

TEST REPORT

Test report no.: 1-1554-01-14/09-B



Testing laboratory

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

Accredited test laboratory:

The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025
DAR registration number: DGA-PL-176/94-D1

Area of Testing: Radio/Satellite Communications

Applicant

Digi International GmbH
Branch Breisach
Kueferstr.8
79206 Breisach / Germany
Phone: -/
Fax: +49 7667 908 200
Contact: Andreas Ortlieb
e-mail: andreas.ortlieb@digi.com
Phone: +49 7667 908 136

Manufacturer

Digi International GmbH
Branch Breisach
Kueferstr.8
79206 Breisach / Germany

Test standard/s

47 CFR Part 15 Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission
subchapter A - general, 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: WLAN Modul
Model name: ConnectCore Wi-i.Mx51
FCC ID: MCQ-50M1699
IC: 1846A-50M1699
Frequency [MHz]: 2400 MHz to 2483.5 MHz – ISM band
lowest channel 2412 MHz – highest channel 2462 MHz
Power supply: 115.0V AC by AC/DC power supply
Temperature range: -20 °C to +55 °C

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

Test performed:

Test report authorised:

Marco Bertolino

Stefan Bös

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2 General information

2.1 Notes

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 generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM ICT Services GmbH.

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2.2 Application details

Date of receipt of order:	2010-02-17
Date of receipt of test item:	2010-10-01
Start of test:	2010-10-05
End of test:	2010-12-07
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Version	Test standard description
47 CFR Part 15	2009-10	Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission subchapter A - general, 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

4 Test environment

Temperature:	T _{nom}	+24 °C during room temperature tests
	T _{max}	+55 °C during high temperature test
	T _{min}	-20 °C during low temperature test
Relative humidity content:		60 %
Air pressure:		not relevant for this kind of testing
Power supply:	V _{nom}	115.0 V AC by AC/DC power supply
	V _{max}	126.5 V
	V _{min}	103.5 V

5 Test item

Kind of test item	:	WLAN Modul
Type identification	:	ConnectCore Wi-i.Mx51
S/N serial number	:	Prototype 55001445-92
HW hardware status	:	No information available!
SW software status	:	No information available!
Frequency band [MHz]	:	2400 MHz to 2483.5 MHz – ISM band lowest channel 2412 MHz – highest channel 2462 MHz
Type of modulation	:	DSSS and OFDM technology with BPSK, QPSK, 16- & 64 QAM modulation
Number of channels	:	11
Antenna	:	External rod antenna → for more information please take a look at the annex B – photos of the EUT
Power supply	:	115.0 V AC by AC/DC power supply
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, Annex 8	Passed	2011-01-12	-/-

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	☒	☐	☐	☐	-/-
§15.247(e) RSS 210 / A8.2(b)	Power spectral density	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	-/-
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth of a FHSS system 6dB bandwidth	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	-/-
§15.247(a)(2) RSS 210 / A8.2(a)	Spectrum bandwidth of a FHSS system 20dB bandwidth	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	-/-
§15.247(b)(3) RSS-210 / A8.4(4)	Maximum output power	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	-/-
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	-/-
§15.205 RSS-210 / A8.5	Band edge compliance radiated	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	-/-
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	-/-
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	-/-
§15.109 RSS-Gen.	RX spurious emissions radiated	Nominal	Nominal	-/-	☒	☐	☐	☐	-/-
§15.209(a) RSS-Gen	TX spurious emissions radiated < 30 MHz	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	-/-
§15.107(a)	Conducted emissions < 30 MHz	Nominal	Nominal	DSSS OFDM	☒ ☒	☐ ☐	☐ ☐	☐ ☐	-/-

Note: NA = Not Applicable; NP = Not Performed

8 RF measurement testing

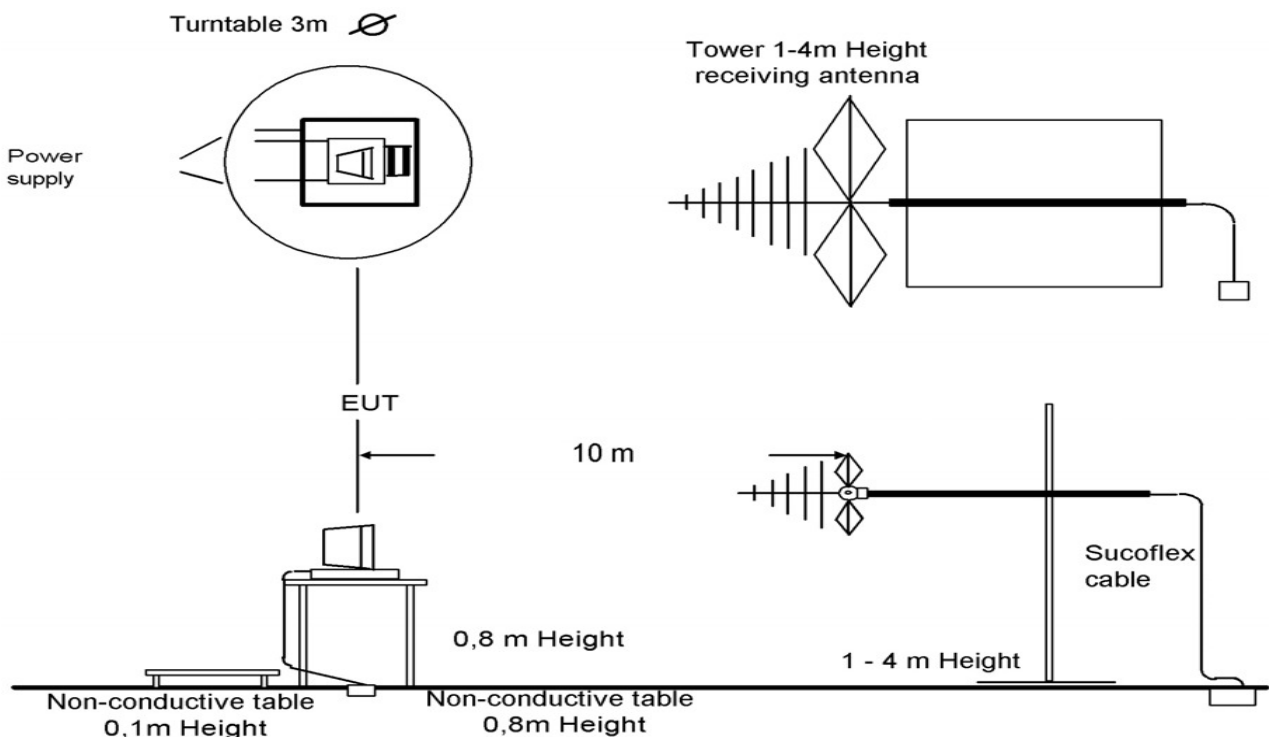
8.1 Description of test setup

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



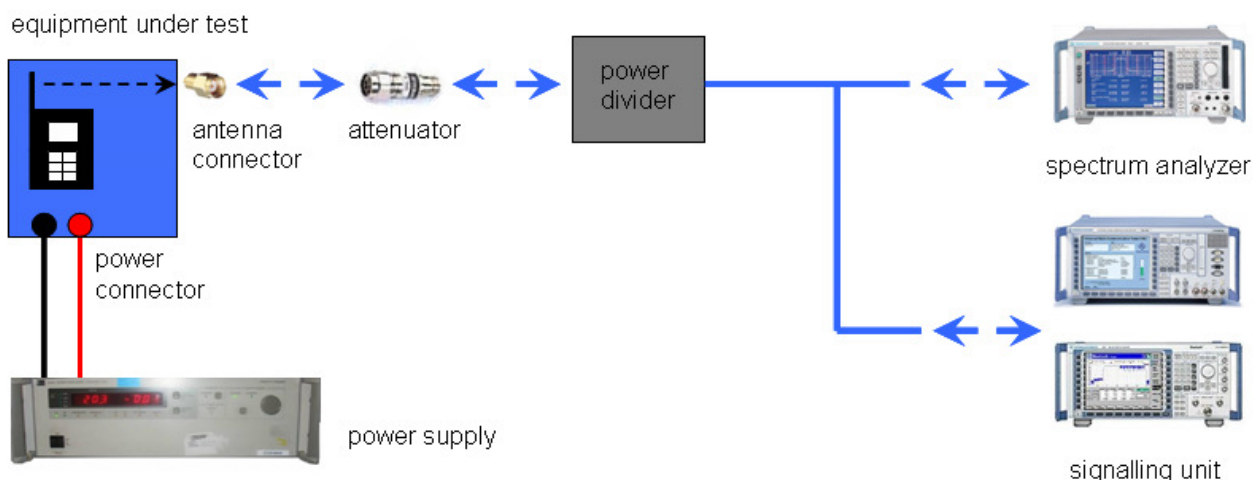
Picture 1: Diagram radiated measurements

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.
Iperf was used to ping an other 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	:	1-1554-01-14/09-B
Equipment model number	:	ConnectCore Wi-i.Mx51
Certification number	:	1846A-50M1699
Manufacturer (complete address)	:	Digi International GmbH Branch Breisach Kueferstr.8 79206 Breisach / Germany
Tested to radio standards specification no.	:	RSS 210, Issue 8, Annex 8
Open area test site IC No.	:	IC 3462C-1
Frequency range	:	2400 MHz to 2483.5 MHz – ISM band lowest channel 2412 MHz – highest channel 2462 MHz
RF-power [W] (max.)	:	cond.: 37.15 mW (DSSS) 68.08 mW (OFDM g – mode) 87.50 mW (OFDM n – mode) EIRP: 78.70 mW (DSSS) 144.21 mW (OFDM g – mode) 185.35 mW (OFDM n – mode)
Occupied bandwidth (-20 dB BW) [MHz]	:	DSSS: 13.99 MHz OFDM g – mode: 20.14 MHz OFDM n – mode: 19.71 MHz
Type of modulation	:	DSSS and OFDM technology with BPSK, QPSK, 16- & 64 QAM modulation
Emission designator (TRC-43)	:	14M0G1D (DSSS) 20M1G7D (OFDM g – mode) 19M7G7D (OFDM n – mode)
Antenna information	:	External rod antenna → for more information please take a look at the annex B or – photos of the EUT
Transmitter spurious (worst case) [dBμV/m @ 3m]:		50.03 dBμV/m @ 4924 MHz (DSSS) 49.72 dBμV/m @ 4924 MHz (OFDM g – mode)
Receiver spurious (worst case) [dBμV/m @ 3m]:		44.45 dBμV/m @ 24.9 GHz (noise floor)

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:

2011-01-12

Date

Marco Bertolino

Name



Signature

9 Measurement results

9.1 Maximum output power (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
Video bandwidth:	30 MHz
Resolution bandwidth:	50 MHz
Span:	100 MHz
Trace-Mode:	Max Hold

Results:

DSSS	Maximum Output Power Conducted [dBm]			
	1	2	5.5	11
Data Rate [MBit/s]				
Ch 6 - 2437 MHz	15.31	15.32	15.38	15.39
Measurement uncertainty	± 0.5 dB			

OFDM	Maximum Output Power Conducted [dBm]							
	6	9	12	18	24	36	48	54
Data Rate [MBit/s]								
Ch 6 - 2437 MHz	18.14	18.13	18.16	18.02	18.17	18.01	18.06	18.09
Measurement uncertainty	± 0.5 dB							

OFDM	Maximum Output Power Conducted [dBm]							
	mcs 0	mcs 1	mcs 2	mcs 3	mcs 4	mcs 5	mcs 6	mcs 7
Data Rate [MBit/s]								
Ch 6 - 2437 MHz	19.09	19.04	19.28	18.92	19.18	19.25	19.15	19.29
Measurement uncertainty	± 0.5 dB							

Result: Selected data rate for all measurements:

DSSS:

OFDM g mode:

OFDM n mode:

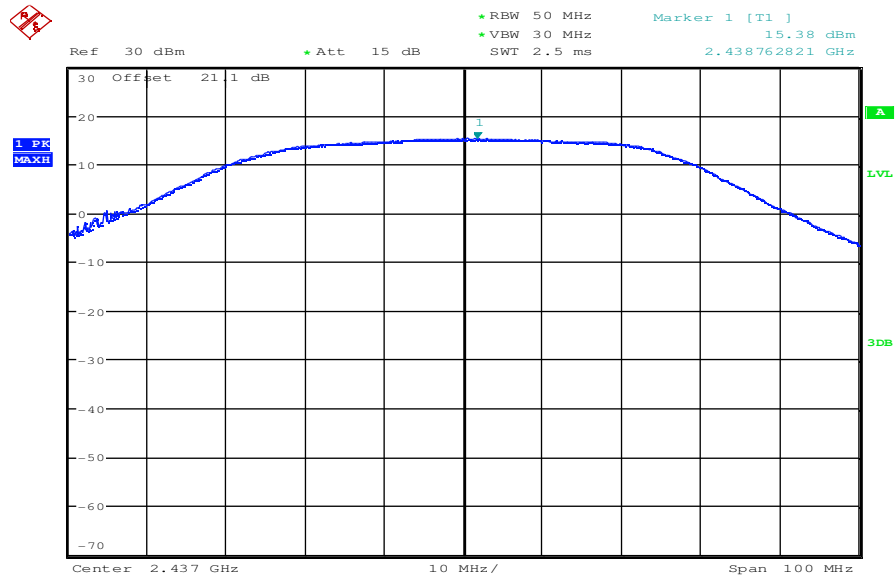
11 MBit/s

24 MBit/s

mcs 7

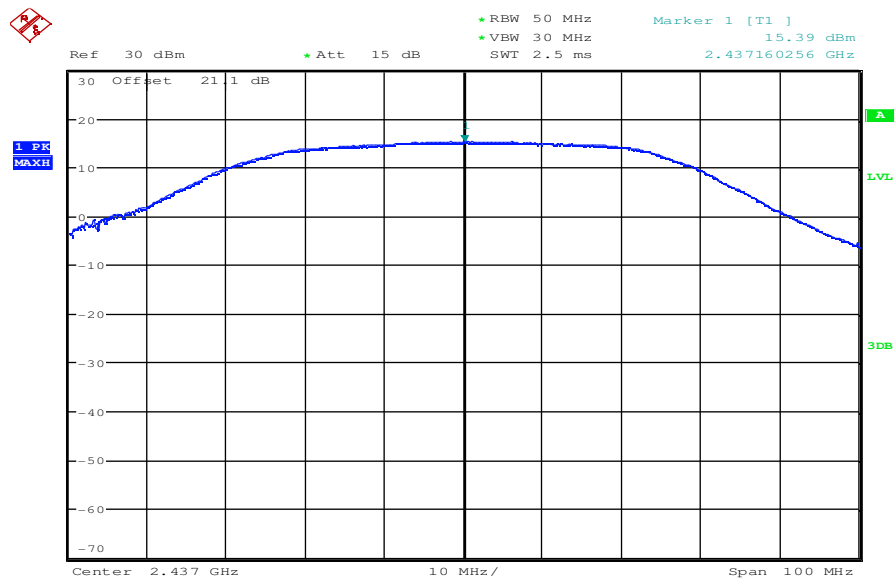


Plot 3: DSSS mode, 5.5 MBit/s, channel 6, power index 45



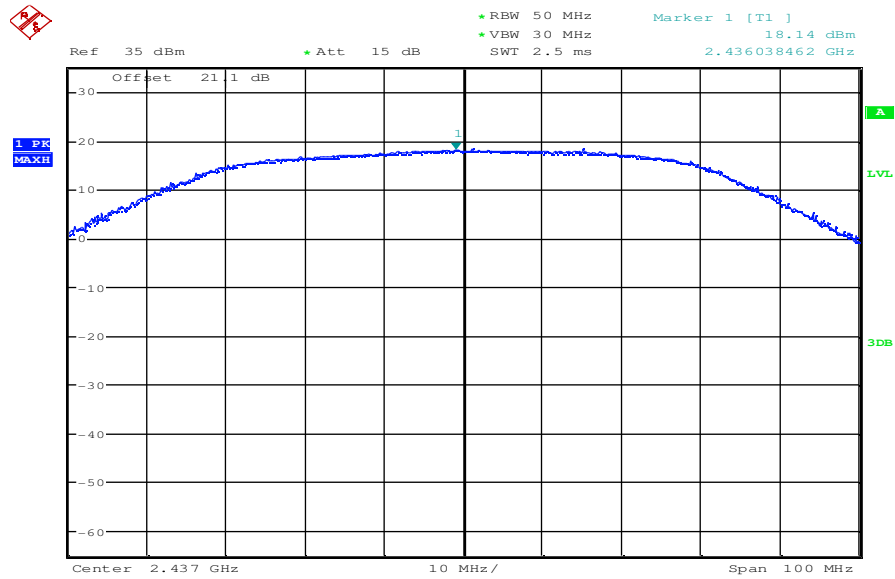
Date: 5.OCT.2010 10:19:20

Plot 4: DSSS mode, 11 MBit/s, channel 6, power index 45



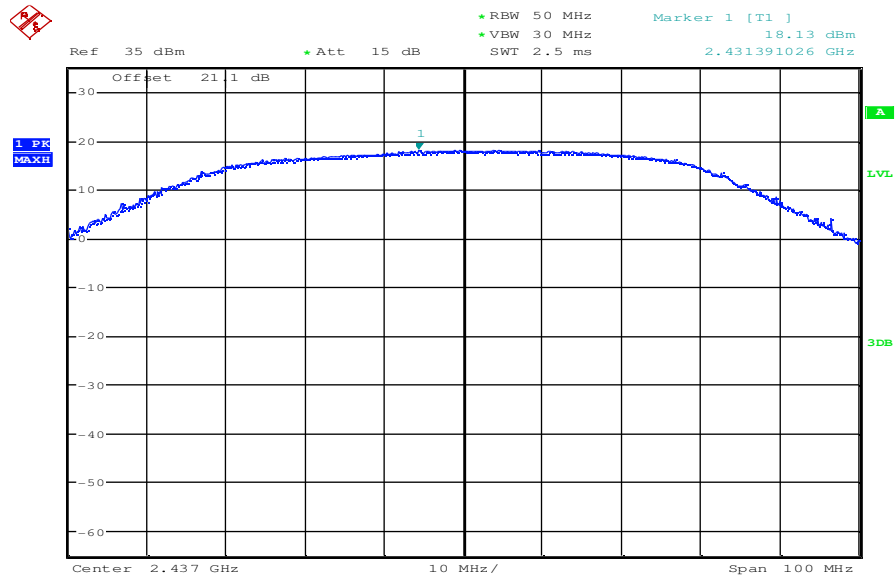
Date: 5.OCT.2010 10:21:11

Plot 5: OFDM, g – mode, 6 MBit/s, channel 6, power index 45



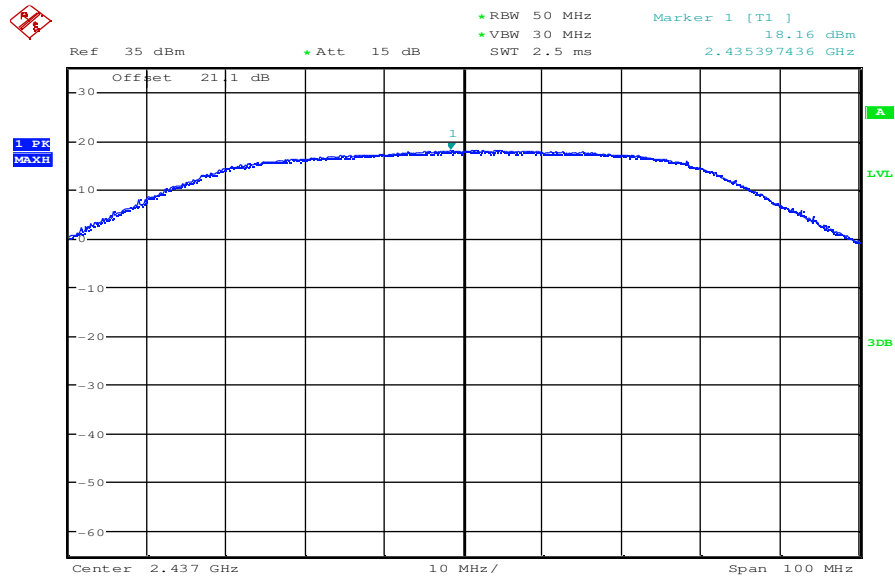
Date: 5.OCT.2010 08:55:14

Plot 6: OFDM, g – mode, 9 MBit/s, channel 6, power index 45



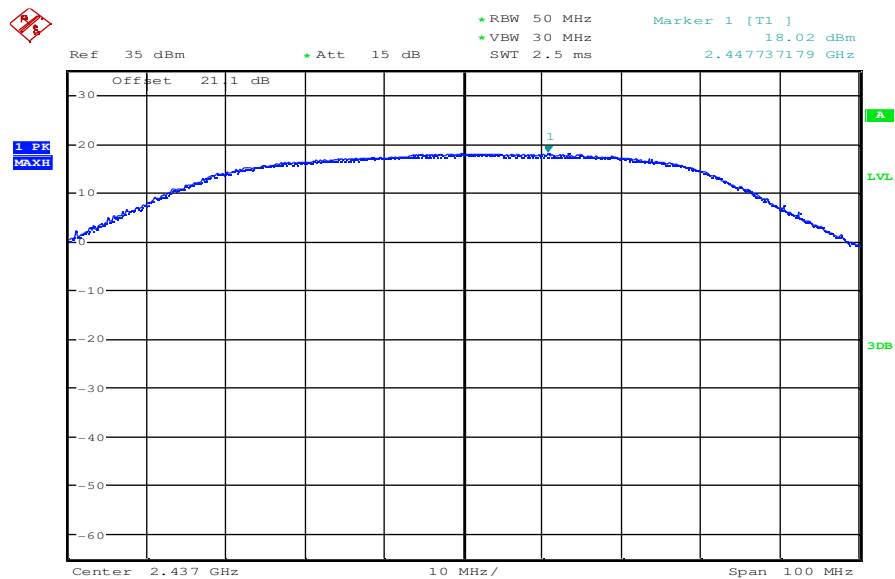
Date: 5.OCT.2010 08:56:22

Plot 7: OFDM, g – mode, 12 MBit/s, channel 6, power index 45



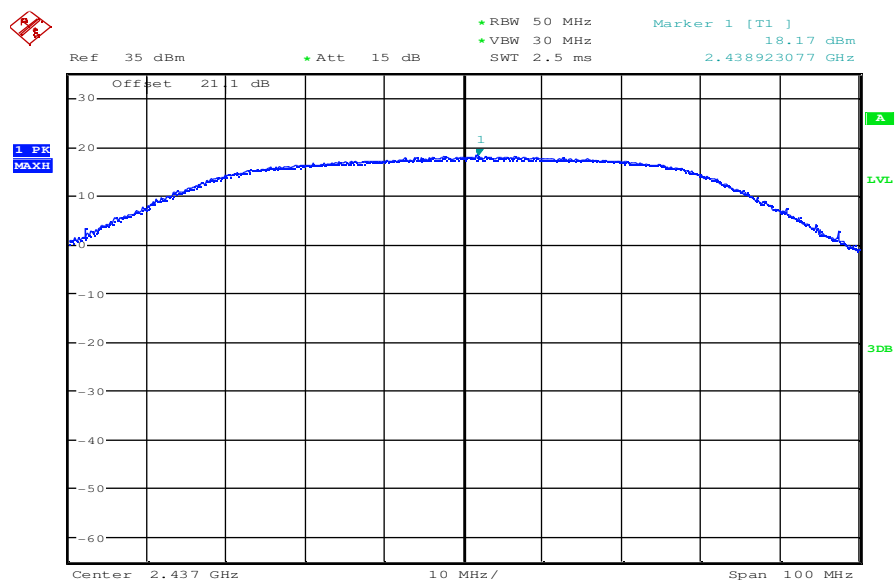
Date: 5.OCT.2010 08:57:24

Plot 8: OFDM, g – mode, 18 MBit/s, channel 6, power index 45



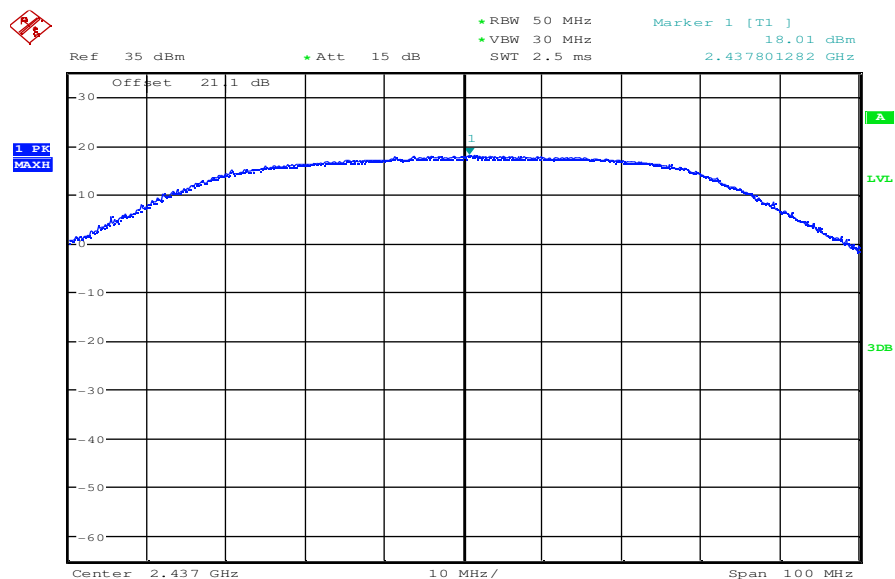
Date: 5.OCT.2010 08:58:35

Plot 9: OFDM, g – mode, 24 MBit/s, channel 6, power index 45



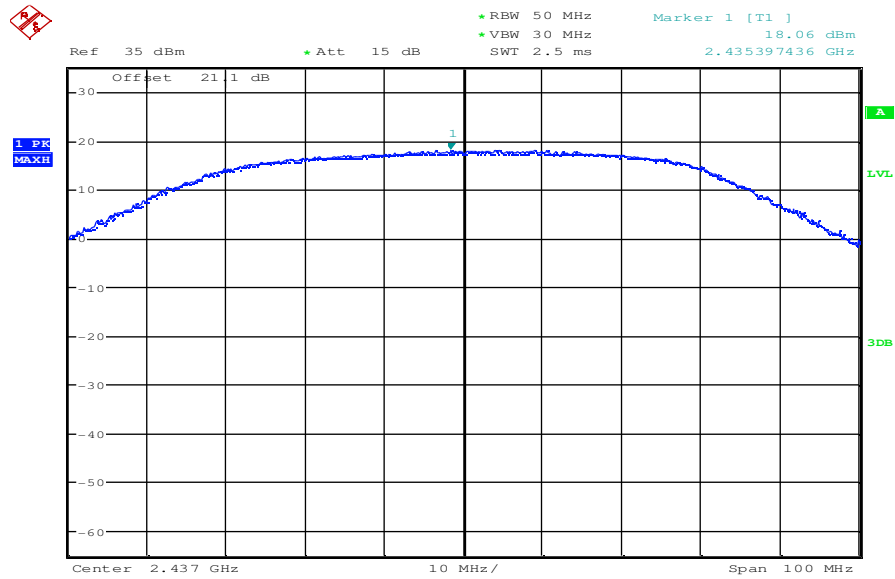
Date: 5.OCT.2010 09:00:33

Plot 10: OFDM, g – mode, 36 MBit/s, channel 6, power index 45



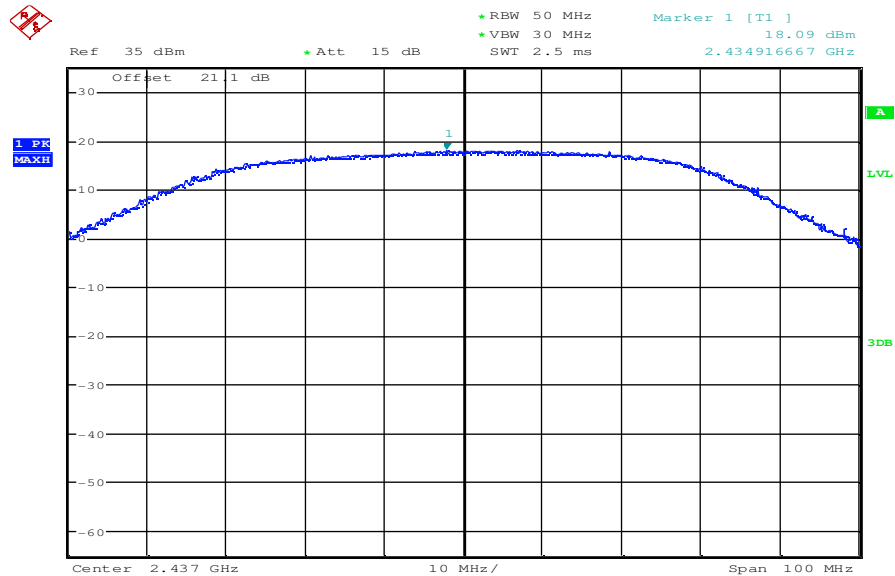
Date: 5.OCT.2010 09:01:27

Plot 11: OFDM, g – mode, 48 MBit/s, channel 6, power index 45



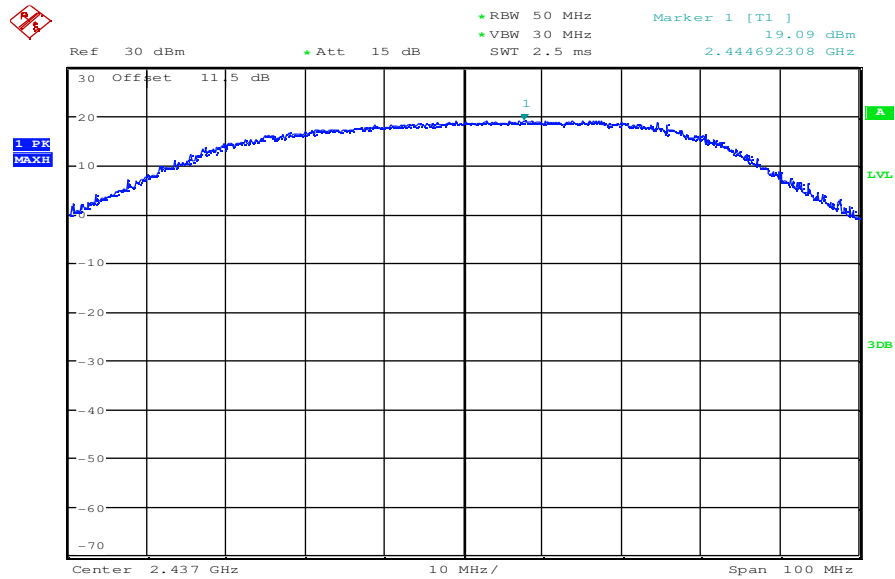
Date: 5.OCT.2010 09:02:34

Plot 12: OFDM, g – mode, 54 MBit/s, channel 6, power index 45



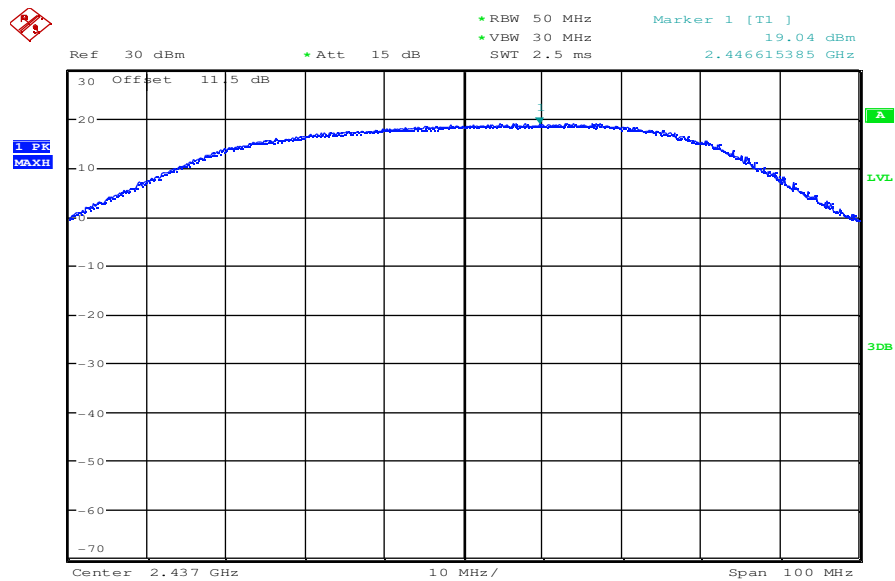
Date: 5.OCT.2010 09:03:37

Plot 13: OFDM, n – mode, mcs 0, channel 6, power index 45



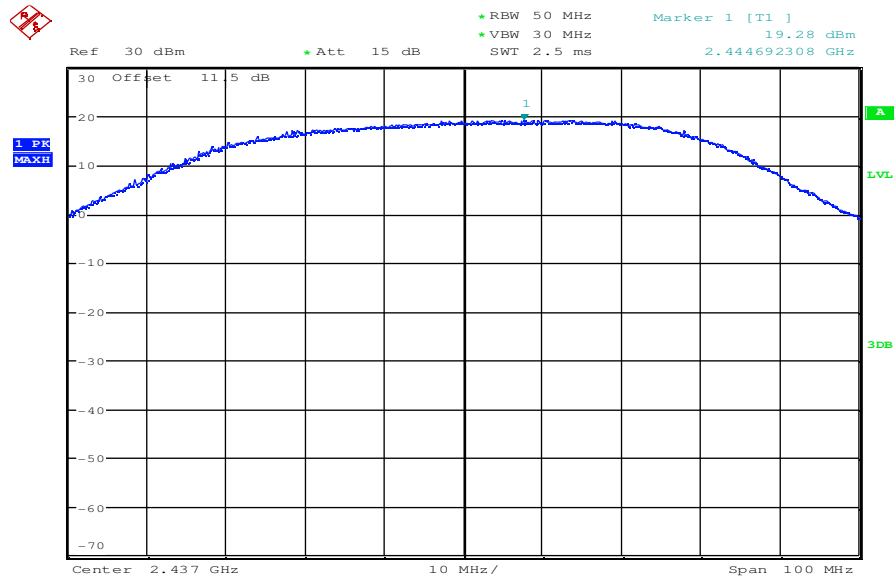
Date: 6.DEC.2010 13:17:06

Plot 14: OFDM, n – mode, mcs 1, channel 6, power index 45



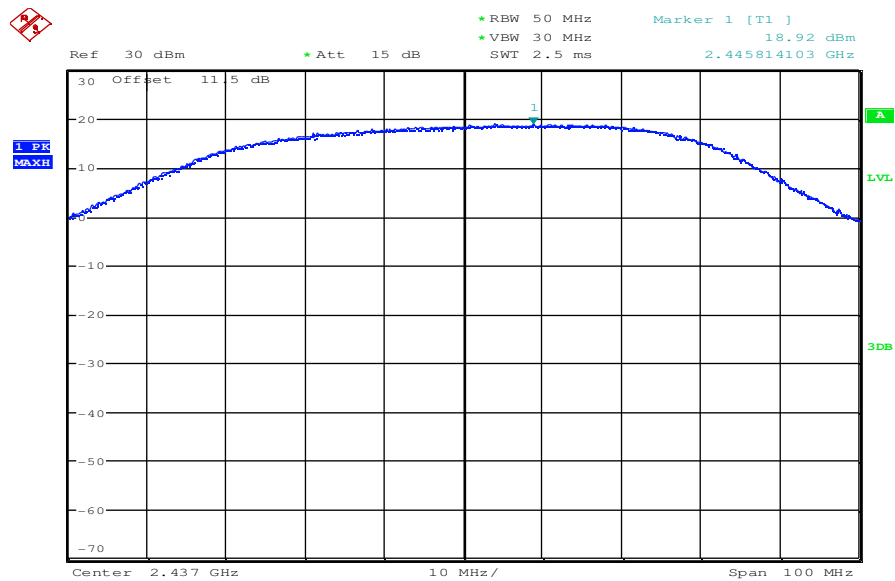
Date: 6.DEC.2010 13:17:41

Plot 15: OFDM, n – mode, mcs 2, channel 6, power index 45



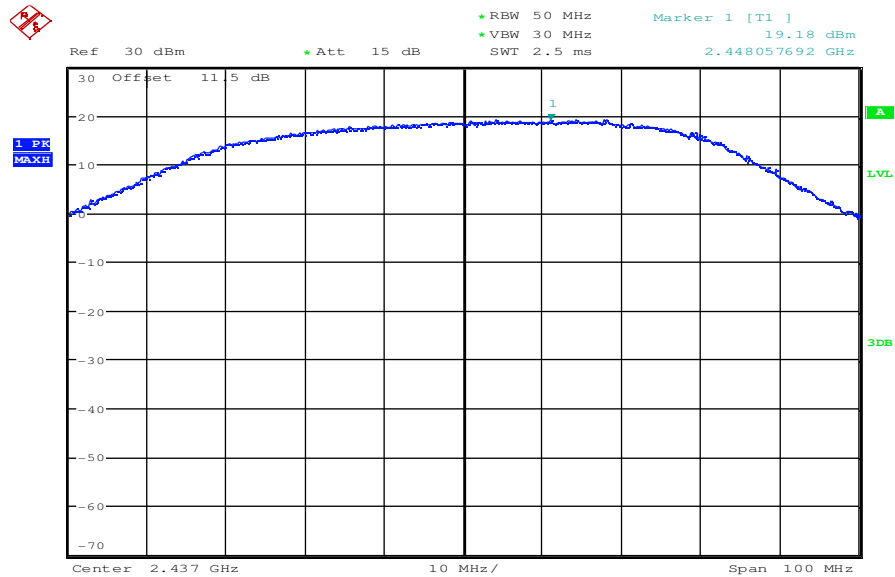
Date: 6.DEC.2010 13:18:31

Plot 16: OFDM, n – mode, mcs 3, channel 6, power index 45



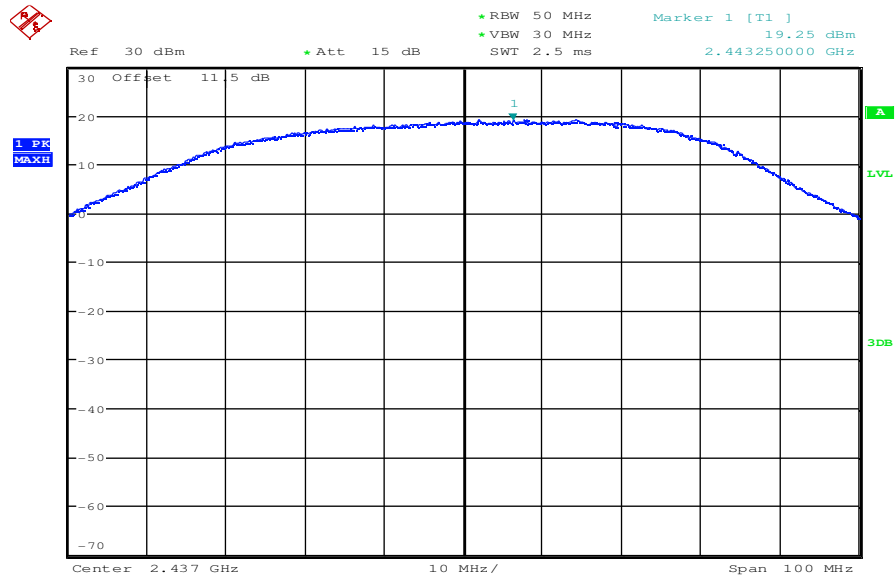
Date: 6.DEC.2010 13:19:04

Plot 17: OFDM, n – mode, mcs 4, channel 6, power index 45



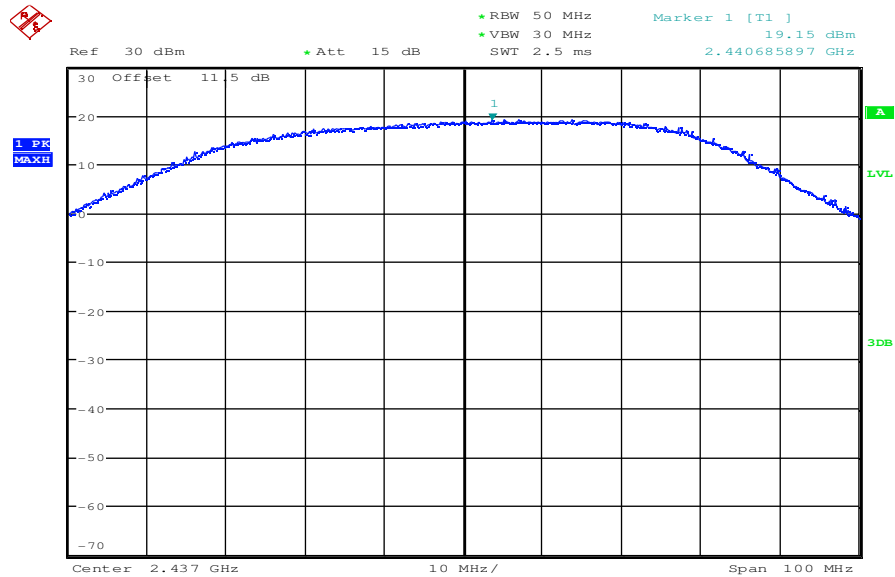
Date: 6.DEC.2010 13:19:42

Plot 18: OFDM, n – mode, mcs 5, channel 6, power index 45



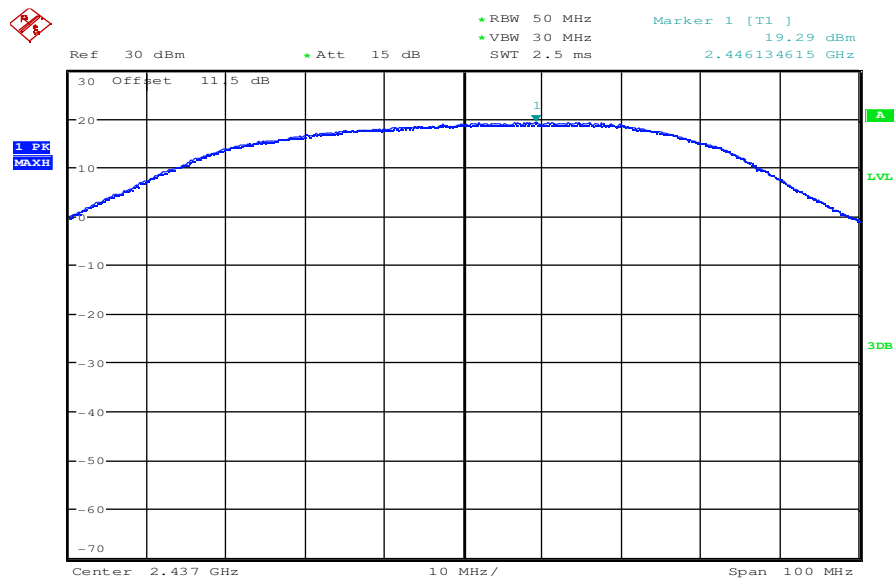
Date: 6.DEC.2010 13:20:21

Plot 19: OFDM, n – mode, mcs 6, channel 6, power index 45



Date: 6.DEC.2010 13:21:01

Plot 20: OFDM, n – mode, mcs 7, channel 6, power index 45



Date: 6.DEC.2010 13:22:04

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:	1 MHz
Video bandwidth:	3 MHz
Span:	50 MHz
Trace-Mode:	Max hold

Limits:

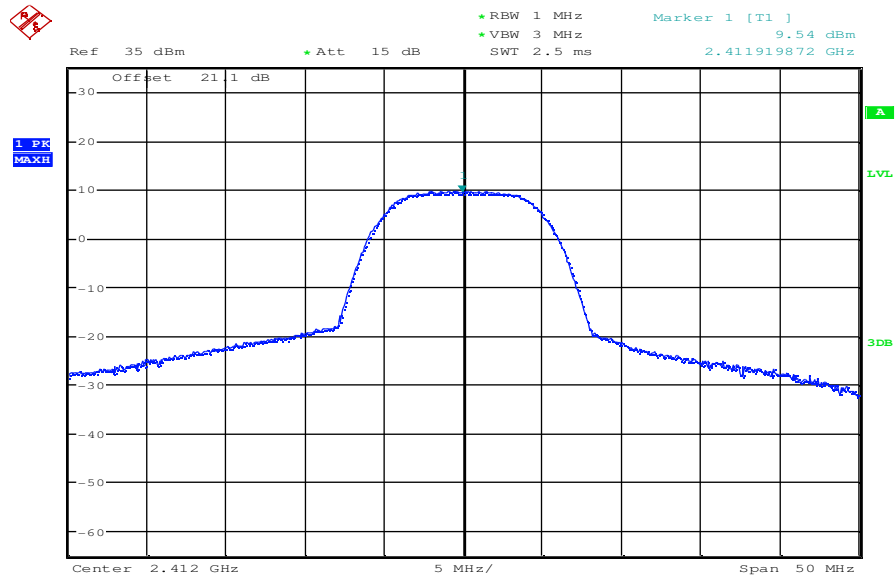
FCC	IC
CFR Part 15.247 (b)(4)	RSS 210, Issue 8, A 8.4(2)
Antenna Gain	
6 dBi	

Results:

T _{nom}	V _{nom}	lowest channel 2412 MHz	middle channel 2437 MHz	highest channel 2462 MHz
Conducted power [dBm] Measured with DSSS modulation		9.54	9.30	9.10
Radiated power [dBm] Measured with DSSS modulation		12.80	12.66	12.23
Gain [dBi] Calculated		3.26	3.36	3.13

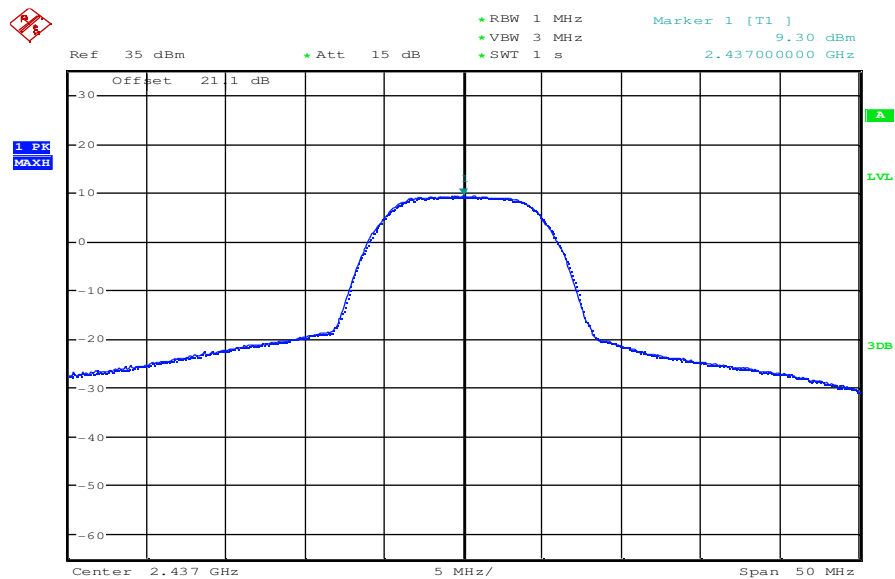
Result: The result of the measurement is passed.

