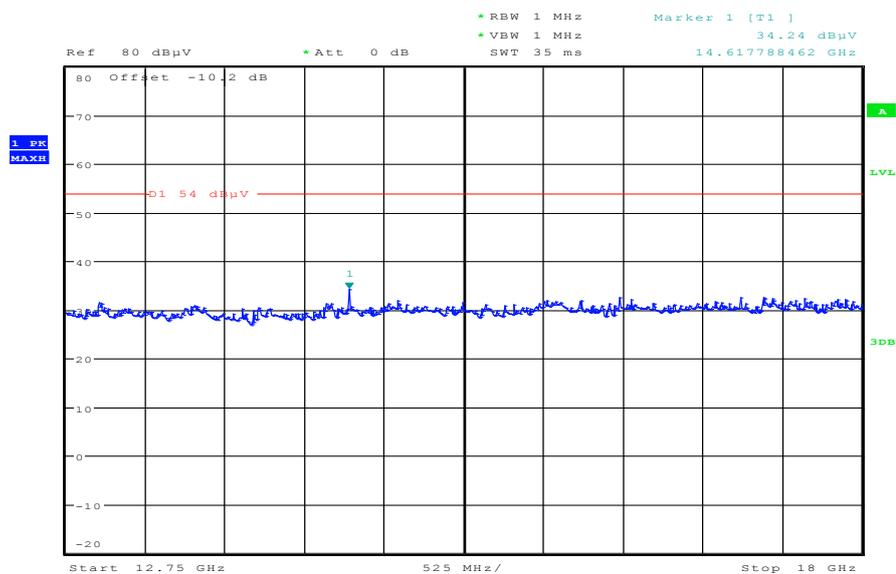
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.952100	18.0	1000.0	120.000	170.0	V	190.0	12.7	12.0	30.0	
35.369250	16.0	1000.0	120.000	170.0	V	178.0	13.1	14.0	30.0	
105.992550	7.5	1000.0	120.000	170.0	H	280.0	11.4	26.0	33.5	
180.015000	17.6	1000.0	120.000	170.0	V	80.0	10.4	15.9	33.5	
760.708500	20.7	1000.0	120.000	152.0	H	265.0	23.7	15.3	36.0	
912.991500	22.2	1000.0	120.000	170.0	H	93.0	25.2	13.8	36.0	

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

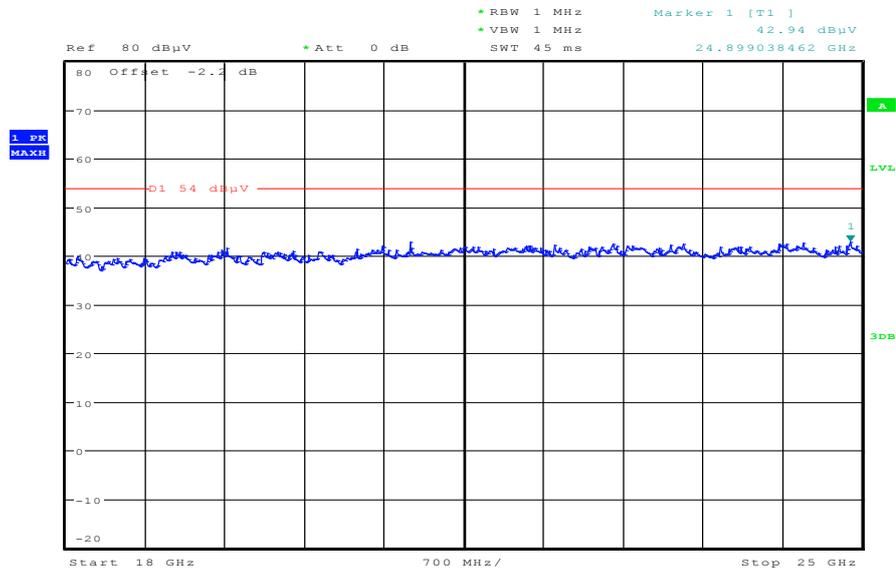


Plot 7: Middle channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 5.JUL.2012 15:08:54

Plot 8: Middle channel, 18 GHz to 25 GHz, vertical & horizontal polarization



Date: 5.JUL.2012 15:23:47

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

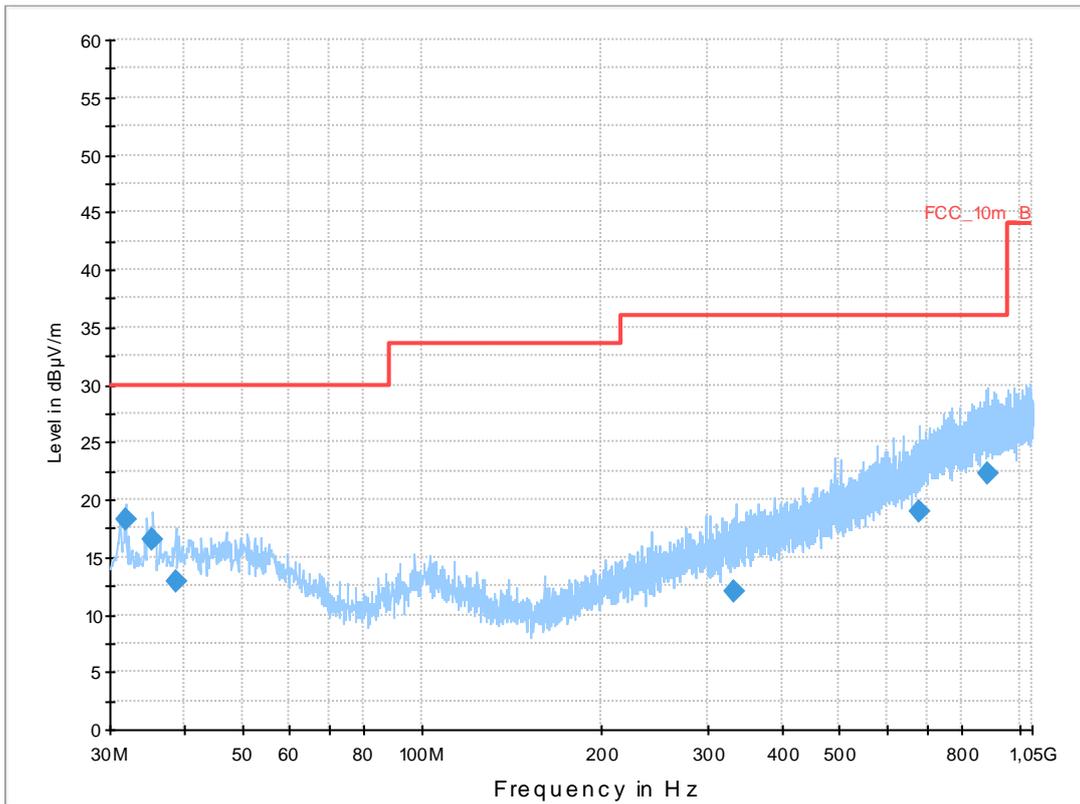
Common Information

EUT: PM-0140-BV
 Serial Number: CB511Z7M8M
 Test Description: FCC part 15 B class B @ 10 m
 Operating Conditions: W-LAN G_mode ch 11+charging
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

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

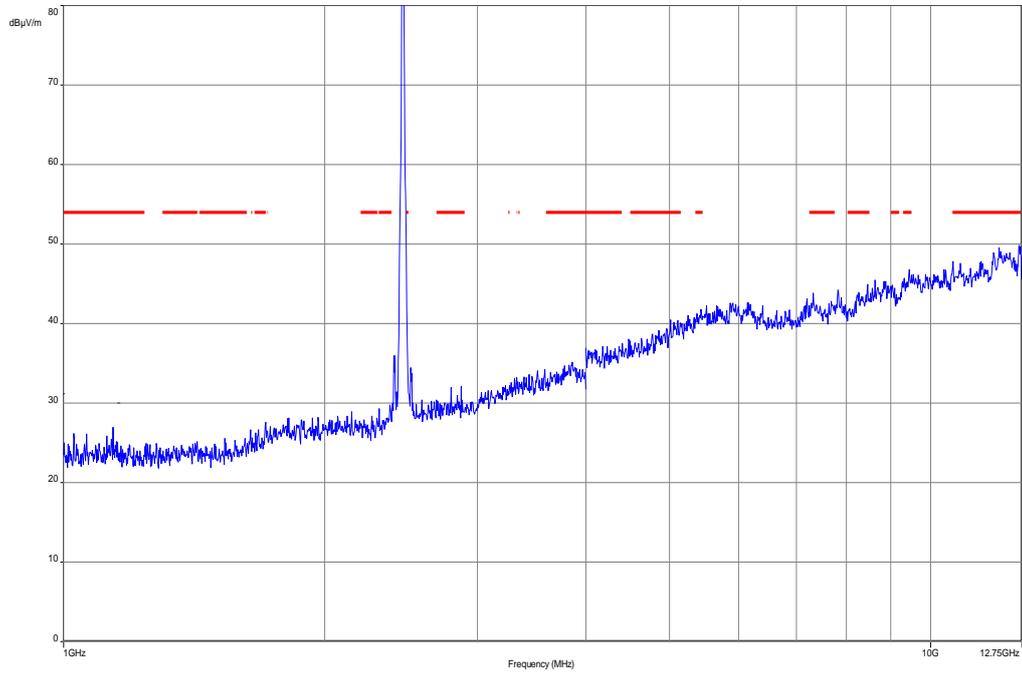
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