Plot 1: DSSS mode, 11 MBit/s, channel 1, power index 45, @ 1 MHz RBW



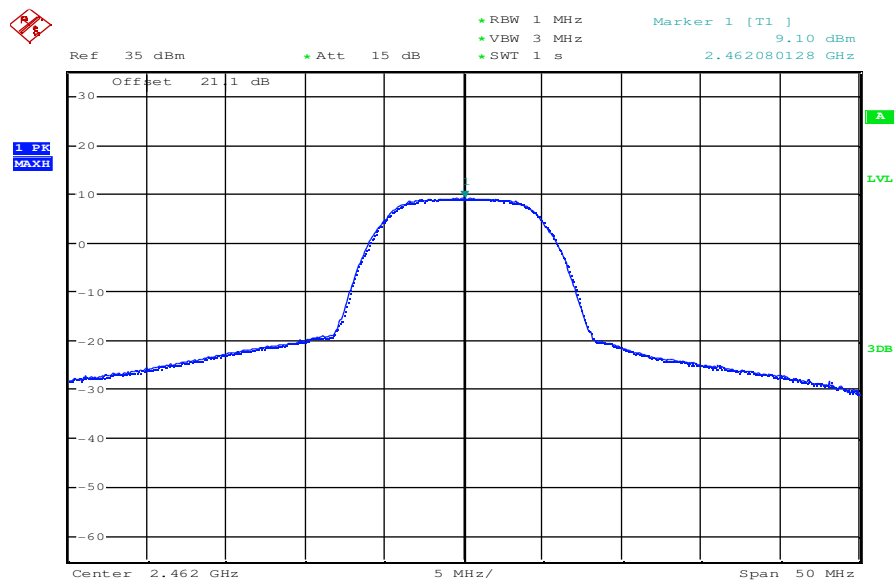
Date: 5.OCT.2010 09:37:43

Plot 2: DSSS mode, 11 MBit/s, channel 6, power index 45, @ 1 MHz RBW



Date: 5.OCT.2010 09:59:15

Plot 3: DSSS mode, 11 MBit/s, channel 11, power index 45, @ 1 MHz RBW



Date: 5.OCT.2010 10:01:28

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	
Detector:	Peak
Sweep time:	500 s
Resolution bandwidth:	3 kHz
Video bandwidth:	30 kHz
Span:	1,5 MHz
Trace-Mode:	Max Hold

Limits:

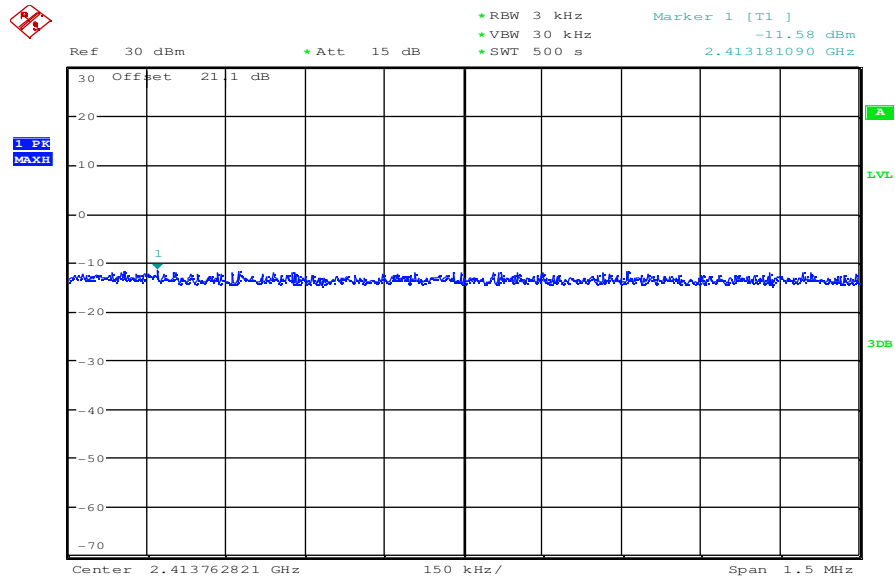
FCC	IC
CFR Part 15.247 (e)	RSS 210, Issue 8, A 8.2(b)
Power Spectral Density	
The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0-second duration.	

Results:

Modulation Frequency	Power Spectral density [dBm/3kHz]		
	2412 MHz	2437 MHz	2462 MHz
DSSS	-11.58	-11.64	-11.62
OFDM g – mode	-13.10	-12.75	-13.21
OFDM n – mode	-15.42	-15.62	-16.52
Measurement uncertainty	± 0.5 dB		

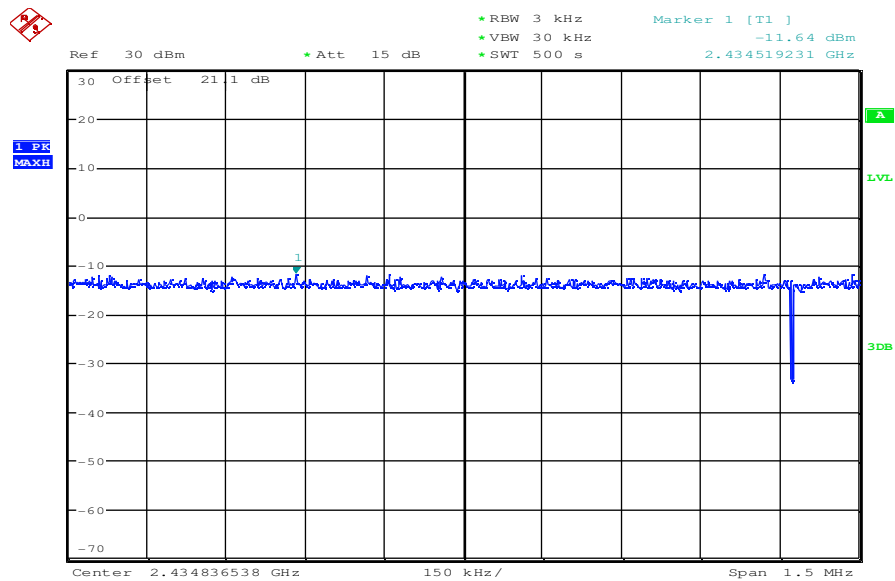
Result: The result of the measurement is passed.

Plot 1: DSSS mode, 11 MBit/s, channel 1, power index 45



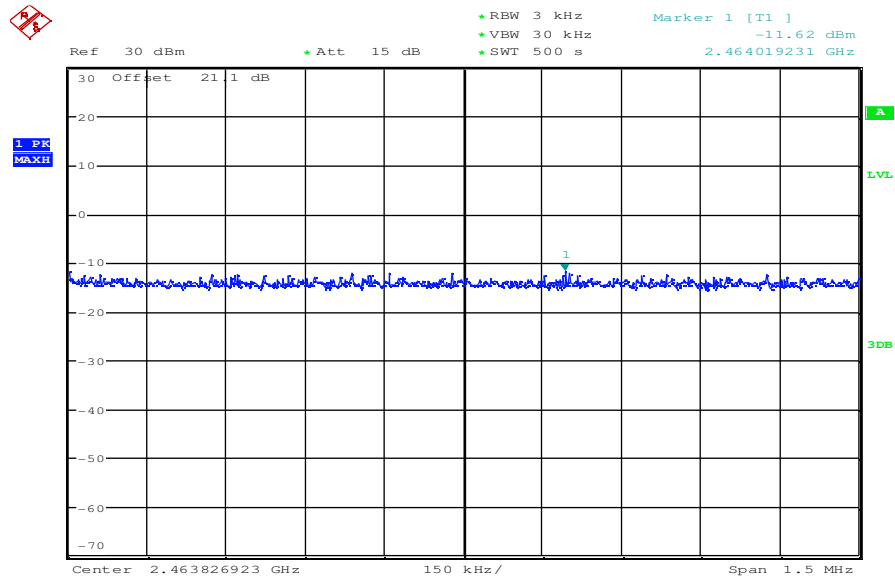
Date: 5.OCT.2010 13:17:51

Plot 2: DSSS mode, 11 MBit/s, channel 6, power index 45



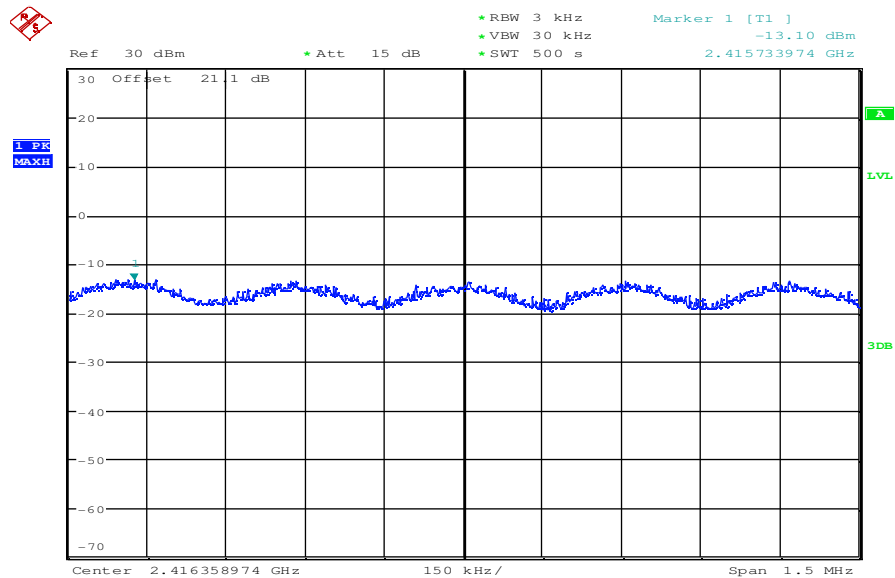
Date: 5.OCT.2010 13:27:15

Plot 3: DSSS mode, 11 MBit/s, channel 11, power index 45



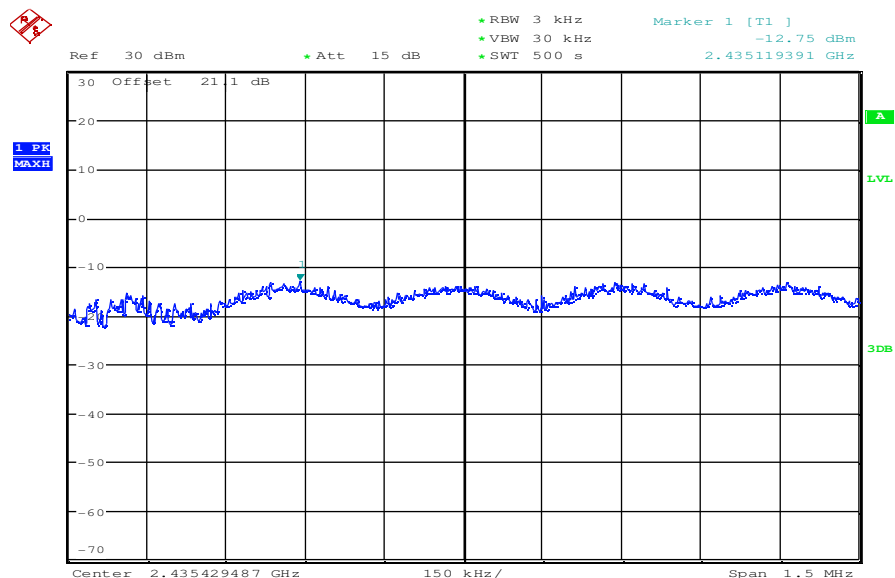
Date: 5.OCT.2010 13:36:50

Plot 4: OFDM, g – mode, 24 MBit/s, channel 1, power index 45



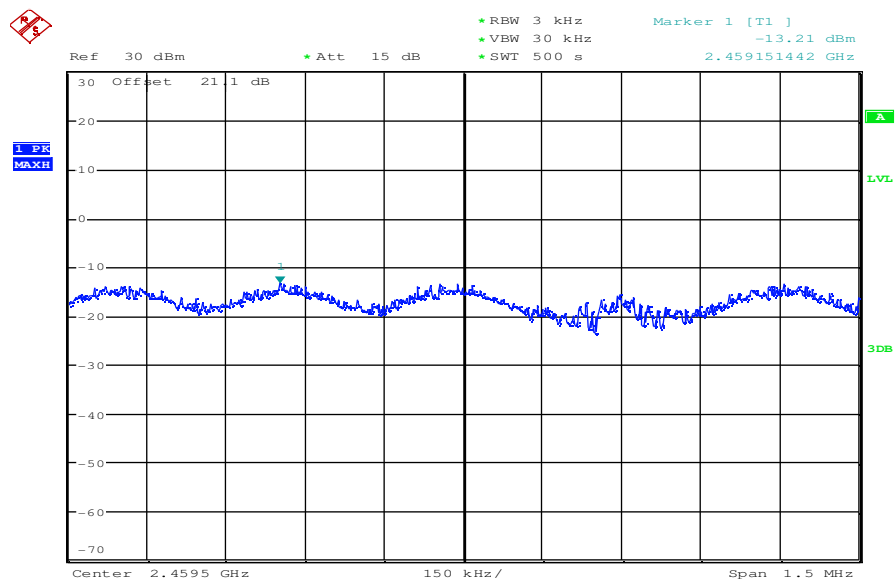
Date: 5.OCT.2010 13:48:07

Plot 5: OFDM, g – mode, 24 MBit/s, channel 6, power index 45



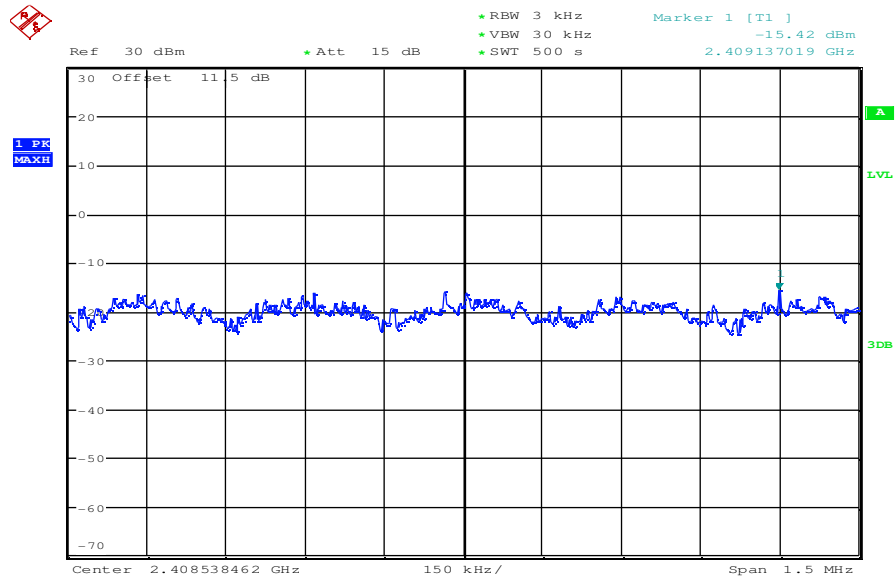
Date: 5.OCT.2010 14:06:54

Plot 6: OFDM, g – mode, 24 MBit/s, channel 11, power index 45



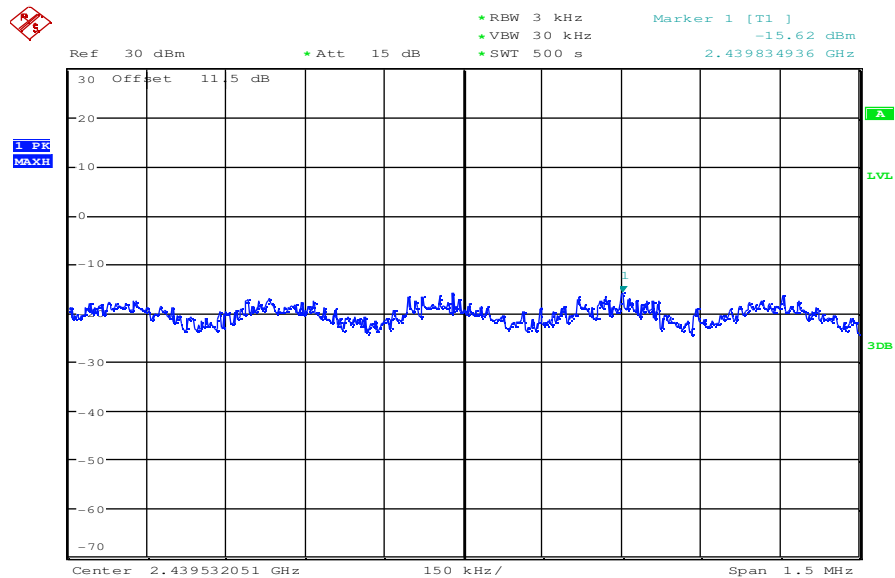
Date: 5.OCT.2010 14:16:33

Plot 7: OFDM, n – mode, mcs 7, channel 1, power index 45



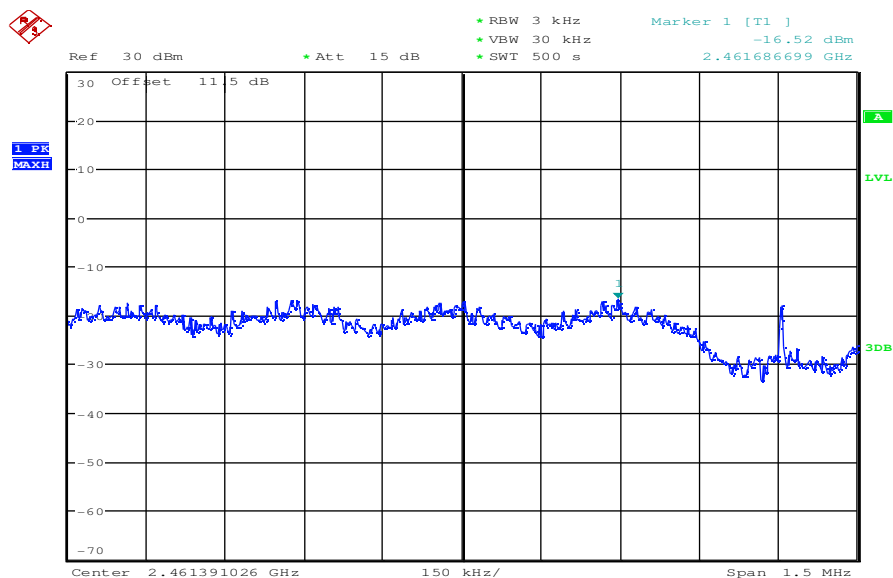
Date: 6.DEC.2010 13:57:54

Plot 8: OFDM, n – mode, mcs 7, channel 6, power index 45



Date: 6.DEC.2010 14:08:54

Plot 9: OFDM, n – mode, mcs 7, channel 11, power index 45



Date: 6.DEC.2010 14:18:42

9.4 Spectrum bandwidth – 6 dB bandwidth

Description:

Measurement of the 6 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	1s
Video bandwidth:	300 kHz
Resolution bandwidth:	300 kHz
Span:	30 MHz
Trace-Mode:	Max Hold

Limits:

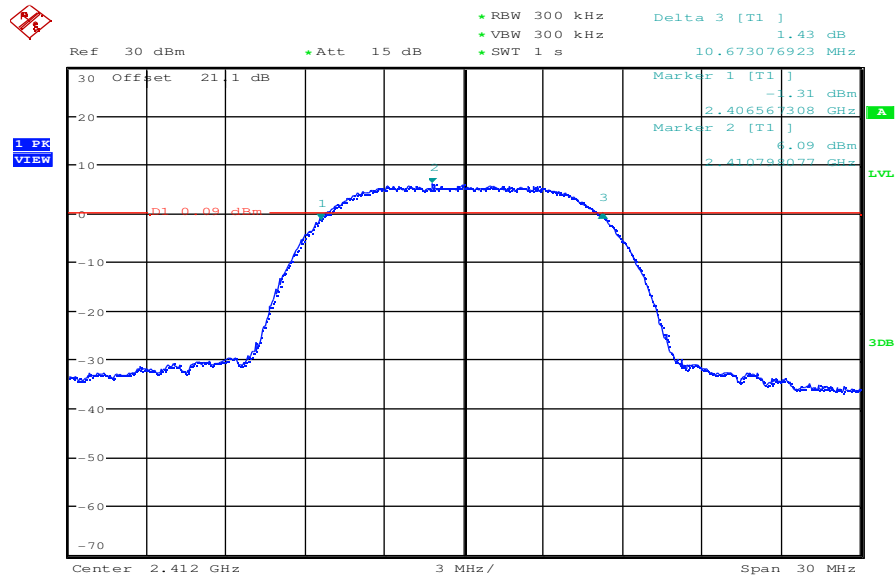
FCC	IC
CFR Part 15.247 (a)(2)	RSS 210, Issue 8, A 8.2(a)
Spectrum Bandwidth of a FHSS System – 6 dB Bandwidth	
Systems using digital modulation techniques may operate in the 2400–2483.5 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.	

Result:

Modulation Frequency	6 dB BANDWIDTH [MHz]		
	2412 MHz	2437 MHz	2462 MHz
DSSS	10.67	10.48	10.67
OFDM g – mode	16.78	16.68	16.78
OFDM n – mode	17.88	17.88	17.93
Measurement uncertainty	± 300 kHz		

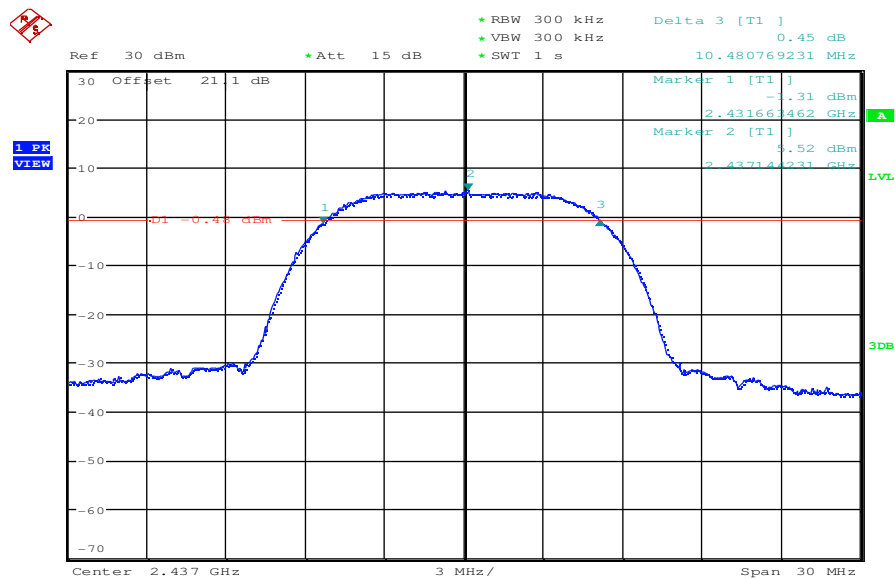
Result: The result of the measurement is passed.

Plot 1: DSSS mode, 11 MBit/s, channel 1, power index 45



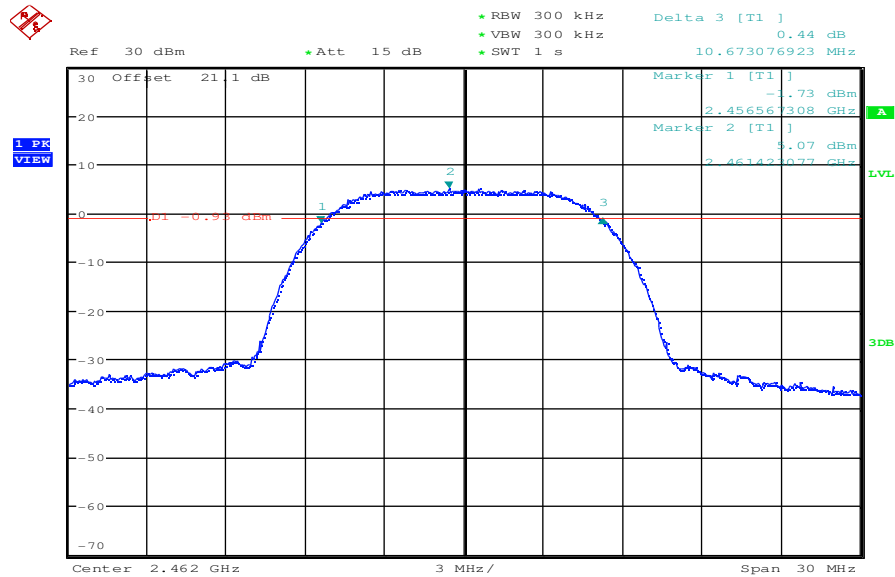
Date: 5.OCT.2010 11:37:04

Plot 2: DSSS mode, 11 MBit/s, channel 6, power index 45



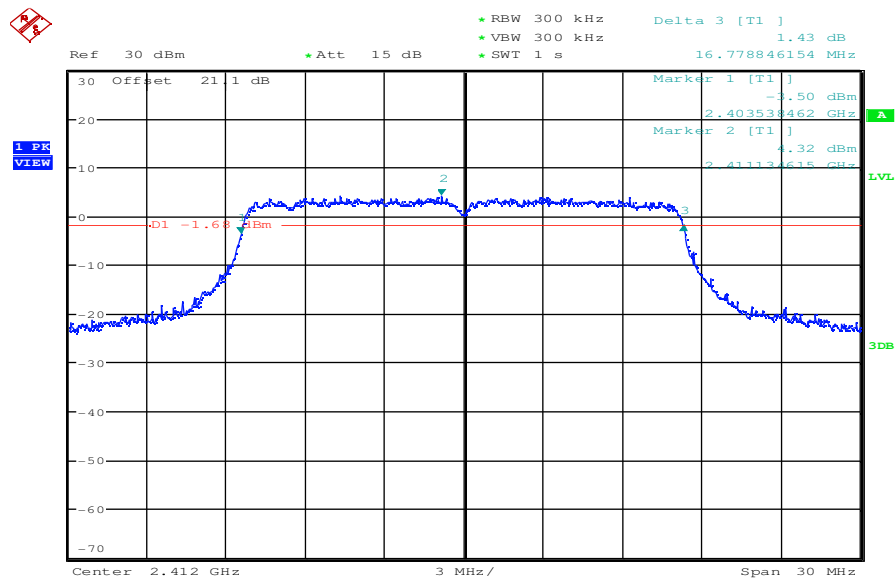
Date: 5.OCT.2010 11:39:20

Plot 3: DSSS mode, 11 MBit/s, channel 11, power index 45



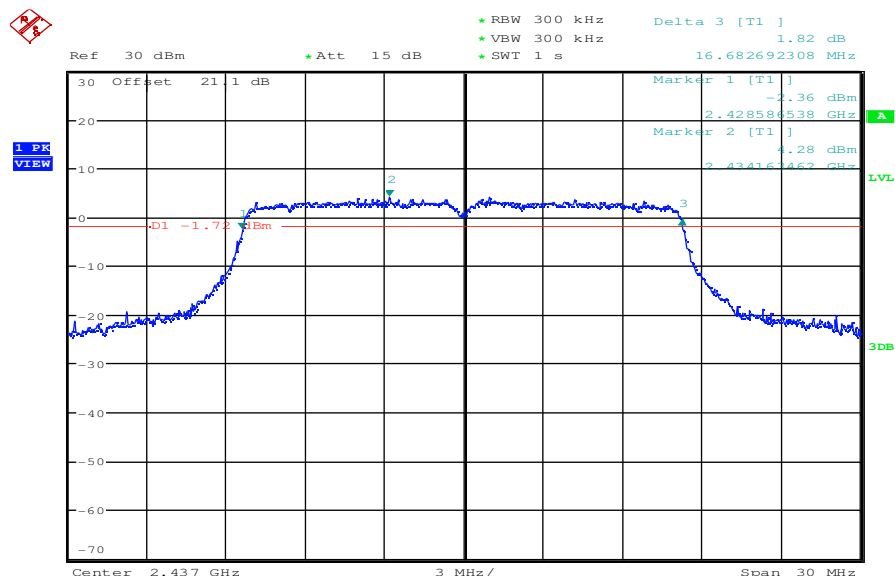
Date: 5.OCT.2010 11:42:10

Plot 4: OFDM, g – mode, 24 MBit/s, channel 1, power index 45



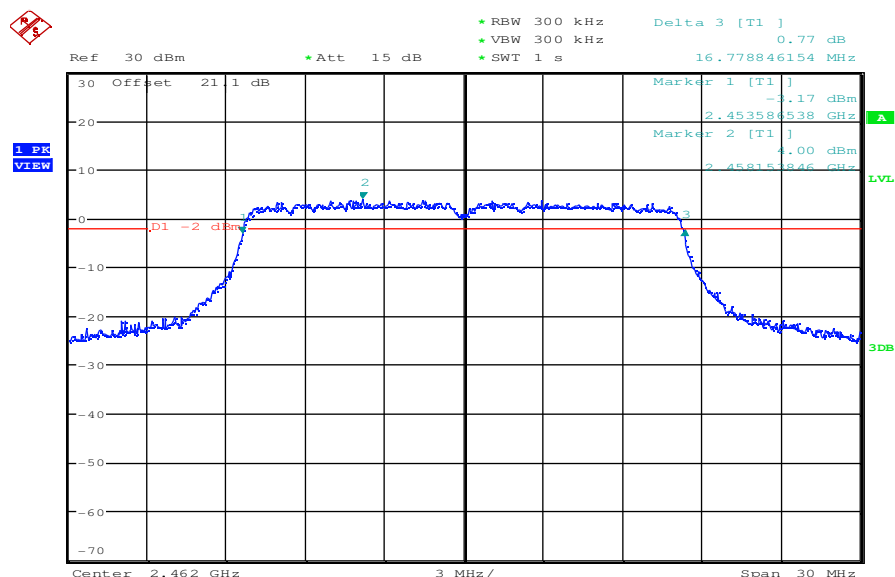
Date: 5.OCT.2010 11:55:26

Plot 5: OFDM, g – mode, 24 MBit/s, channel 6, power index 45



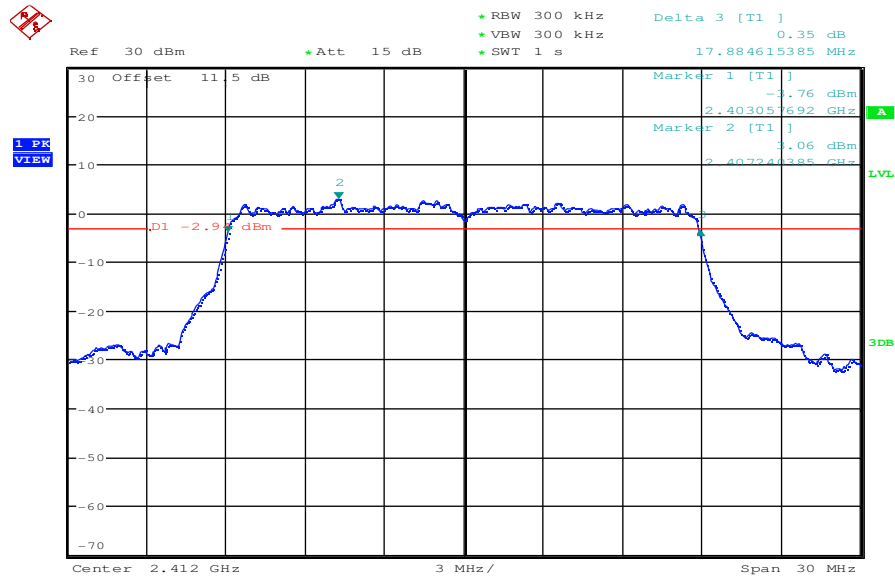
Date: 5.OCT.2010 11:52:37

Plot 6: OFDM, g – mode, 24 MBit/s, channel 11, power index 45



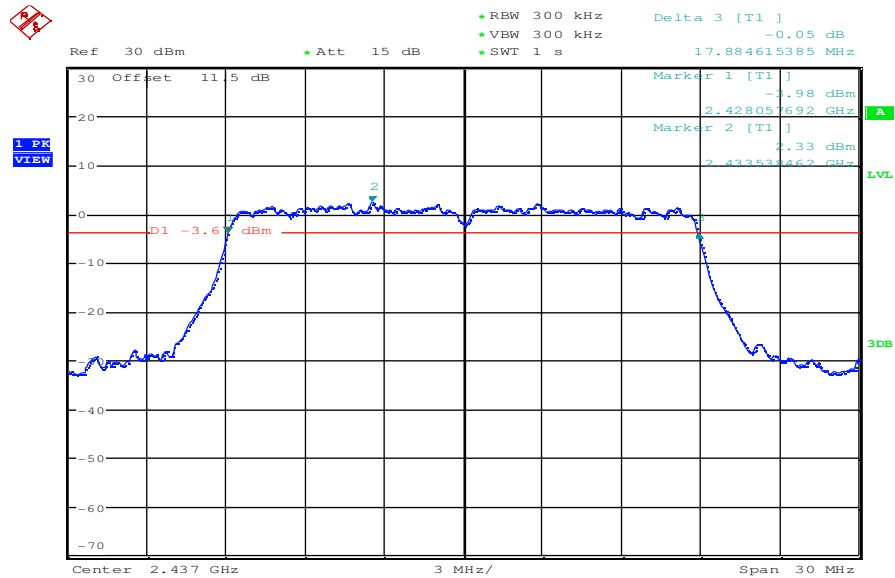
Date: 5.OCT.2010 11:45:50

Plot 7: OFDM, n – mode, mcs 7, channel 1, power index 45



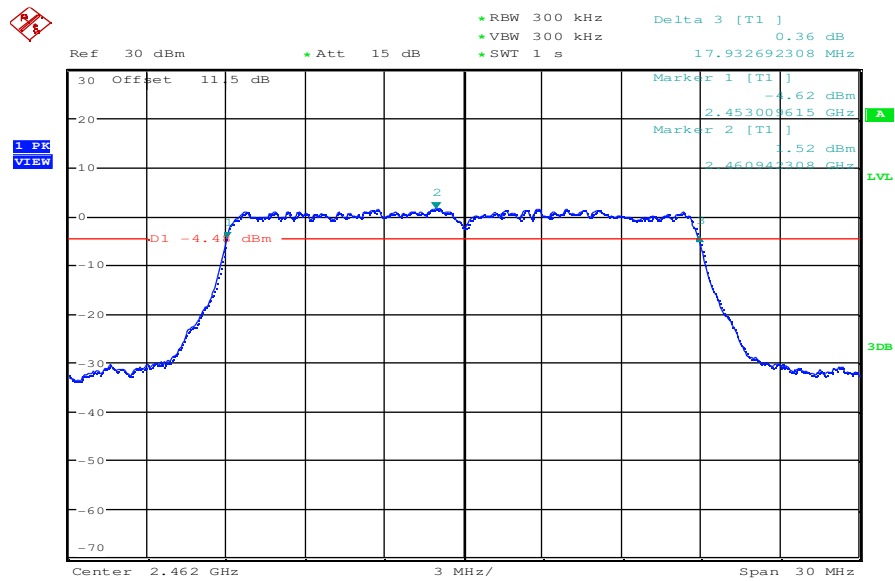
Date: 6.DEC.2010 14:25:03

Plot 8: OFDM, n – mode, mcs 7, channel 6, power index 45



Date: 6.DEC.2010 14:27:13

Plot 9: OFDM, n – mode, mcs 7, channel 11, power index 45



Date: 6.DEC.2010 14:29:07

9.5 Spectrum bandwidth – 20 dB bandwidth

Description:

Measurement of the 20 dB bandwidth of the modulated signal.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	1s
Video bandwidth:	300 kHz
Resolution bandwidth:	300 kHz
Span:	30 MHz
Trace-Mode:	Max Hold

Limits:

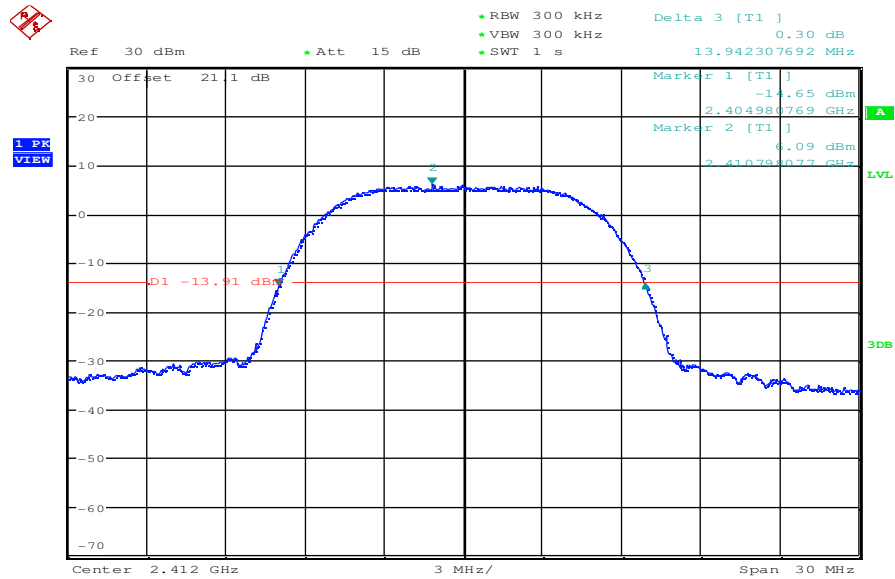
FCC	IC
CFR Part 15.247 (a)(2)	RSS 210, Issue 8, A 8.2(a)
Spectrum Bandwidth of a FHSS System – 20 dB Bandwidth	
Systems using digital modulation techniques may operate in the 2400–2483.5 MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.	

Results:

Modulation Frequency	-20 dB BANDWIDTH [MHz]		
	2412 MHz	2437 MHz	2462 MHz
DSSS	13.94	13.94	13.99
OFDM g – mode	20.14	19.71	19.66
OFDM n – mode	19.71	19.71	19.66
Measurement uncertainty	± 100 kHz		

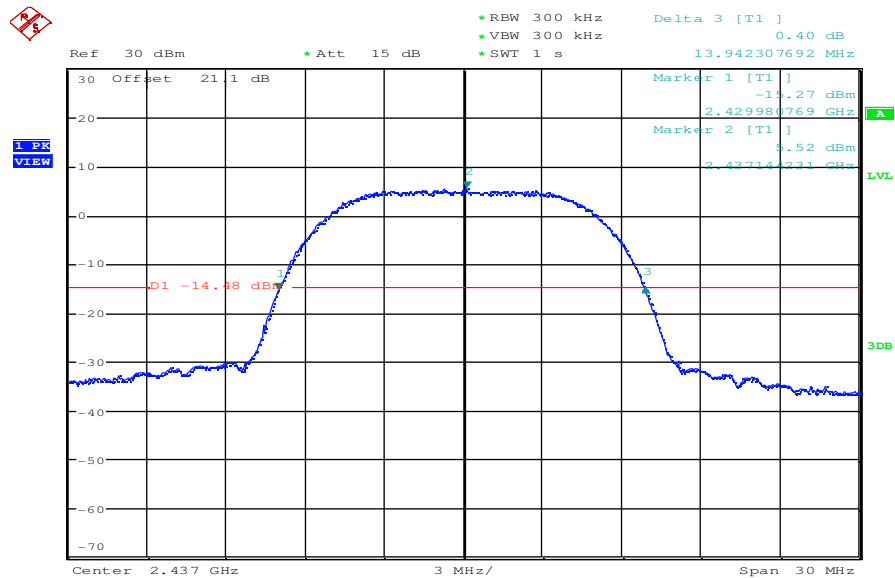
Result: The result of the measurement is passed.

Plot 1: DSSS mode, 11 MBit/s, channel 1, power index 45



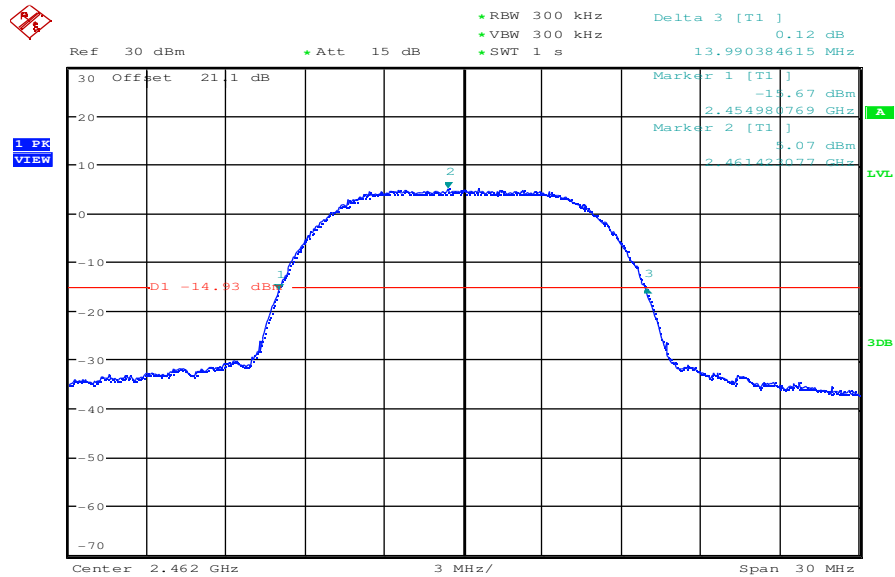
Date: 5.OCT.2010 11:36:11

Plot 2: DSSS mode, 11 MBit/s, channel 6, power index 45



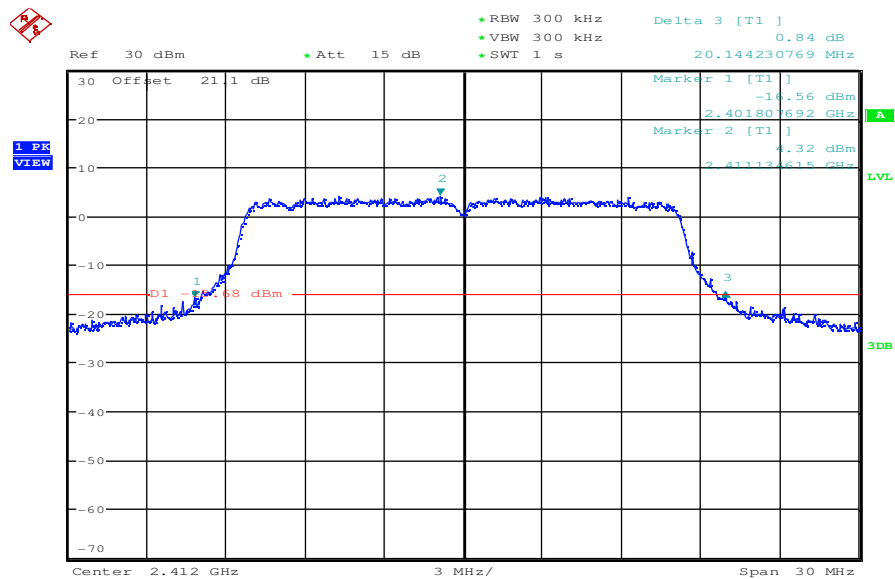
Date: 5.OCT.2010 11:40:19

Plot 3: DSSS mode, 11 MBit/s, channel 11, power index 45



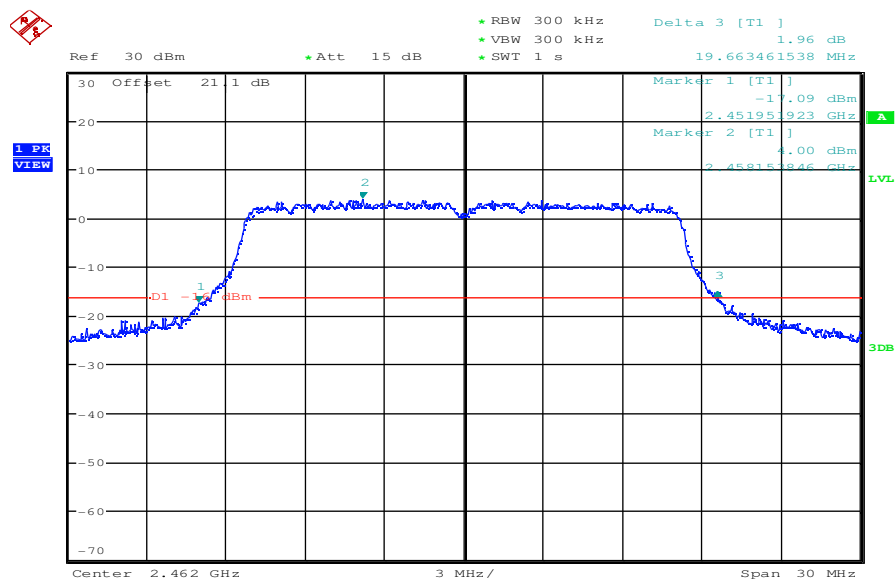
Date: 5.OCT.2010 11:42:51

Plot 4: OFDM, g – mode, 24 MBit/s, channel 1, power index 45



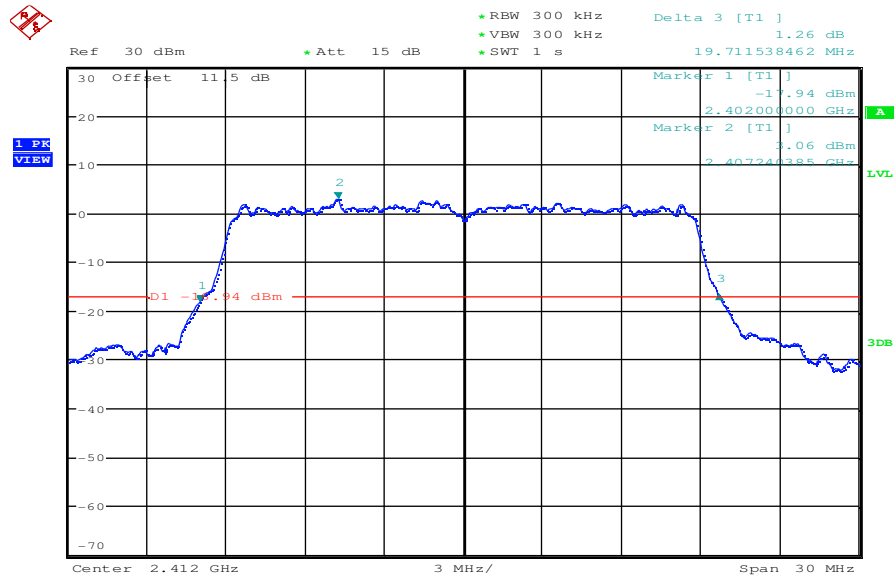
Date: 5.OCT.2010 11:56:02

Plot 6: OFDM, g – mode, 24 MBit/s, channel 11, power index 45



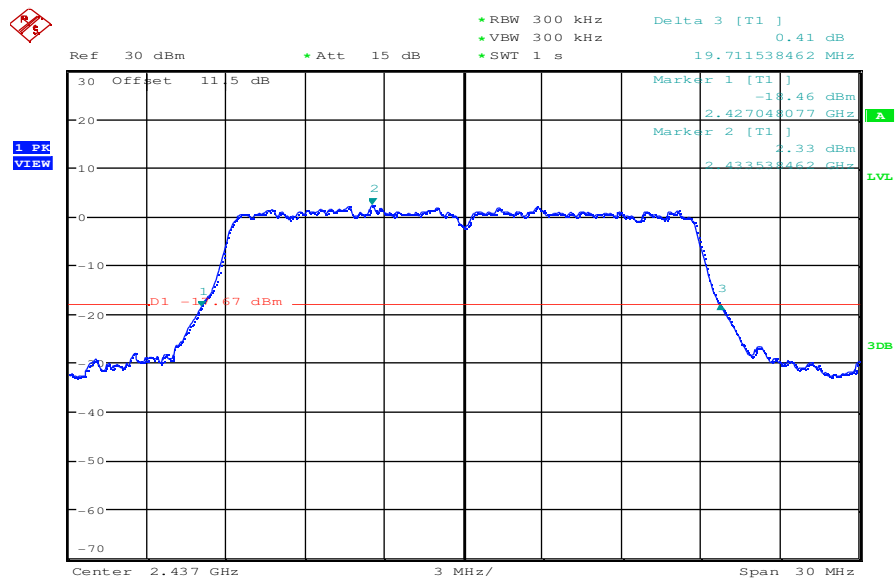
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Plot 7: OFDM, n – mode, mcs 7, channel 1, power index 45



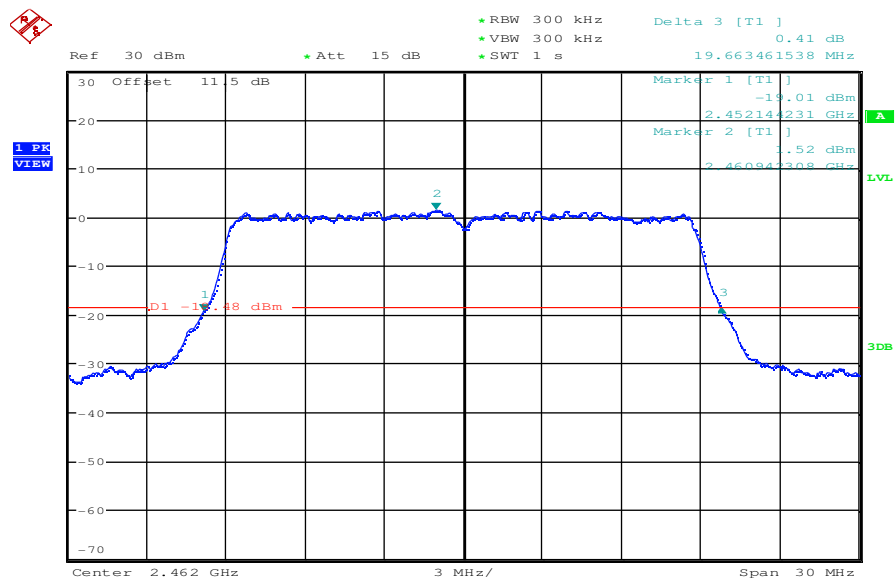
Date: 6.DEC.2010 14:25:44

Plot 8: OFDM, n – mode, mcs 7, channel 6, power index 45



Date: 6.DEC.2010 14:27:48

Plot 9: OFDM, n – mode, mcs 7, channel 11, power index 45



Date: 6.DEC.2010 14:29:34

9.6 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. Additionally the average power is measured using a wideband power meter.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	30 MHz
Video bandwidth:	50 MHz
Span:	100 MHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 15.247 (b)(3)	RSS 210, Issue 8, A 8.4(4)
Maximum Output Power	
Conducted: 1.0 W – Antenna Gain max. 6 dBi	

Result:

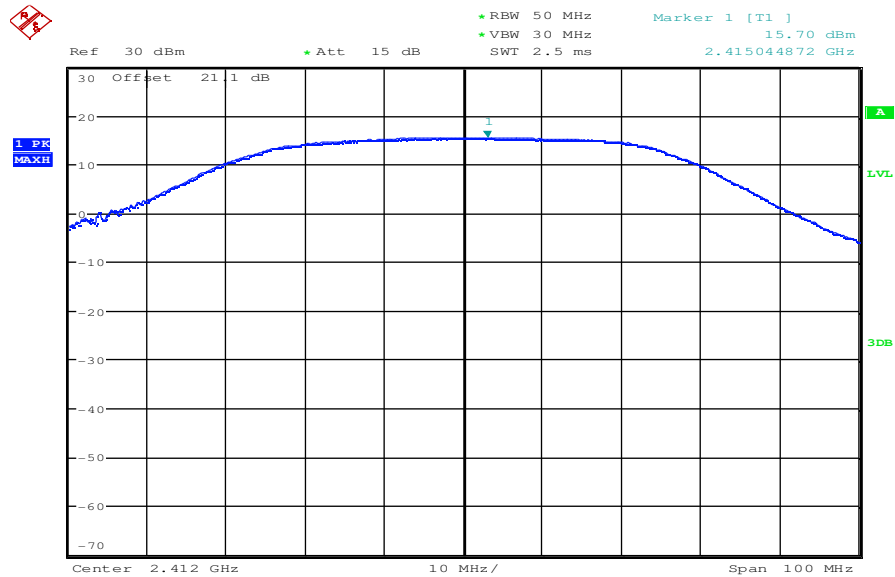
DSSS Frequency	Maximum Output Power [dBm]		
	2412 MHz	2437 MHz	2462 MHz
Peak Output Power Conducted	15.70	15.39	15.39
Output Power Radiated - EIRP	18.96	18.75	18.52
Measurement uncertainty	± 0.5 dB (cond.) / ± 2 dB (rad.)		