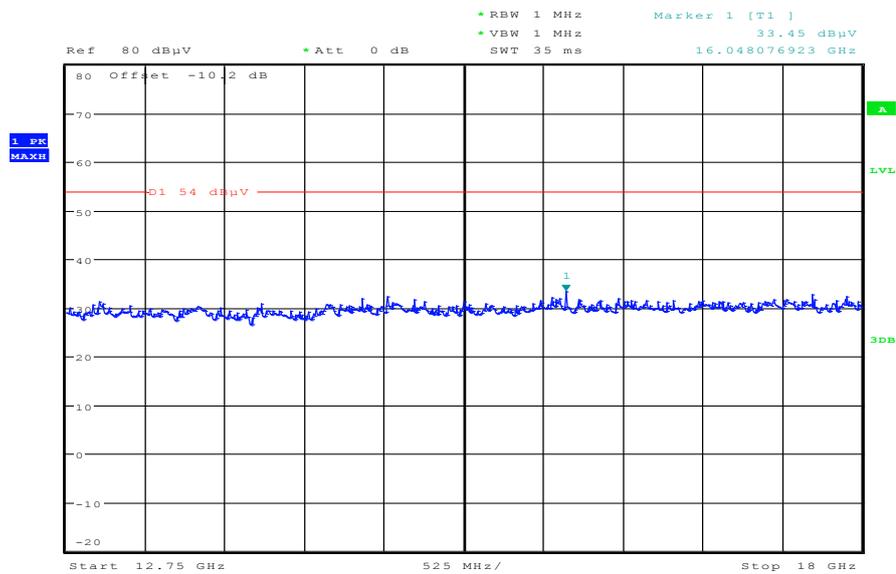
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.936800	18.2	1000.0	120.000	98.0	V	180.0	12.7	11.8	30.0	
35.369700	16.5	1000.0	120.000	98.0	V	100.0	13.1	13.5	30.0	
38.709750	13.0	1000.0	120.000	170.0	V	-9.0	13.3	17.0	30.0	
334.092000	12.0	1000.0	120.000	170.0	V	92.0	15.6	24.0	36.0	
679.839150	19.0	1000.0	120.000	143.0	H	2.0	21.9	17.0	36.0	
886.650000	22.2	1000.0	120.000	170.0	V	170.0	25.0	13.8	36.0	

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

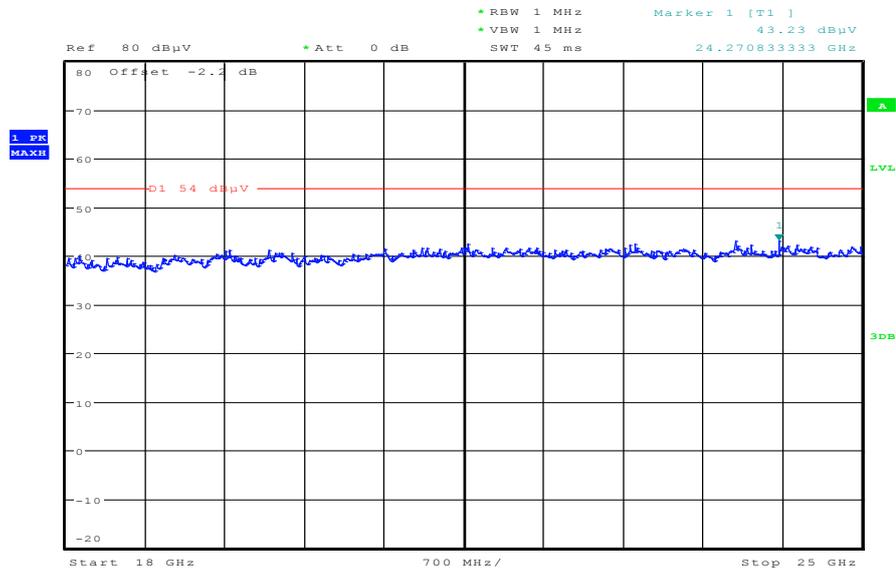


Plot 11: Highest channel, 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 5.JUL.2012 15:10:19

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



Date: 5.JUL.2012 15:25:16

9.11 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:	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.		
Above 1 GHz: All detected emissions are below the limit – see plots!		
Measurement uncertainty	± 3 dB	

Result: Passed.

Plots: RX / Idle – mode

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

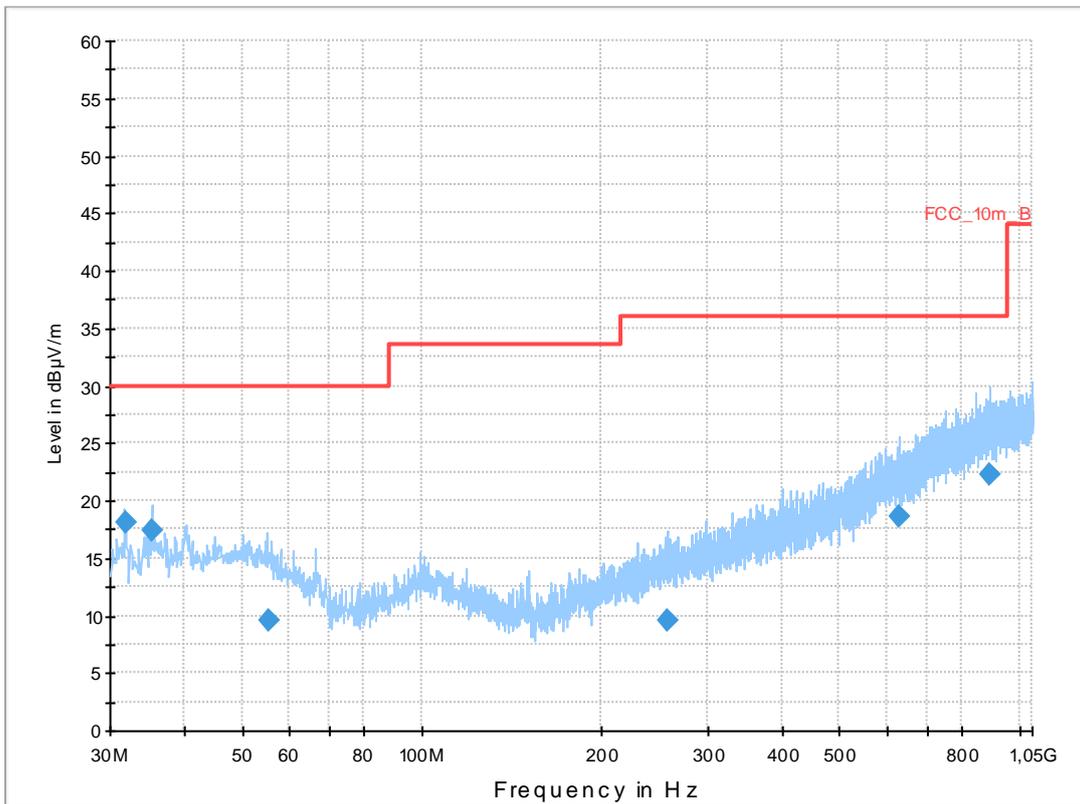
Common Information

EUT: PM-0140-BV
 Serial Number: CB511Z7M8M
 Test Description: FCC part 15 B class B @ 10 m
 Operating Conditions: W-LAN B_mode idle
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

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

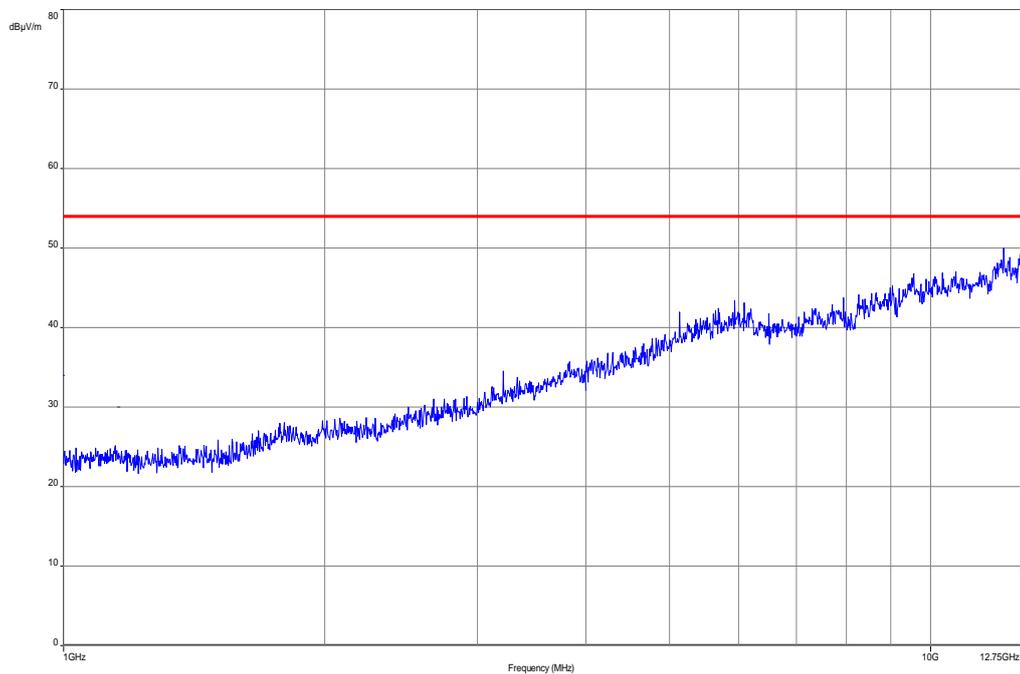
Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
30 MHz - 2 GHz	60 kHz	QPK	120 kHz	1 s	20 dB