OFDM g – mode	Maximum Output Power [dBm]		
Frequency	2412 MHz	2437 MHz	2462 MHz
Peak Output Power Conducted	18.33	18.17	18.13
Output Power Radiated - EIRP	21.59	21.53	21.26
Measurement uncertainty	± 0.5 dB (cond.) / ± 2 dB (rad.)		

OFDM n – mode	Maximum Output Power [dBm]		
Frequency	2412 MHz	2437 MHz	2462 MHz
Peak Output Power Conducted	19.42	19.29	19.08
Output Power Radiated - EIRP	22.68	22.65	22.21
Measurement uncertainty	± 0.5 dB (cond.) / ± 2 dB (rad.)		

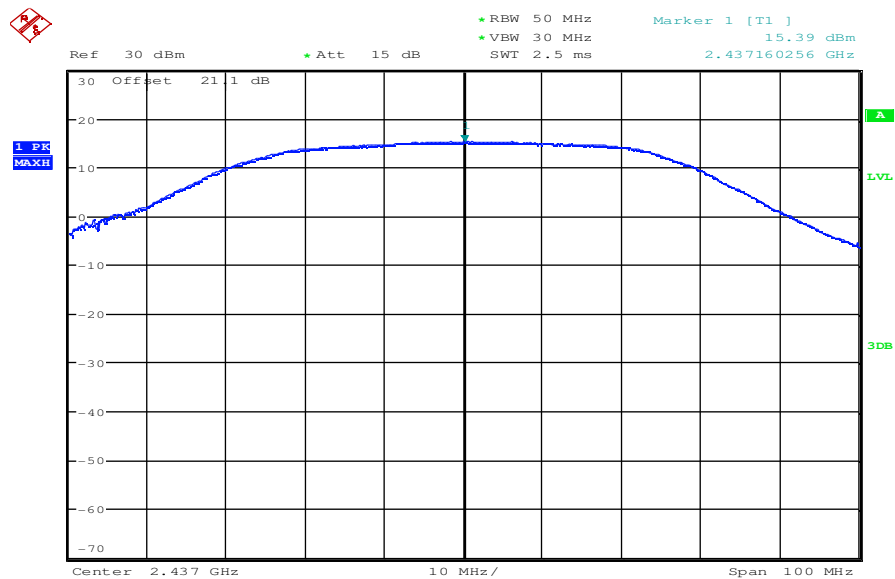
Result: The result of the measurement is passed.

Plot 1: DSSS mode, 11 MBit/s, channel 1, power index 45



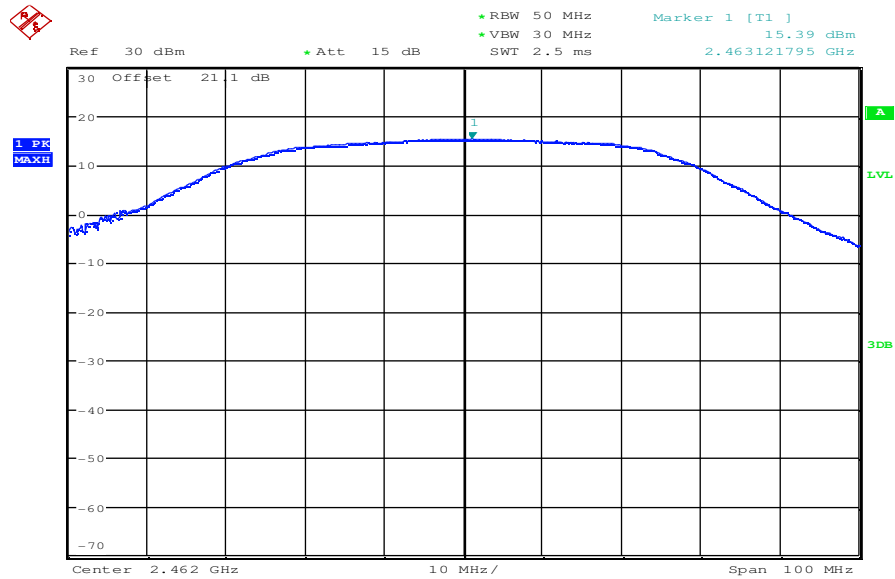
Date: 5.OCT.2010 10:22:36

Plot 2: DSSS mode, 11 MBit/s, channel 6, power index 45



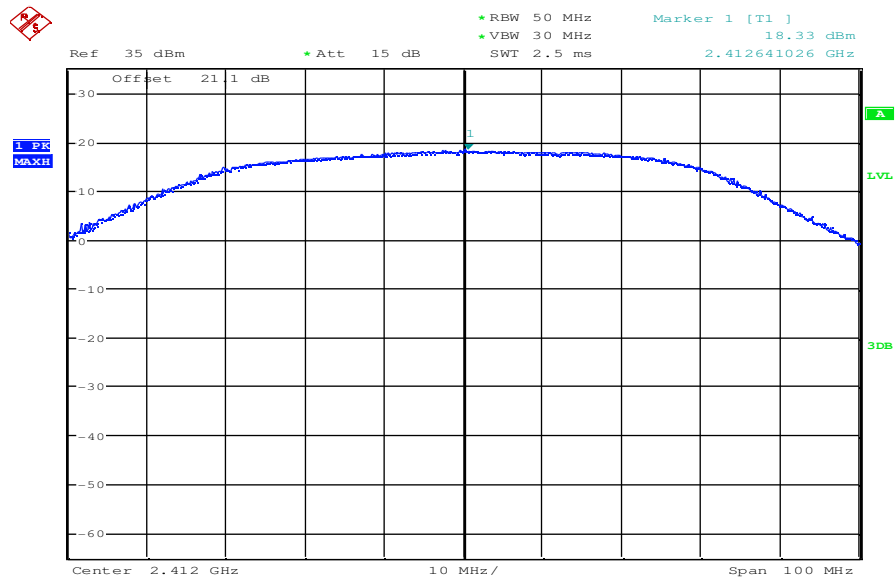
Date: 5.OCT.2010 10:21:11

Plot 3: DSSS mode, 11 MBit/s, channel 11, power index 45



Date: 5.OCT.2010 10:23:54

Plot 4: OFDM, g – mode, 24 MBit/s, channel 1, power index 45



Date: 5.OCT.2010 09:05:05

Ref 35 dBm

* Att 15 dB

SWT 2.5 ms

2.438923077 GHz

Offset 21 1 dB

RBW 50 MHz

VBW 30 MHz

Marker 1 [T1] 18.17 dBm

1 PK MAXH

Center 2.437 GHz

10 MHz/

Span 100 MHz

Offset 21 1 dB

Ref 35 dBm Att 15 dB RBW 50 MHz VBW 30 MHz SWT 2.5 ms Marker 1 [T1] 18.13 dBm

1 PK MAXH

Center 2.462 GHz Span 100 MHz

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Ref 30 dBm * Att 15 dB SWT 2.5 ms 2.421935897 GHz

Marker 1 [T1] 19.42 dBm

30 Offset 11 5 dB

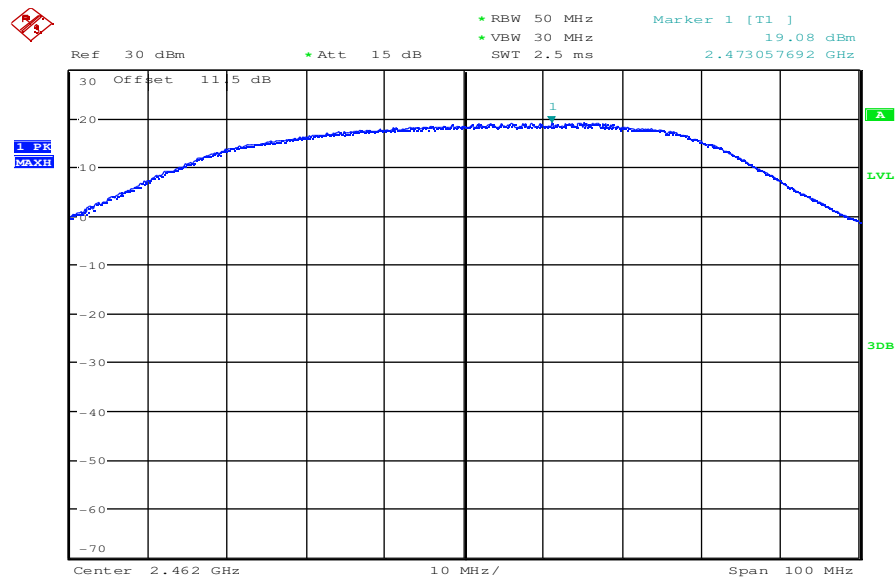
1 PK MAXH

Center 2.412 GHz 10 MHz/ Span 100 MHz

[illegible]

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Plot 9: OFDM, n – mode, mcs 7, channel 11, power index 45



Date: 6.DEC.2010 13:24:01

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 – 2500 MHz
Trace-Mode:	Max Hold

Limits:

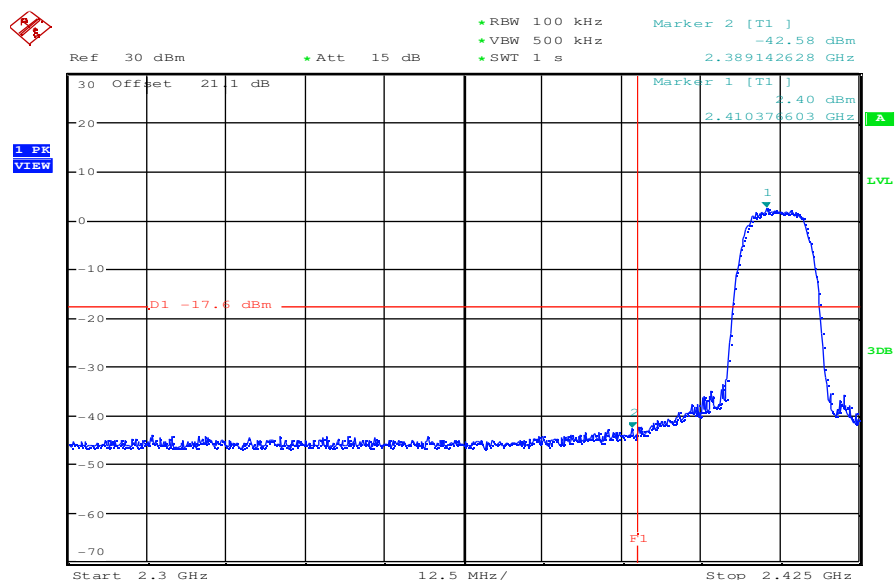
FCC	IC
CFR Part 15.247 (d)	RSS 210, Issue 8, A 8.5
Band Edge Compliance Conducted	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be 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.	

Result:

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

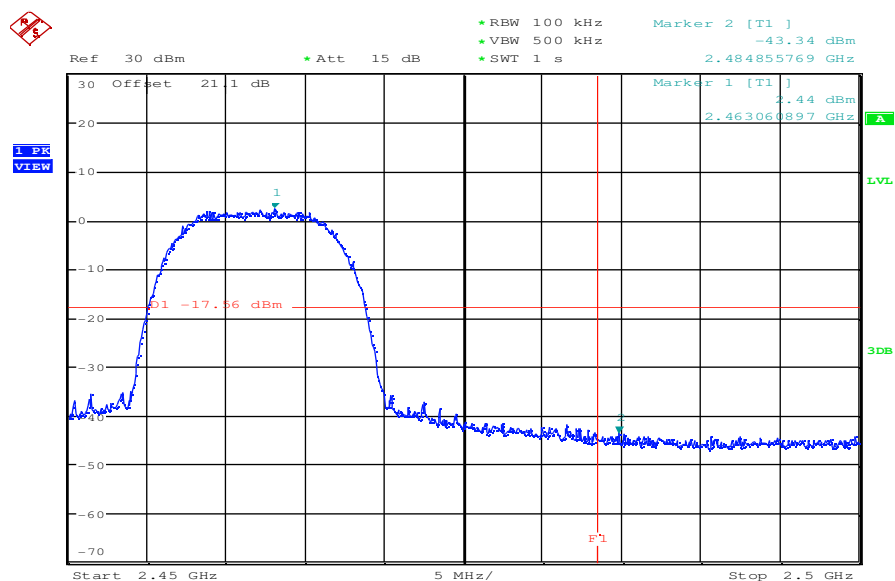
Result: The result of the measurement is passed.

Plot 1: DSSS mode, 11 MBit/s, channel 1, power index 45, lower band edge



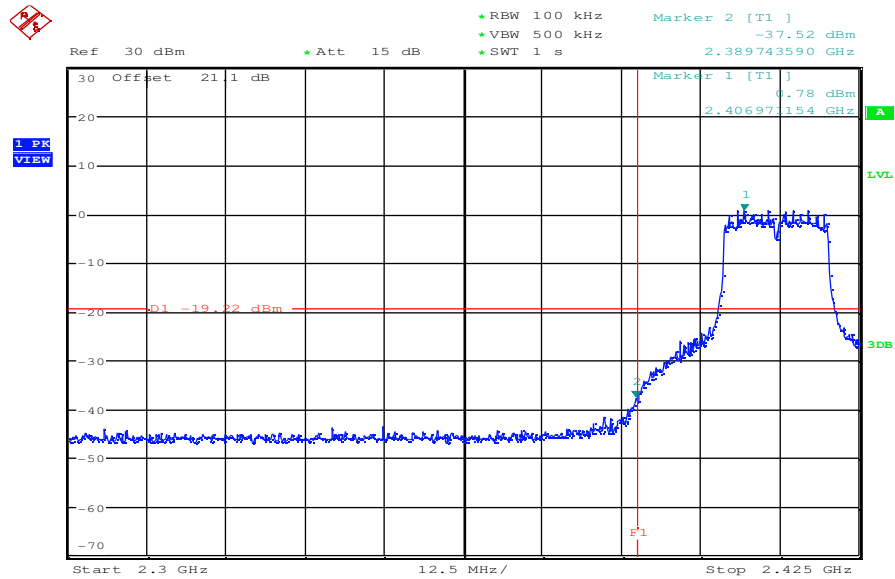
Date: 5.OCT.2010 14:27:49

Plot 2: DSSS mode, 11 MBit/s, channel 11, power index 45, higher band edge



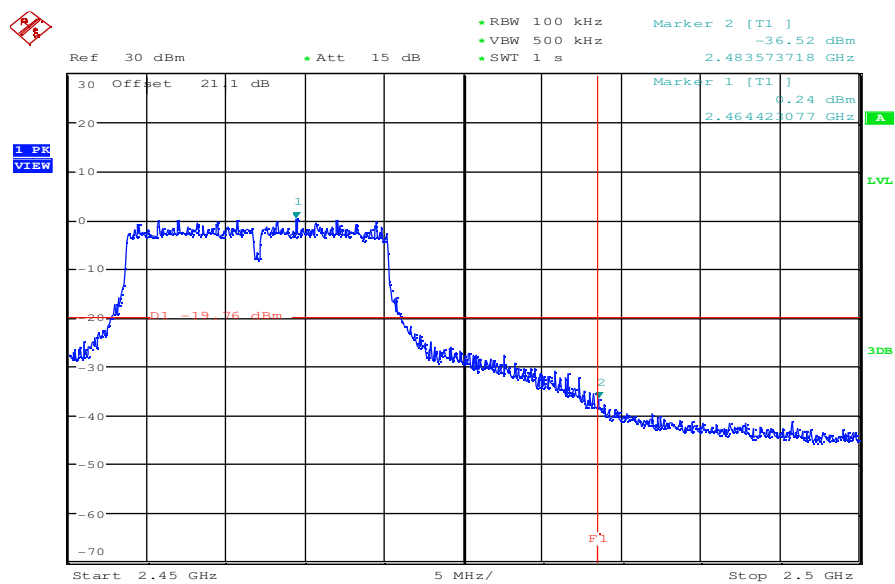
Date: 5.OCT.2010 14:32:00

Plot 3: OFDM, g – mode, 24 MBit/s, channel 1, power index 45, lower band edge



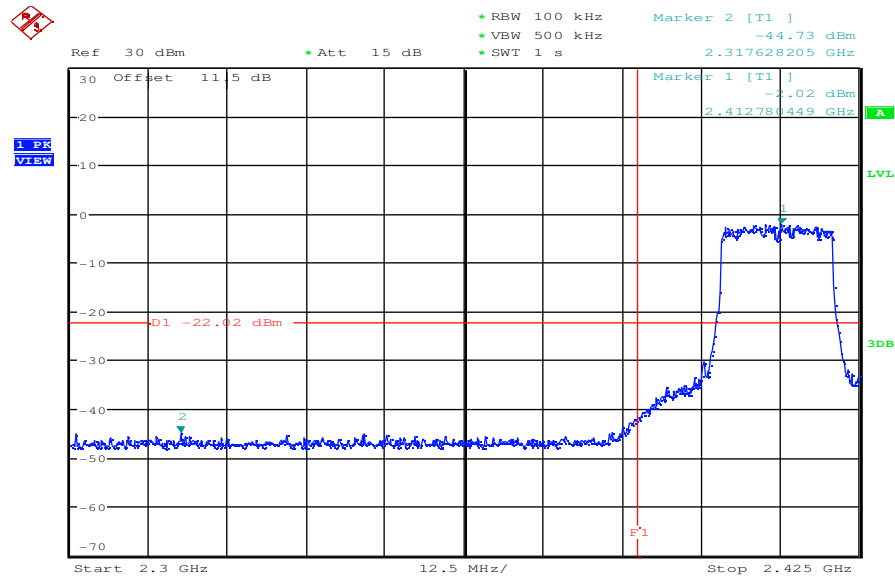
Date: 5.OCT.2010 14:29:33

Plot 4: OFDM, g – mode, 24 MBit/s, channel 11, power index 45, higher band edge



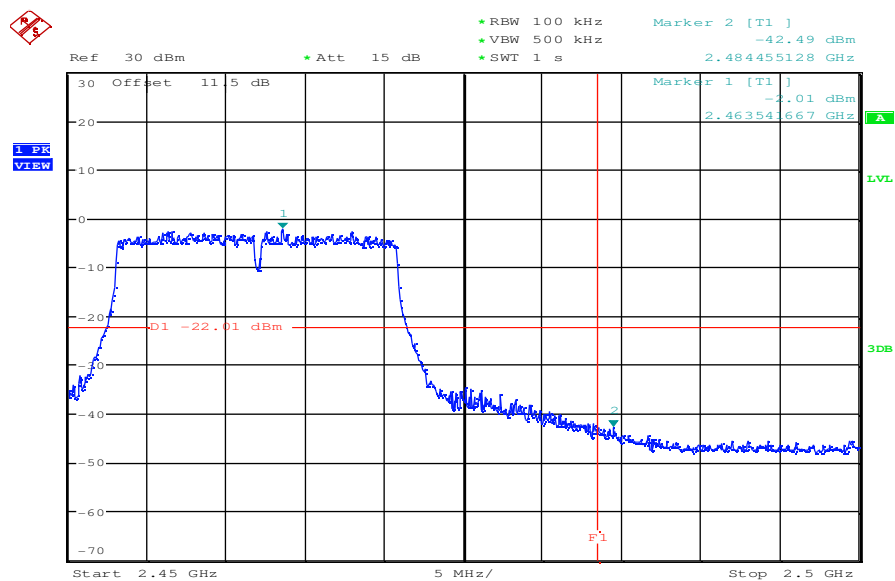
Date: 5.OCT.2010 14:33:57

Plot 5: OFDM, n – mode, mcs 7, channel 1, power index 45, lower band edge



Date: 6.DEC.2010 14:54:44

Plot 6: OFDM, n – mode, mcs 7, channel 11, power index 45, higher band edge



Date: 6.DEC.2010 14:56:15

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:	Lower Band: 2300 – 2400 MHz higher Band: 2480 – 2500 MHz
Trace-Mode:	Max Hold