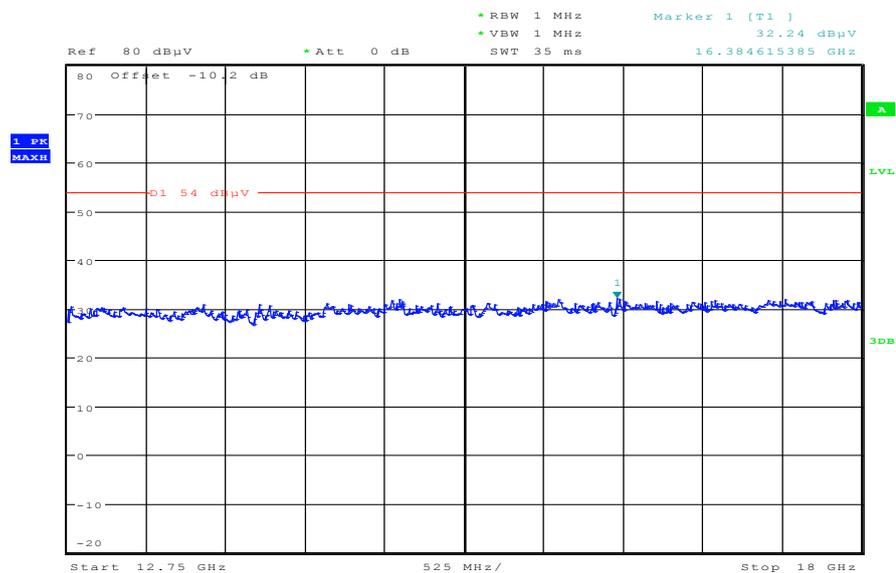
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.898250	18.1	1000.0	120.000	170.0	V	3.0	12.7	11.9	30.0	
35.296050	17.3	1000.0	120.000	98.0	V	10.0	13.0	12.7	30.0	
55.579200	9.5	1000.0	120.000	170.0	H	100.0	12.7	20.5	30.0	
256.905300	9.6	1000.0	120.000	170.0	H	190.0	13.5	26.4	36.0	
629.927550	18.6	1000.0	120.000	170.0	V	-10.0	21.0	17.4	36.0	
894.037050	22.2	1000.0	120.000	170.0	H	177.0	25.1	13.8	36.0	

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

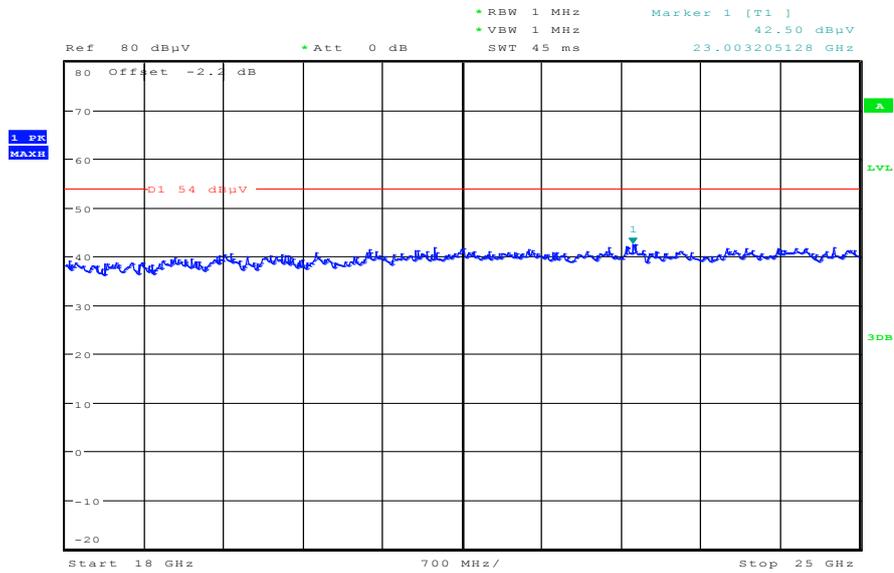


Plot 3: 12.75 GHz to 18 GHz, vertical & horizontal polarization



Date: 5.JUL.2012 15:10:59

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



Date: 5.JUL.2012 15:13:01

9.12 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 critical peaks are found channel 1 and channel 11 will be measured too. The measurement is performed with the data rate producing the highest output power. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

Measurement:

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

Limits:

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

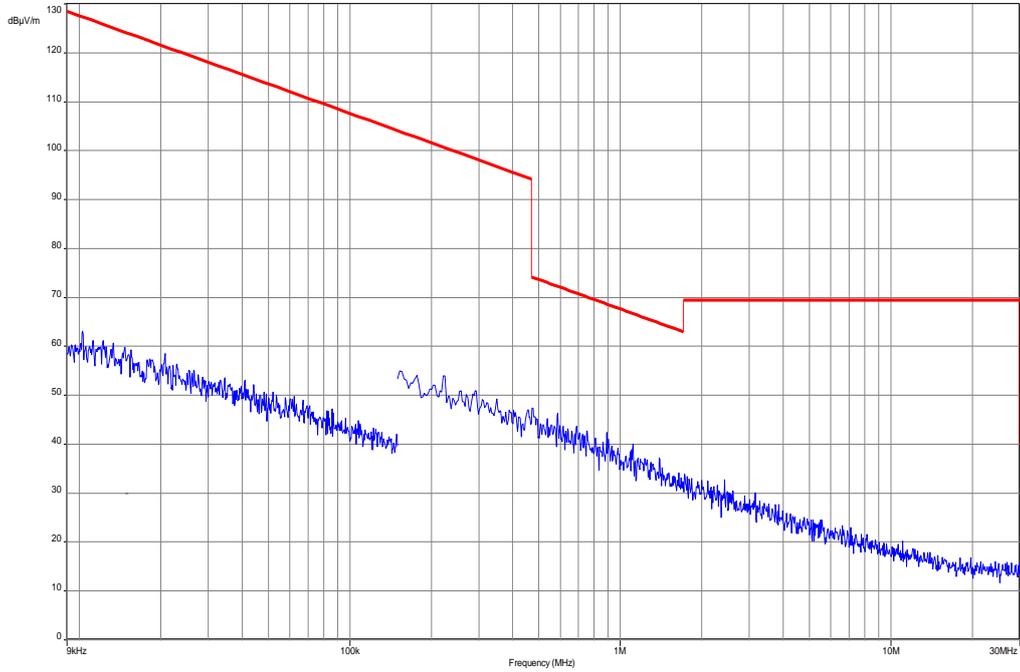
Results:

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

Result: Passed

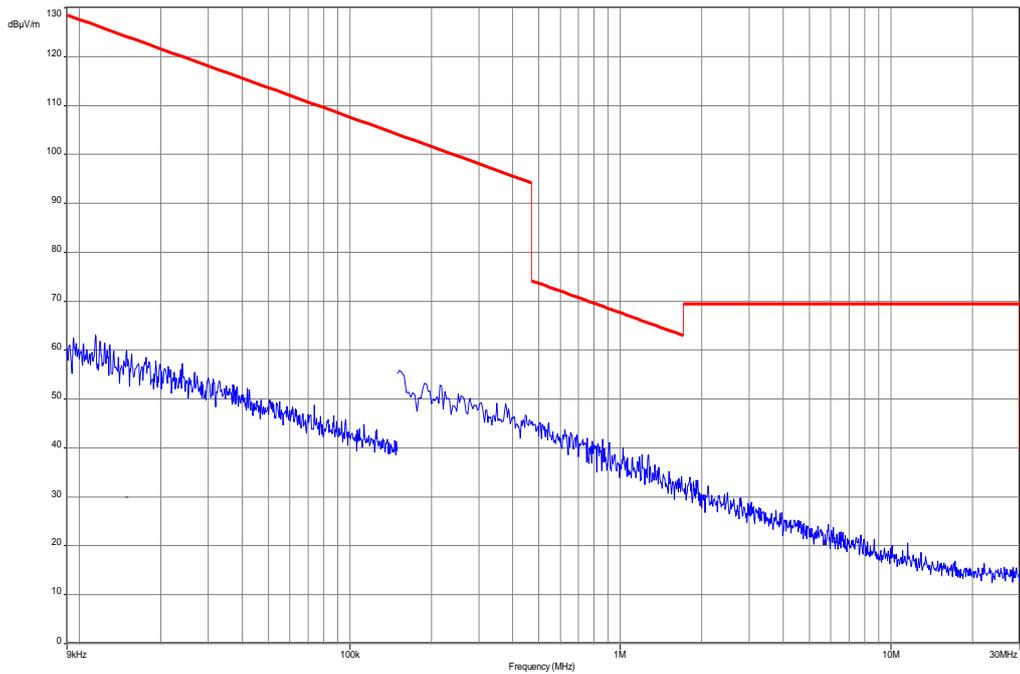
Plots: TX mode

Plot 1: 9 kHz to 30 MHz



Plots: RX / Idle – mode

Plot 1: 9 kHz to 30 MHz



9.13 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 critical peaks are found channel 1 and channel 11 will be measured too. The measurement is performed with the data rate producing the highest output power. Both power lines, phase and neutral line, are measured. Found peaks are remeasured with average and quasi peak detection to show compliance to the limits.

Measurement:

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

Limits:

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

*Decreases with the logarithm of the frequency

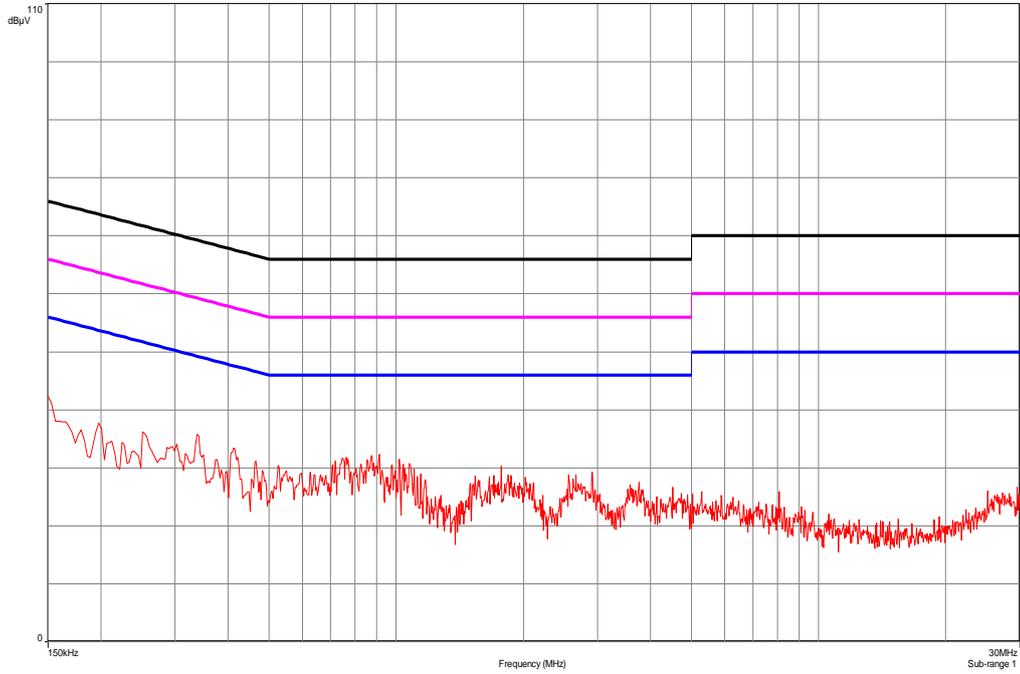
Results:

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

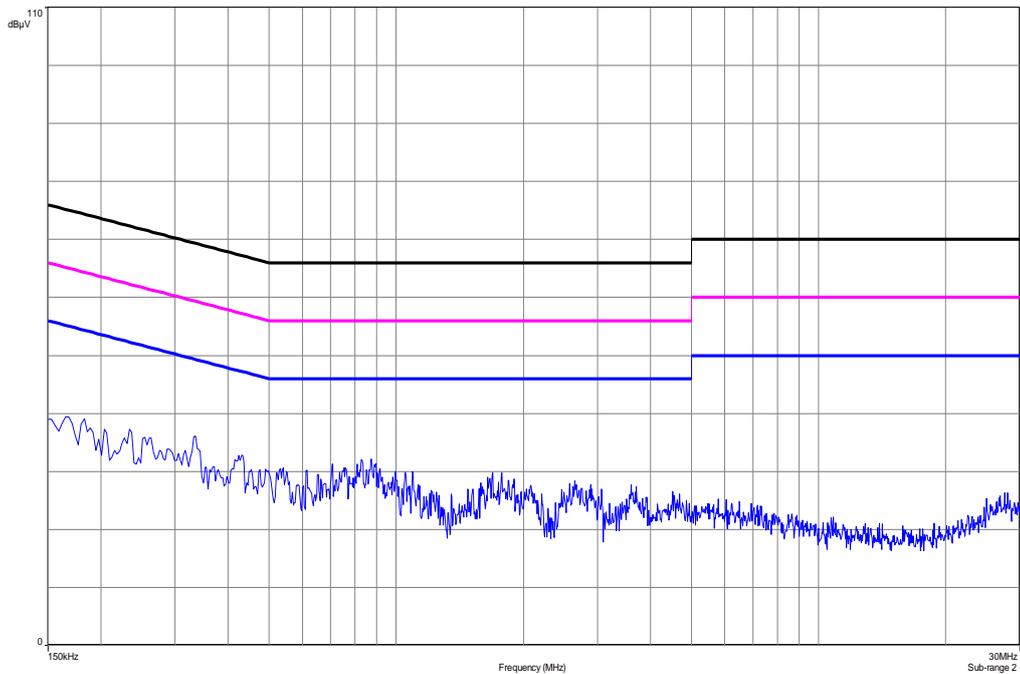
Result: Passed

Plots:

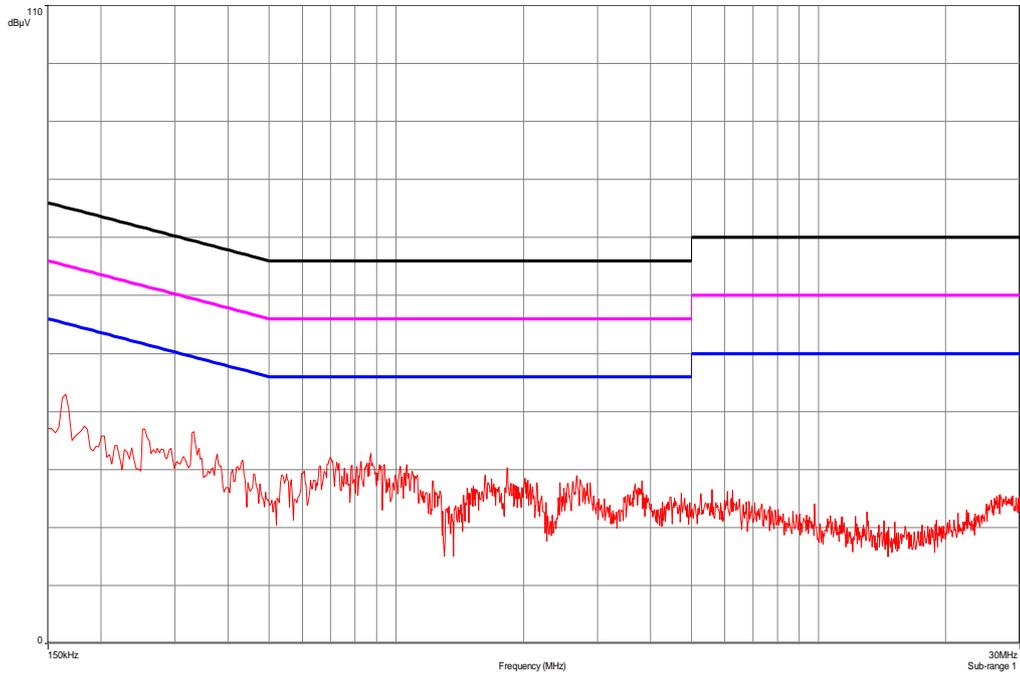
Plot 1: TX mode, 9 kHz to 30 MHz, phase line