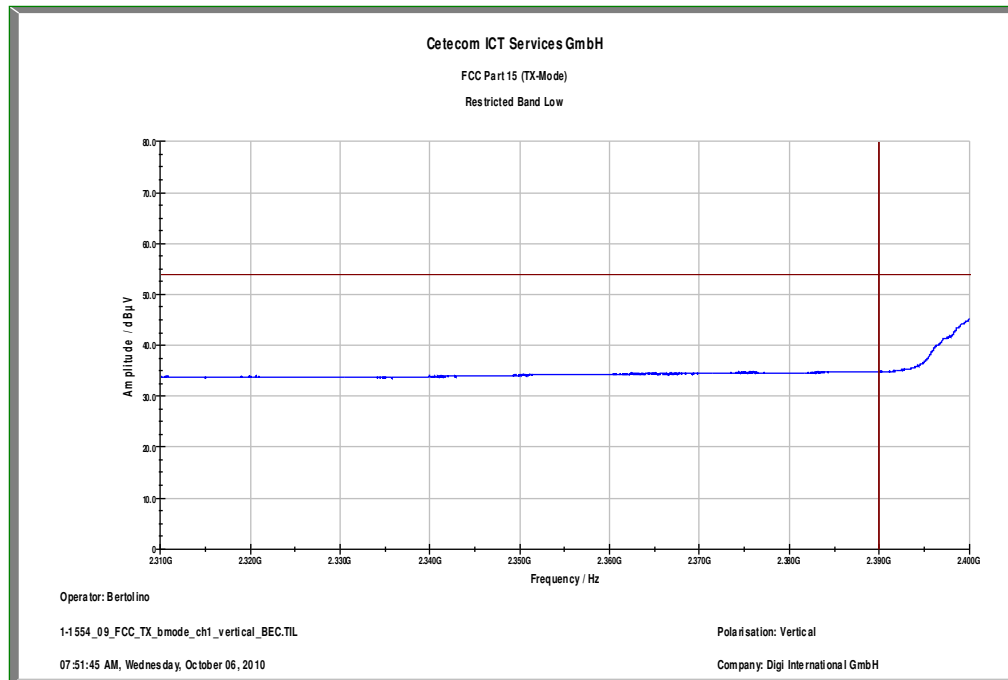
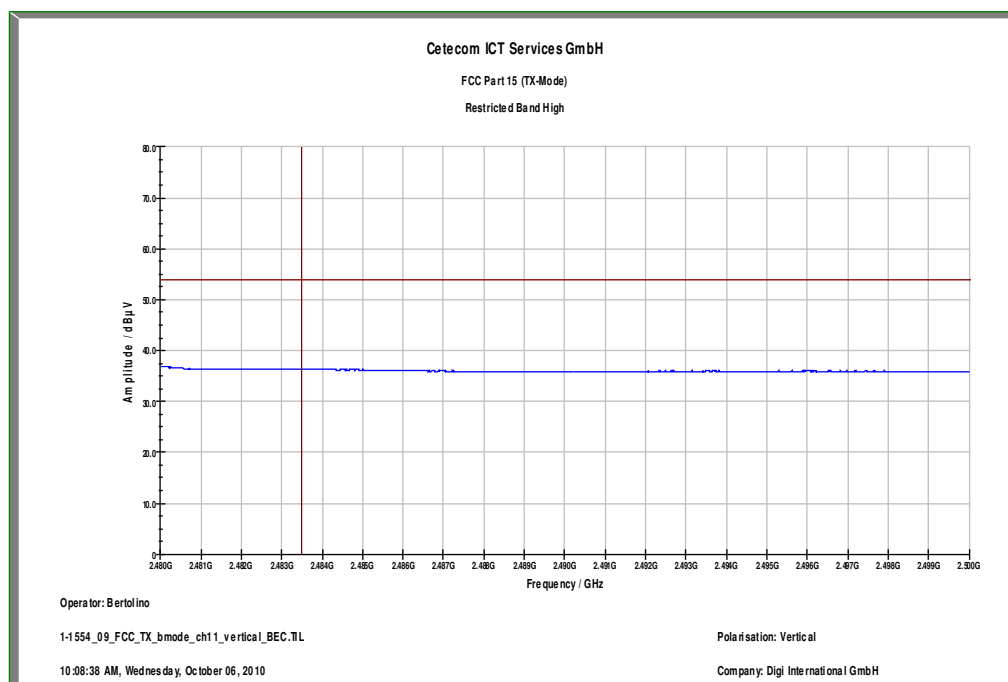
Limits:

FCC	IC
CFR Part 15.205	RSS 210, Issue 8, A 8.5
Band Edge Compliance Radiated	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).	
54 dBμV/m AVG	

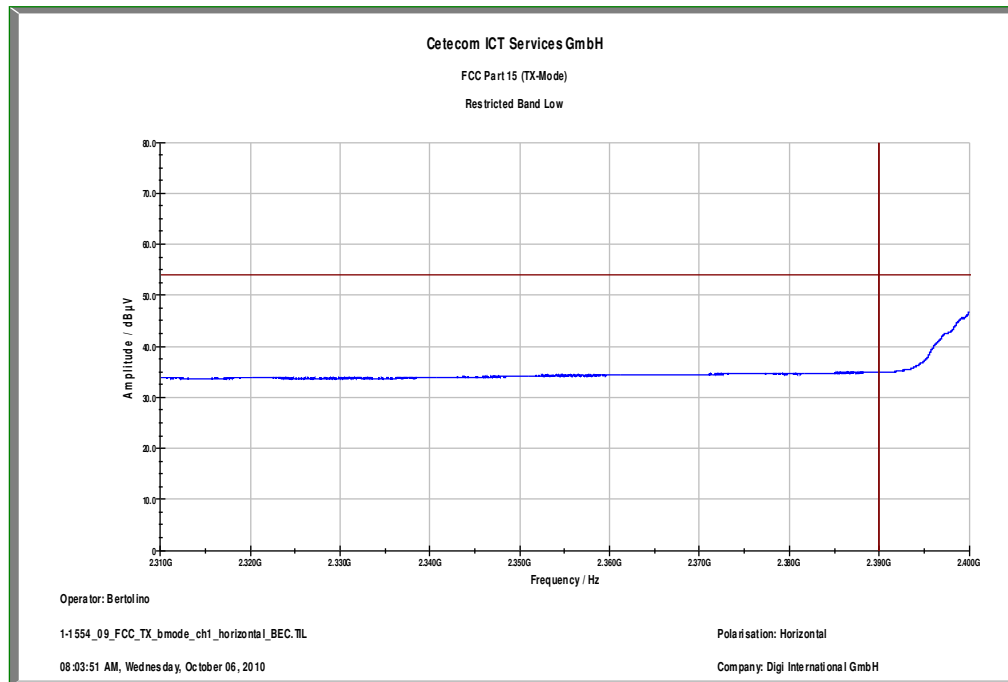
Results:

Szenario Modulation	Band Edge Compliance Radiated [dBμV/m]	
	DSSS	OFDM g & n mode
Lower Band Edge – Channel 1	< 54 dBμV/m (see plot 1)	< 54 dBμV/m (see plot 3)
Upper Band Edge – Channel 11	< 54 dBμV/m (see plot 2)	< 54 dBμV/m (see plot 4)
Measurement uncertainty	± 3 dB	

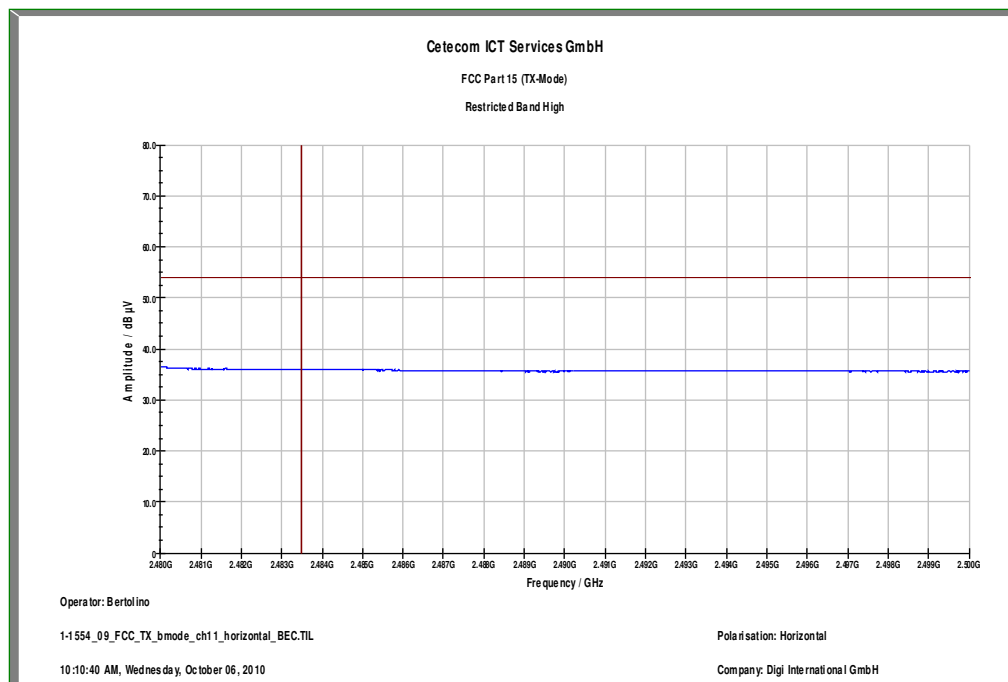
Result: The result of the measurement is passed.

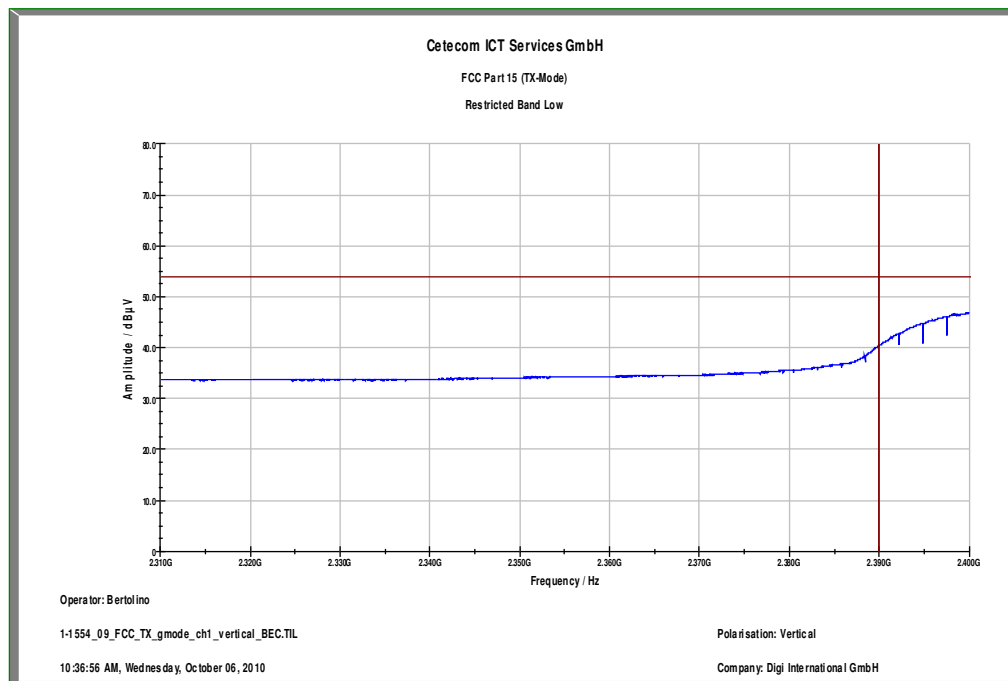
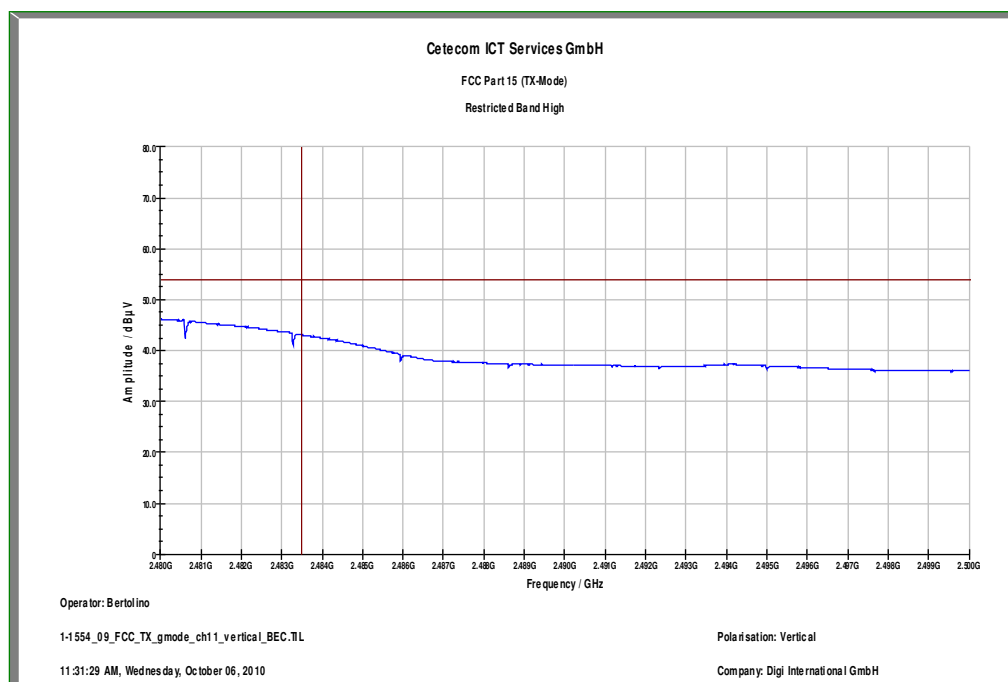
Plot 1: DSSS mode, 11 MBit/s, channel 1, power index 45, lower band edge, vertical polarization**Plot 2: DSSS mode, 11 MBit/s, channel 11, power index 45, higher band edge, vertical polarization**

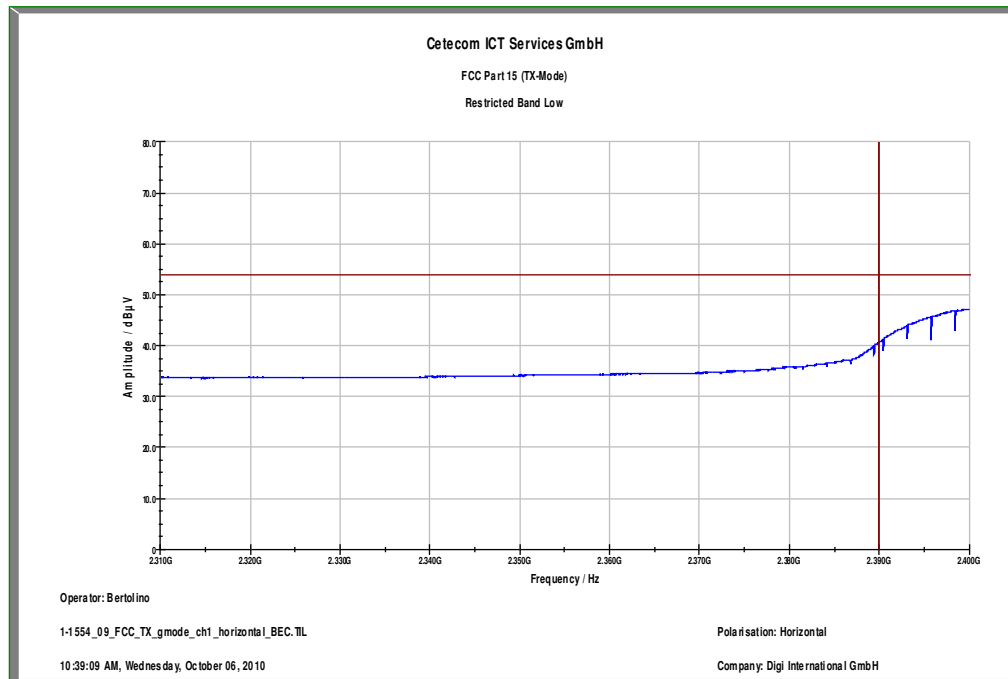
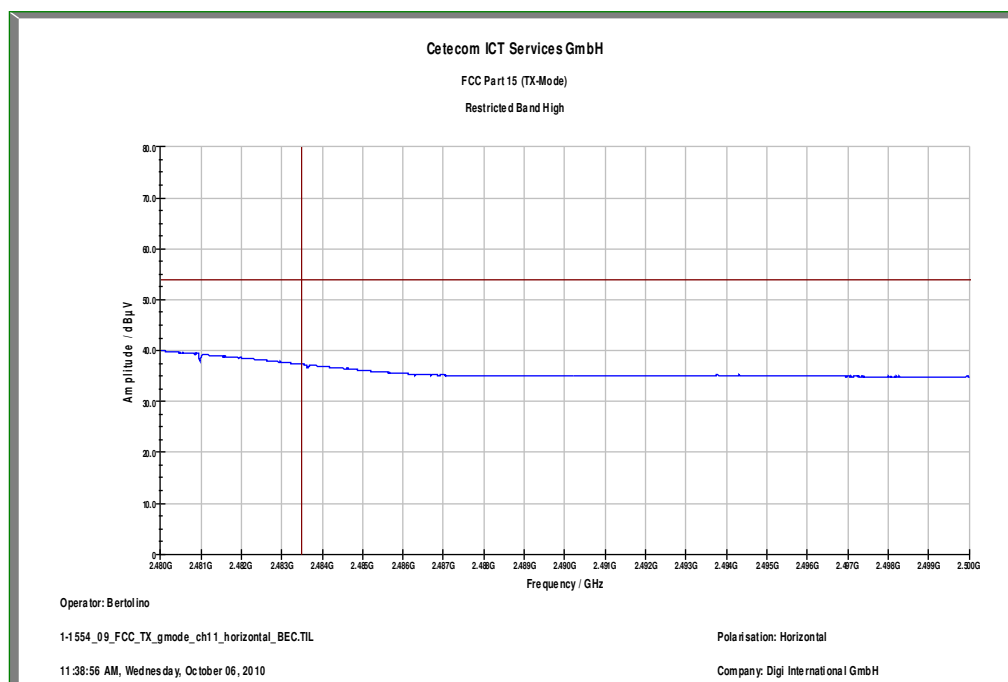
Plot 3: DSSS mode, 11 MBit/s, channel 1, power index 45, lower band edge, horizontal polarization

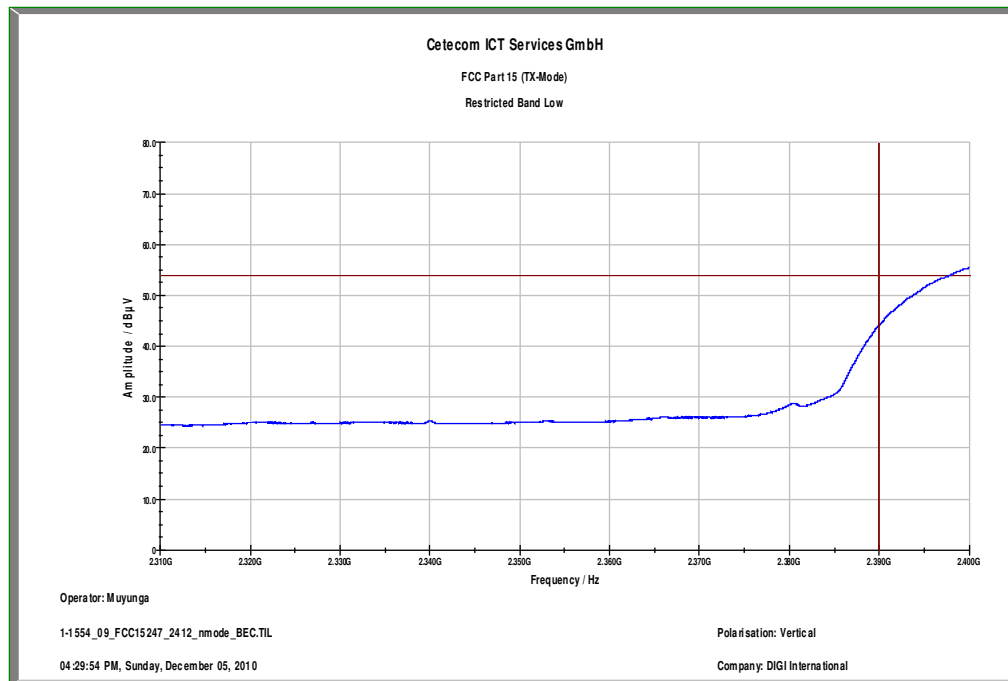
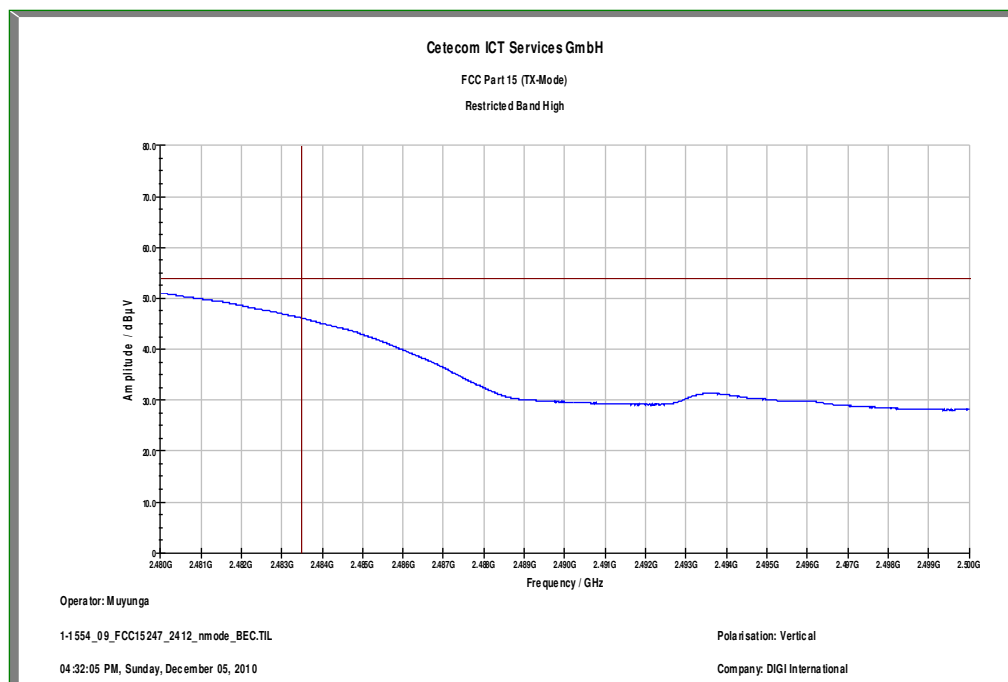


Plot 4: DSSS mode, 11 MBit/s, channel 11, power index 45, higher band edge, horizontal polarization

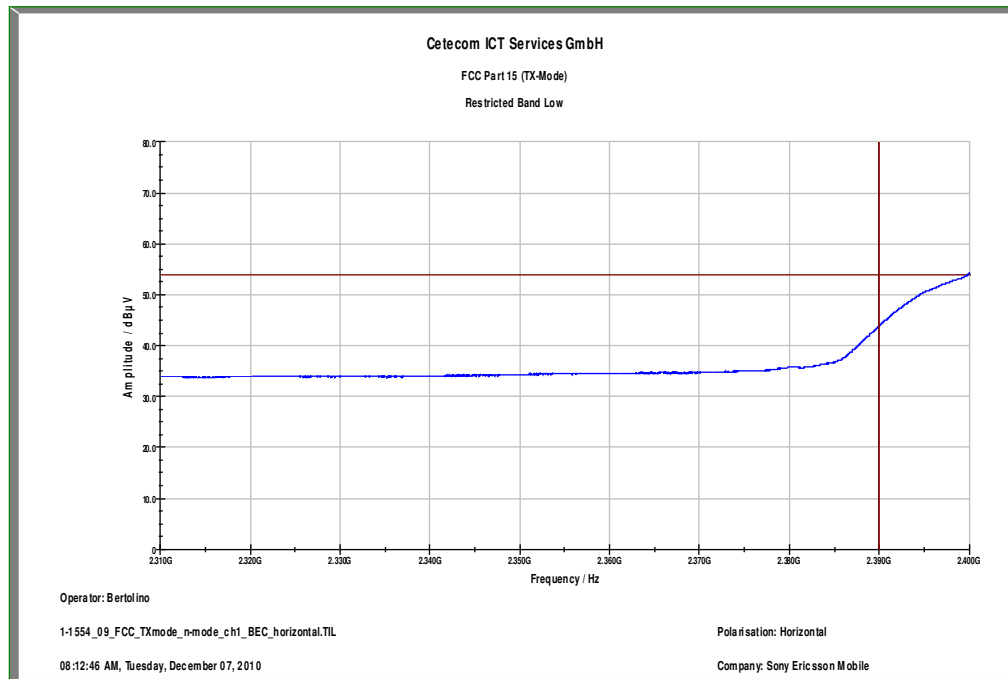


Plot 5: OFDM mode, 24 MBit/s, channel 1, power index 45, lower band edge, vertical polarization**Plot 6: OFDM mode, 24 MBit/s, channel 11, power index 45, higher band edge, vertical polarization**

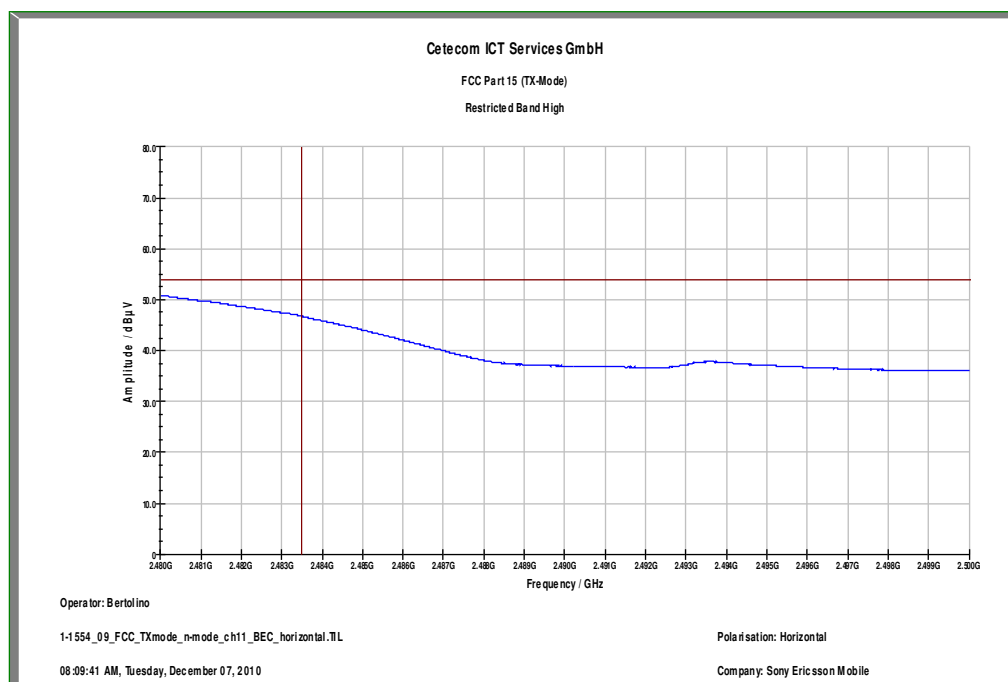
Plot 7: OFDM mode, 24 MBit/s, channel 1, power index 45, lower band edge, horizontal polarization**Plot 8: OFDM mode, 24 MBit/s, channel 11, power index 45, higher band edge, horizontal polarization**

Plot 9: OFDM mode, mcs 7, channel 1, power index 45, lower band edge, vertical polarization**Plot 10: OFDM mode, mcs 7, channel 11, power index 45, higher band edge, vertical polarization**

Plot 11: OFDM mode, mcs 7, channel 1, power index 45, lower band edge, horizontal polarization



Plot 12: OFDM mode, mcs 7, channel 11, power index 45, higher band edge, 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:	Auto
Video bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 500 kHz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 500 kHz
Span:	9 kHz to 25 GHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 15.247(d)	RSS 210, Issue 8, A 8.5
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	

Result: Also see plots

TX Spurious Emissions Conducted					
DSSS – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		3.44	30 dBm		Operating frequency
No peaks found.			-20 dBc		complies
2437		2.65	30 dBm		Operating frequency
No peaks found.			-20 dBc		complies
2462		2.47	30 dBm		Operating frequency
No peaks found.			-20 dBc		complies
Measurement uncertainty		± 3 dB			

Result: The result of the measurement is passed.

Result: Also see plots

TX Spurious Emissions Conducted					
OFDM g – mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		1.61	30 dBm		Operating frequency
No peaks found.			-20 dBc		complies
2437		1.43	30 dBm		Operating frequency
No peaks found.			-20 dBc		complies
2462		1.28	30 dBm		Operating frequency
No peaks found.			-20 dBc		complies
Measurement uncertainty		± 3 dB			

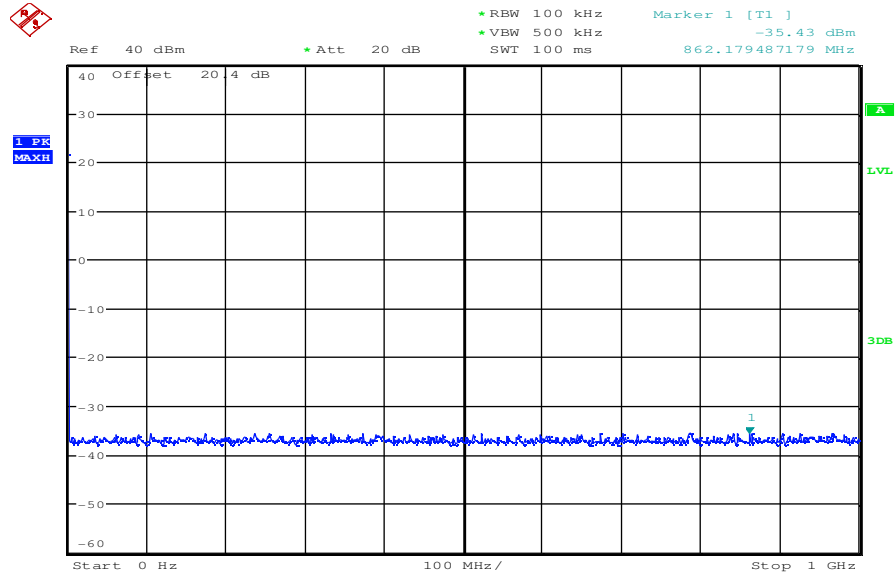
Result: The result of the measurement is passed.

Result: Also see plots

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		-1.09	30 dBm		Operating frequency
No peaks found.			-20 dBc		complies
2437		-1.87	30 dBm		Operating frequency
No peaks found.			-20 dBc		complies
2462		-2.61	30 dBm		Operating frequency
No peaks found.			-20 dBc		complies
Measurement uncertainty			± 3 dB		

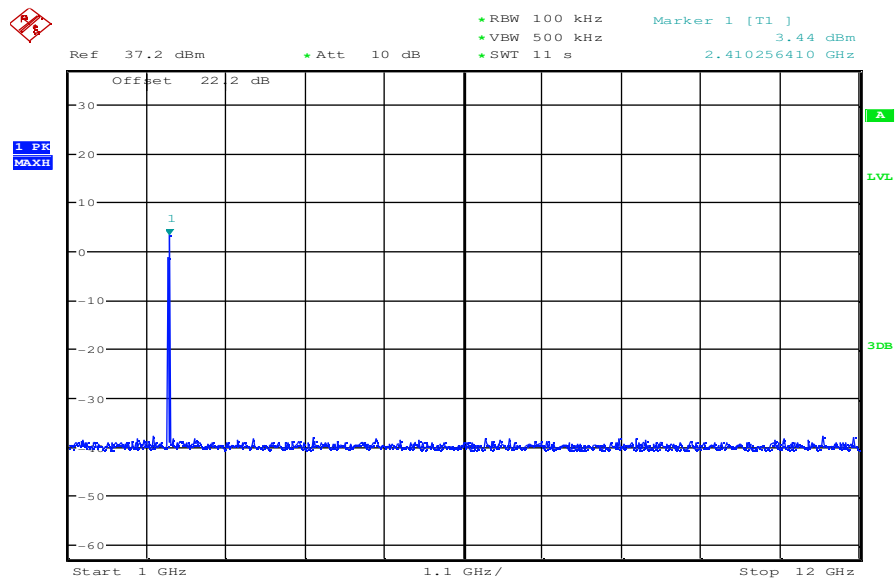
Result: The result of the measurement is passed.

Plot 1: DSSS mode, 11 MBit/s, channel 1, power index 45, 0 MHz – 1 GHz



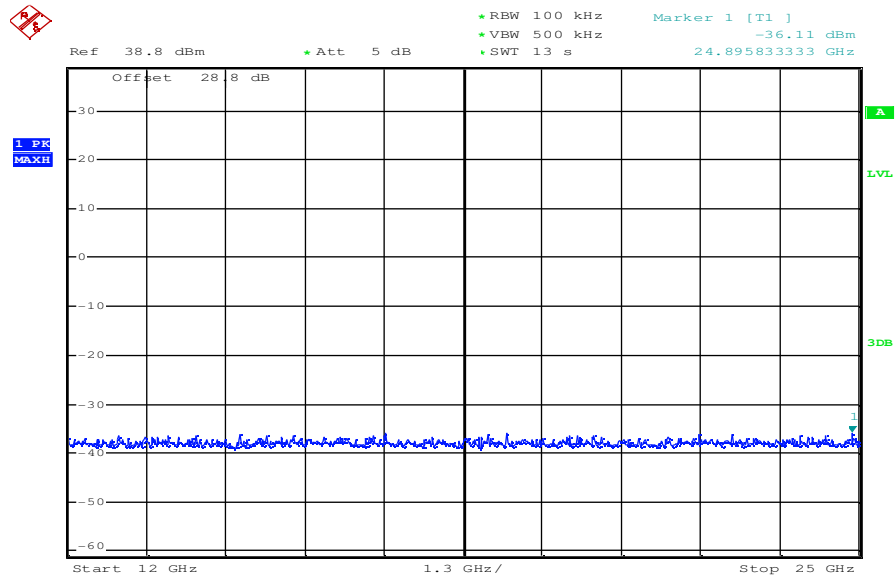
Date: 5.OCT.2010 14:41:47

Plot 2: DSSS mode, 11 MBit/s, channel 1, power index 45, 1 GHz – 12 GHz



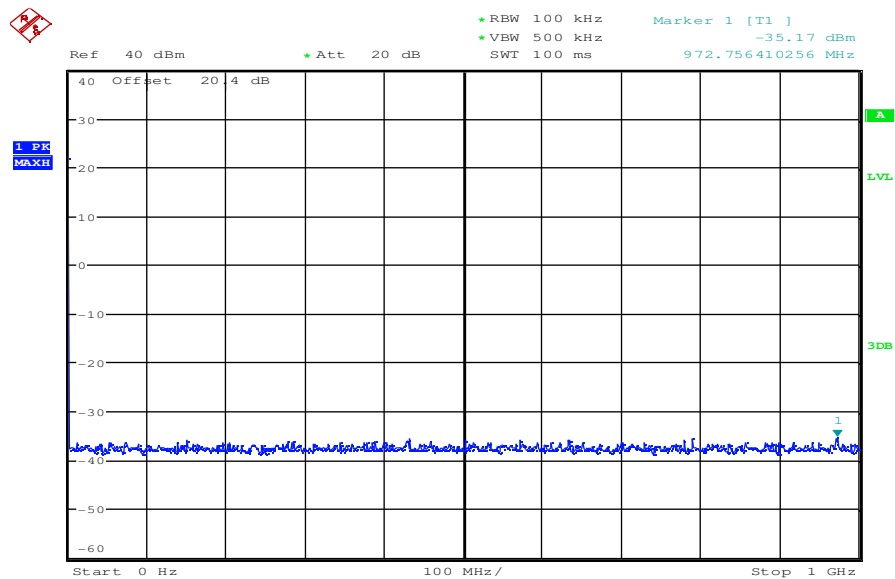
Date: 5.OCT.2010 15:00:38

Plot 3: DSSS mode, 11 MBit/s, channel 1, power index 45, 12 GHz – 25 GHz



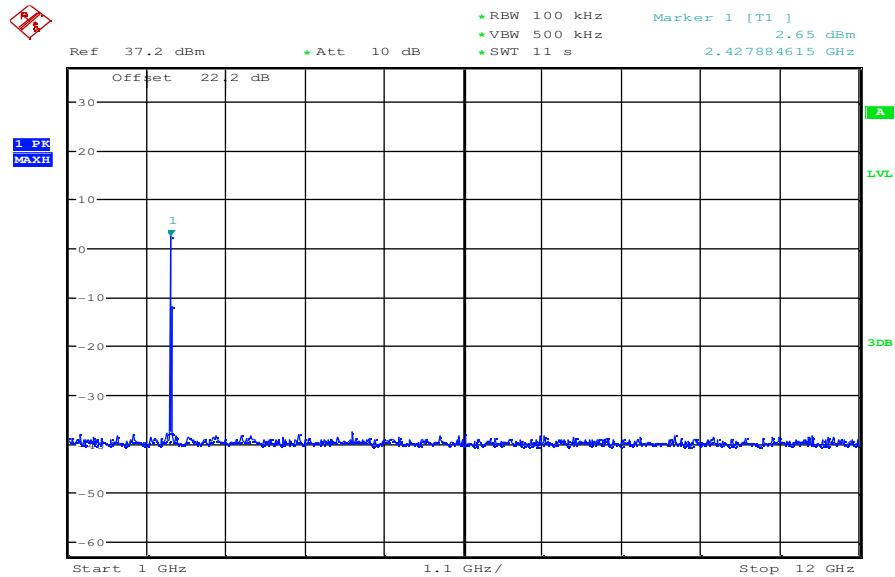
Date: 5.OCT.2010 15:14:38

Plot 4: DSSS mode, 11 MBit/s, channel 6, power index 45, 0 MHz – 1 GHz



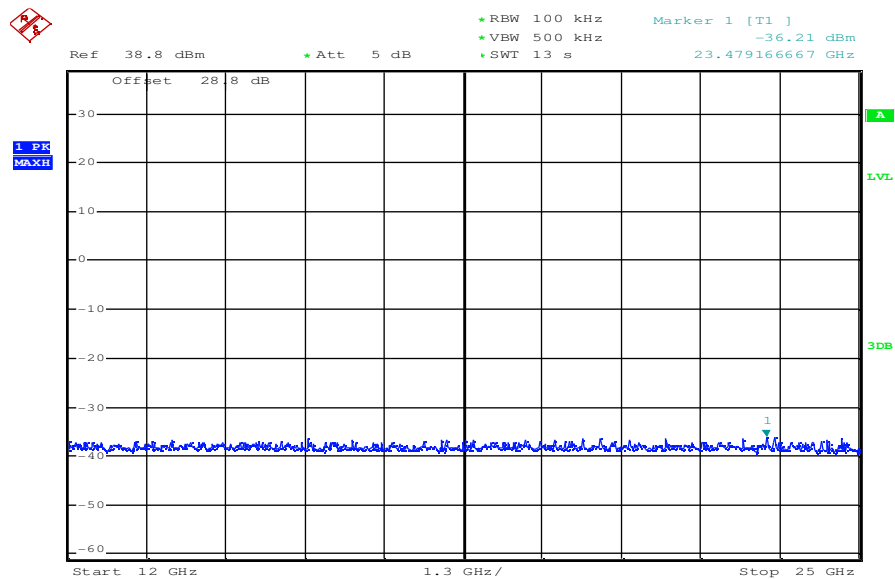
Date: 5.OCT.2010 14:42:32

Plot 5: DSSS mode, 11 MBit/s, channel 6, power index 45, 1 GHz – 12 GHz



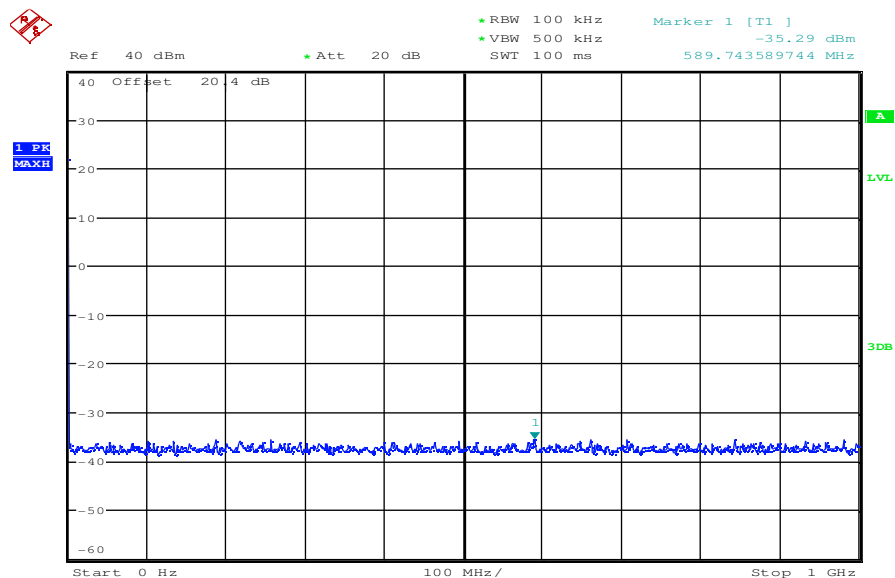
Date: 5.OCT.2010 15:01:52

Plot 6: DSSS mode, 11 MBit/s, channel 6, power index 45, 12 GHz – 25 GHz



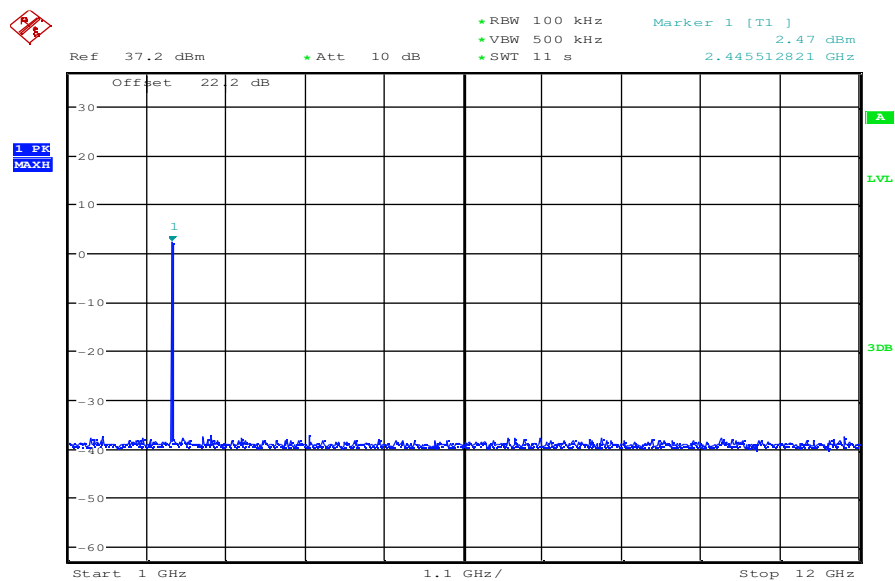
Date: 5.OCT.2010 15:15:27

Plot 7: DSSS mode, 11 MBit/s, channel 11, power index 45, 0 MHz – 1 GHz



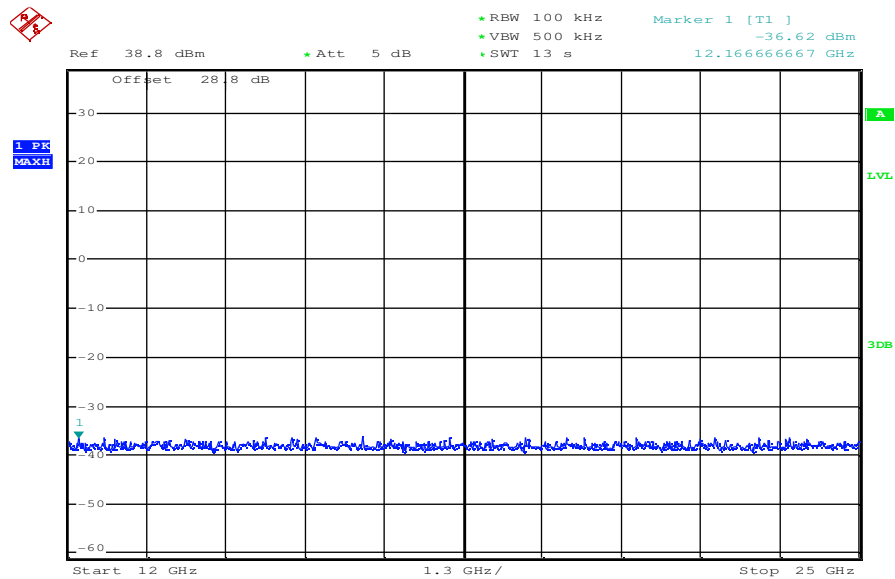
Date: 5.OCT.2010 14:43:18

Plot 8: DSSS mode, 11 MBit/s, channel 11, power index 45, 1 GHz – 12 GHz



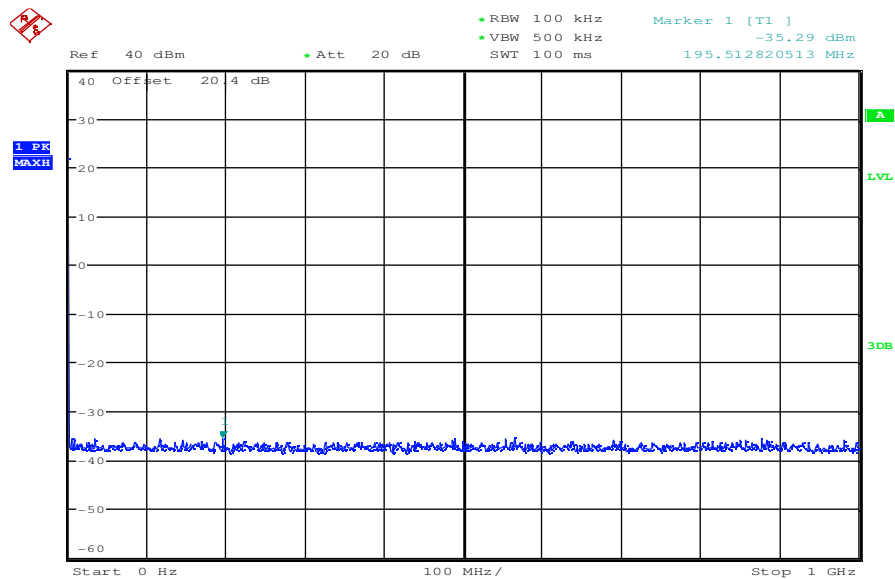
Date: 5.OCT.2010 15:05:55

Plot 9: DSSS mode, 11 MBit/s, channel 11, power index 45, 12 GHz – 25 GHz

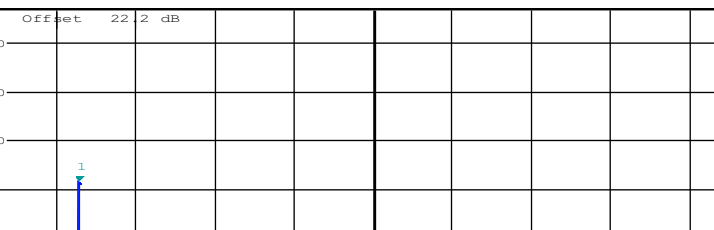


Date: 5.OCT.2010 15:16:13

Plot 10: OFDM, g – mode, 24 MBit/s, channel 1, power index 45, 0 MHz – 1 GHz



Date: 5.OCT.2010 14:44:14



Ref 37.2 dBm * Att 10 dB

- * RBW 100 kHz
- * VBW 500 kHz
- * SWT 11 s

Marker 1 [T1] 1.61 dBm 2.410256410 GHz

Offset 22.2 dB

1 PK MAXH

Start 1 GHz 1.1 GHz / Stop 12 GHz

Offset 28.8 dB

Ref 38.8 dBm

Att 5 dB

RBW 100 kHz

VBW 500 kHz

SWT 13 s

Marker 1 [T1]