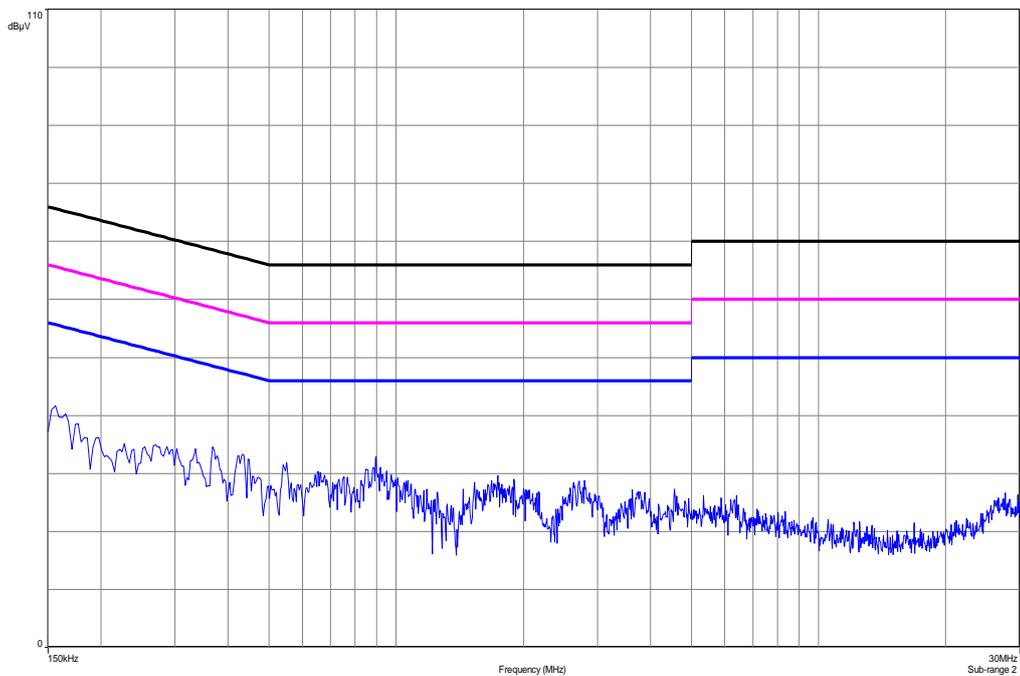
Plot 2: TX mode, 9 kHz to 30 MHz, neutral line



Plot 3: RX / Idle – mode, 9 kHz to 30 MHz, phase line



Plot 4: RX / Idle – mode, 9 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	n. a.	Isolating Transformer	RT5A	Grundig	8041	300001626	g		
2	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	11.05.2011	11.05.2013
3	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
4	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev		
5	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
6	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
7	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
8	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
9	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
10	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
11	n. a.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
12	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vIKI!	14.10.2011	14.10.2014
13	n. a.	MXE EMI Receiver 20 Hz bis 26,5 GHz	N9038A	Agilent Technologies	MY51210197	300004405	k	19.12.2011	19.12.2012
14	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
15	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	ne		
16	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081; B5979	300000210	ne		
17	n. a.	EMI Test Receiver	ESCI 1166.5950.03	R&S	100083	300003312	k	04.01.2012	04.01.2013
18	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0205	300003314	k	14.07.2011	14.07.2013
19	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
20	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
21	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
22	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
23	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k		

24	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	06.01.2012	06.01.2014
25	11b	Microwave System Amplifier, 0.5-26.5 GHz	83017A	HP Meßtechnik	00419	300002268	ev		
26	A026	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda		300000787	ne		
27	A029	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda		300002442	ne		
28	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	ve		
29	n. a.	Spectrum Analyzer 9kHz to 30GHz - 140..+30dBm	FSP30	R&S	100886	300003575	k	07.09.2010	07.09.2012

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

11 Observations

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

Annex D Document history

Version	Applied changes	Date of release
1.0	Initial release	2012-07-10
-A	New standard version	2012-08-30

Annex E 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 F Accreditation Certificate



Front side of certificate



Back side of certificate

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/fileadmin/de/CETECOM_D_Saarbruecken/accreditations_Jan_2010/DAKKS_Akkredi_Urk_EN17025-En_incl_Annex.pdf