-36.03 dBm

22.68750000 GHz

1 PK MAXH

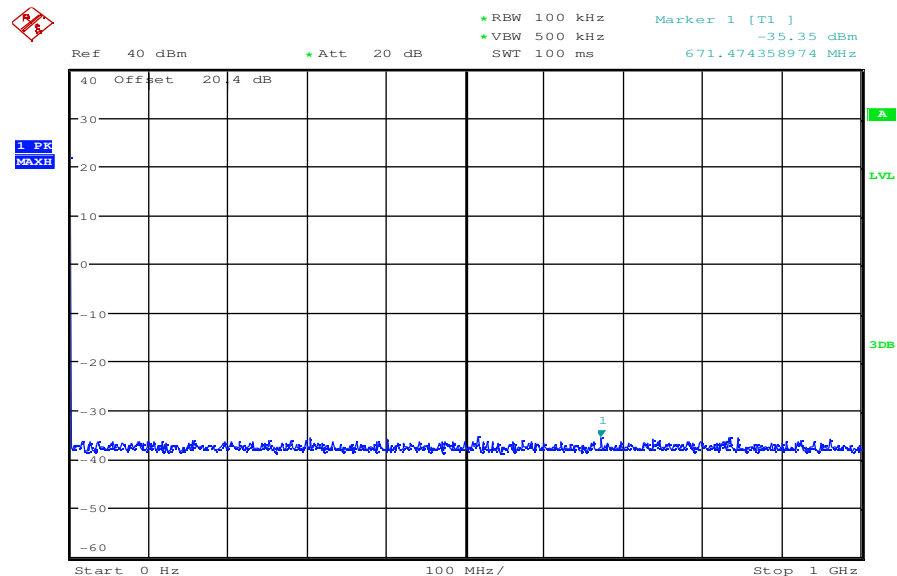
Start 12 GHz

1.3 GHz/

Stop 25 GHz

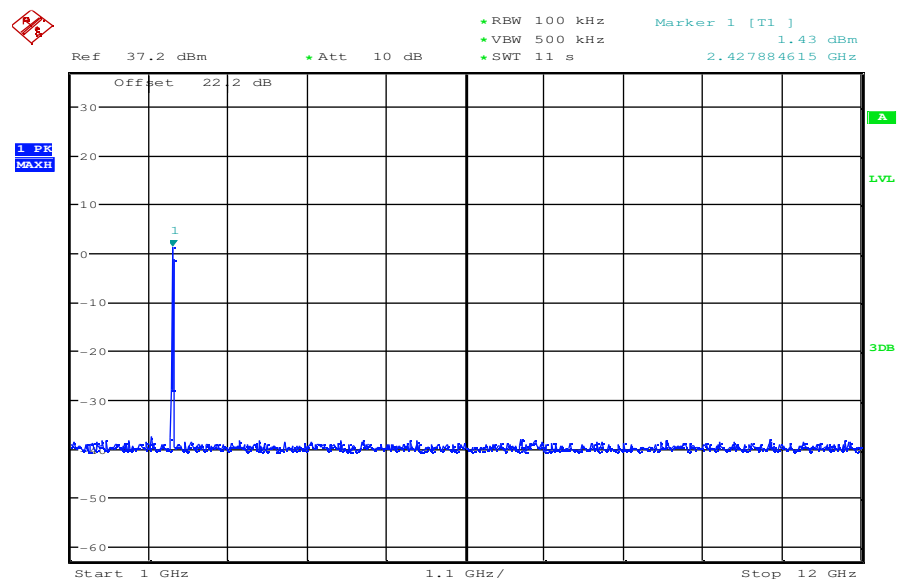
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Plot 13: OFDM, g – mode, 24 MBit/s, channel 6, power index 45, 0 MHz – 1 GHz



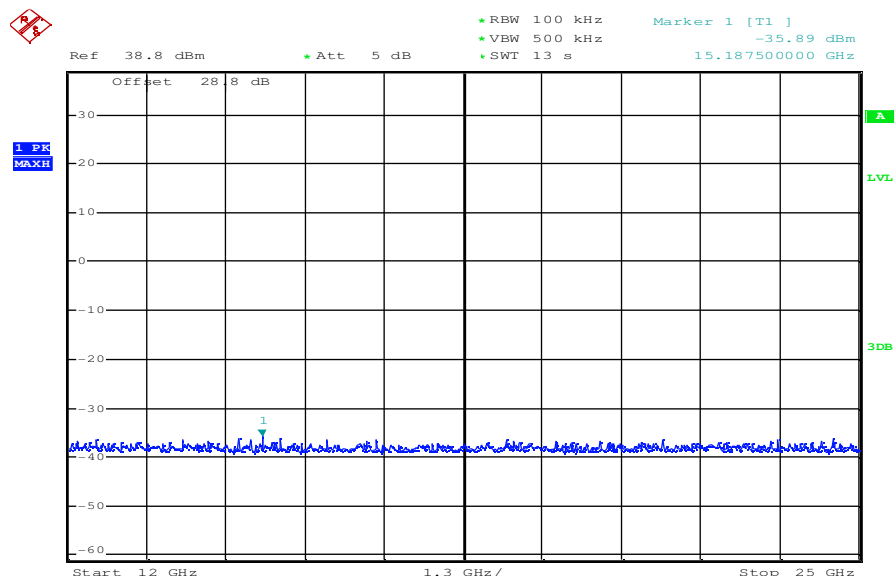
Date: 5.OCT.2010 14:44:59

Plot 14: OFDM, g – mode, 24 MBit/s, channel 6, power index 45, 1 GHz – 12 GHz



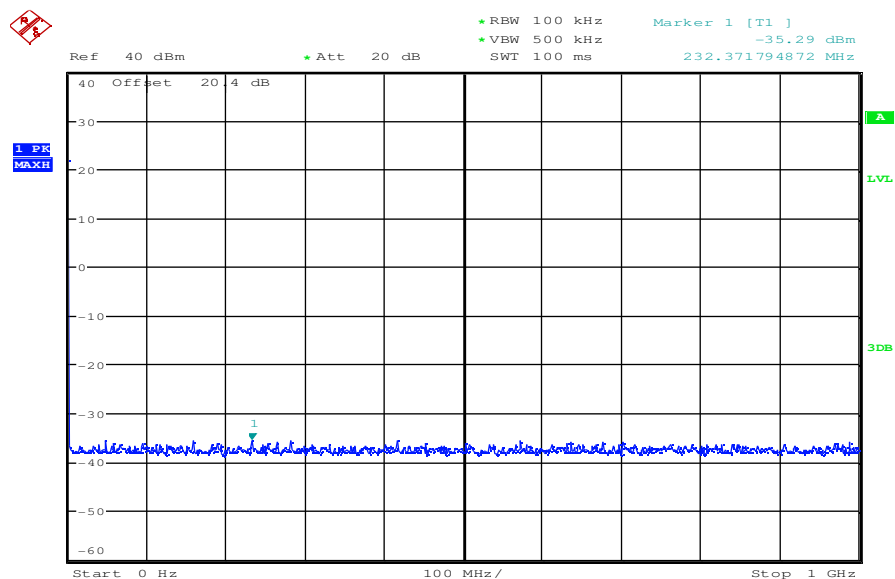
Date: 5.OCT.2010 15:08:38

Plot 15: OFDM, g – mode, 24 MBit/s, channel 6, power index 45, 12 GHz – 25 GHz



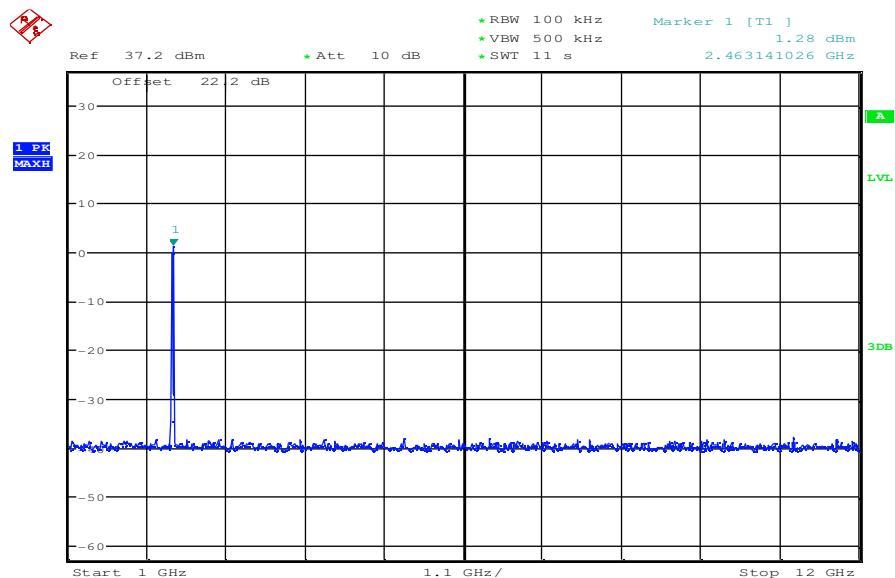
Date: 5.OCT.2010 15:12:44

Plot 16: OFDM, g – mode, 24 MBit/s, channel 11, power index 45, 0 MHz – 1 GHz



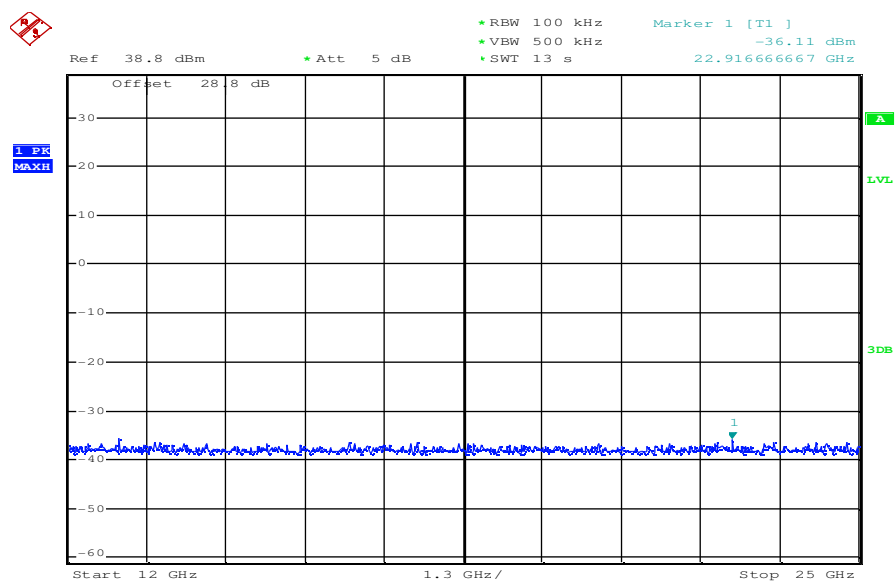
Date: 5.OCT.2010 14:45:52

Plot 17: OFDM, g – mode, 24 MBit/s, channel 11, power index 45, 1 GHz – 12 GHz



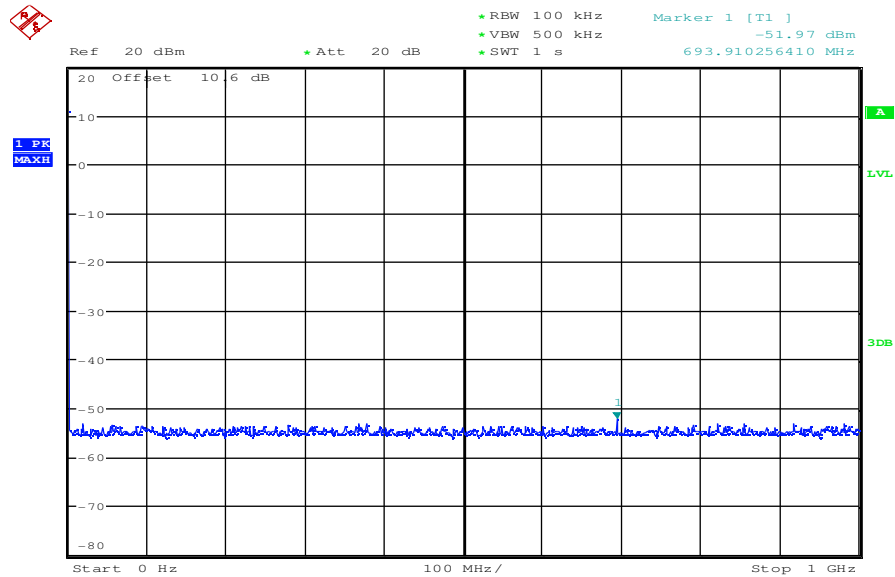
Date: 5.OCT.2010 15:09:47

Plot 18: OFDM, g – mode, 24 MBit/s, channel 11, power index 45, 12 GHz – 25 GHz



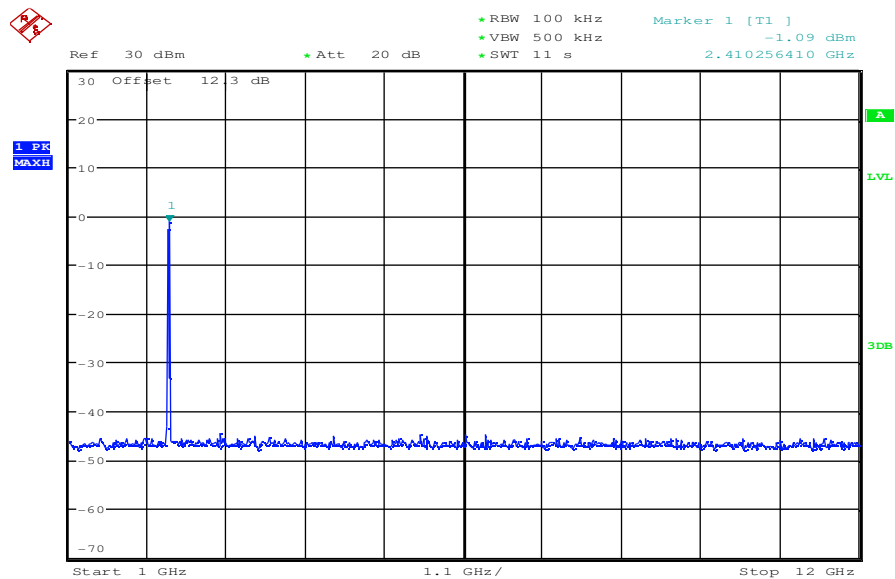
Date: 5.OCT.2010 15:13:55

Plot 19: OFDM, n – mode, mcs 7, channel 1, power index 45, 0 MHz – 1 GHz



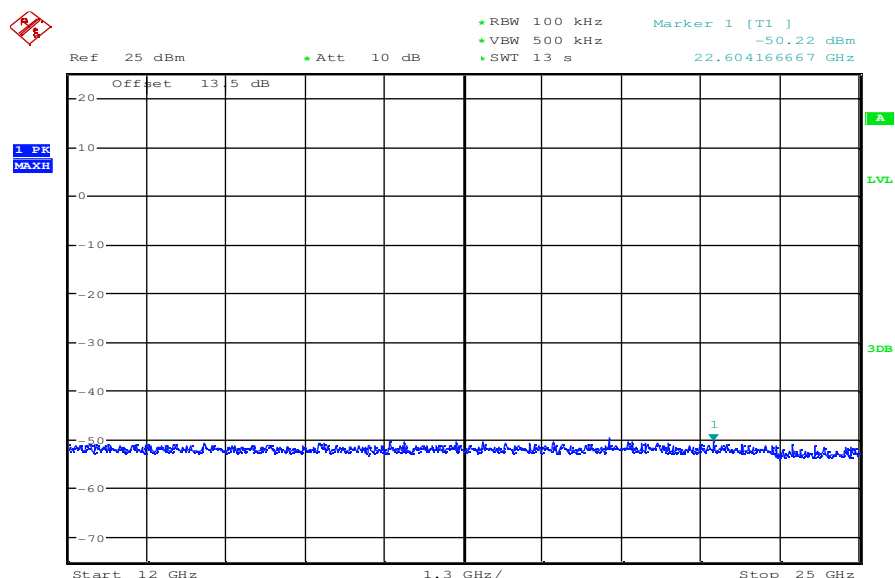
Date: 7.DEC.2010 09:01:54

Plot 20: OFDM, n – mode, mcs 7, channel 1, power index 45, 1 GHz – 12 GHz



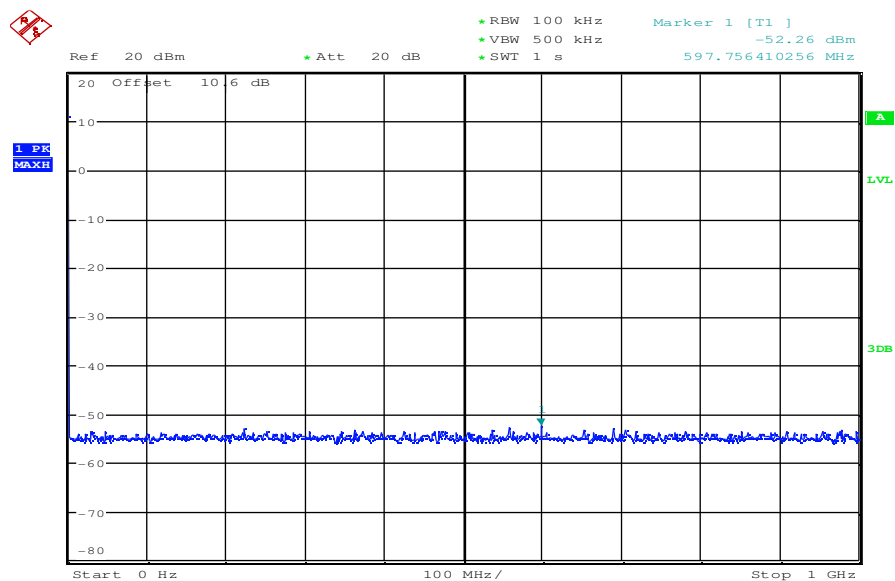
Date: 7.DEC.2010 09:07:32

Plot 21: OFDM, n – mode, mcs 7, channel 1, power index 45, 12 GHz – 25 GHz



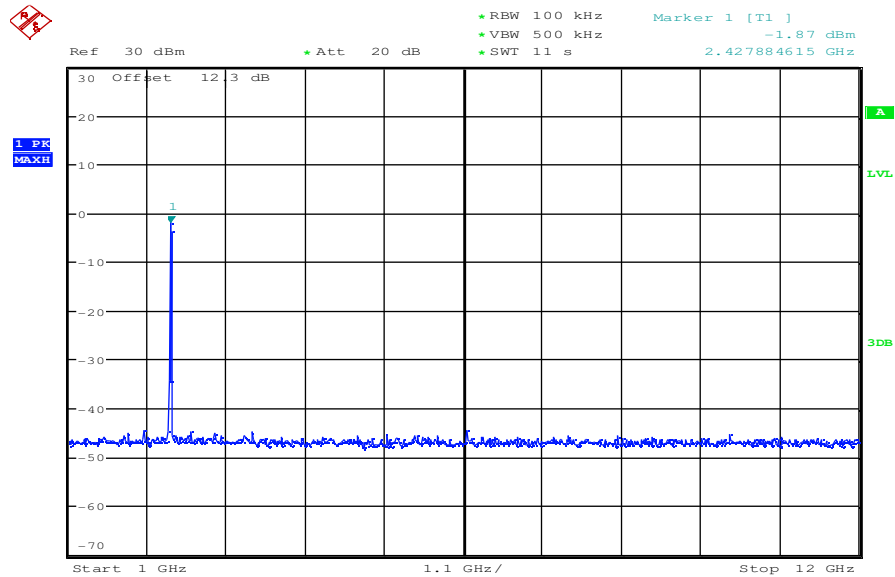
Date: 7.DEC.2010 09:09:12

Plot 22: OFDM, n – mode, mcs 7, channel 6, power index 45, 0 MHz – 1 GHz



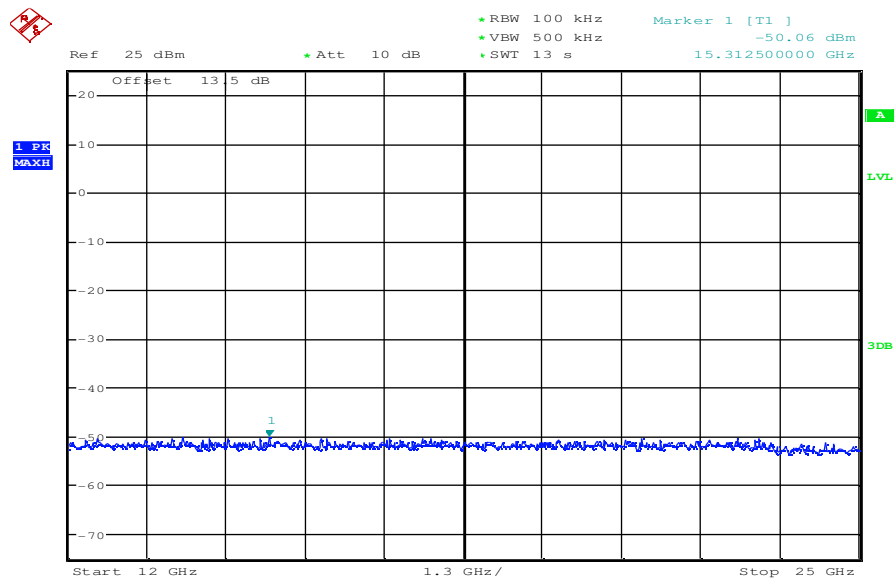
Date: 7.DEC.2010 09:03:02

Plot 23: OFDM, n – mode, mcs 7, channel 6, power index 45, 1 GHz – 12 GHz



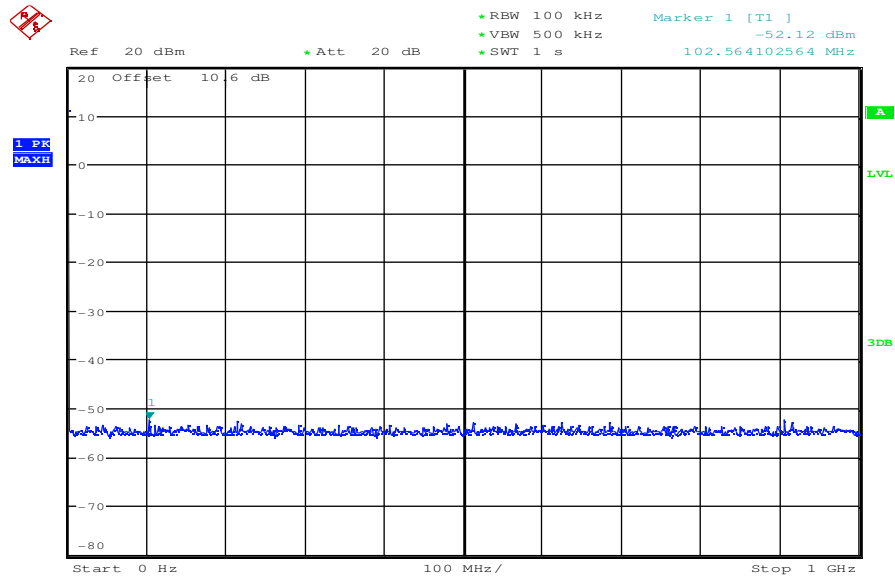
Date: 7.DEC.2010 09:06:29

Plot 24: OFDM, n – mode, mcs 7, channel 6, power index 45, 12 GHz – 25 GHz



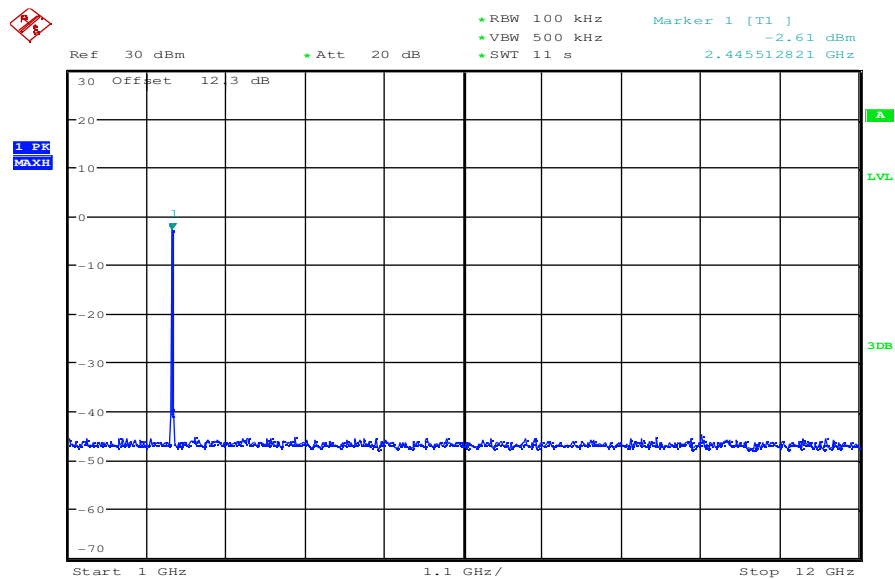
Date: 7.DEC.2010 09:10:55

Plot 25: OFDM, n – mode, mcs 7, channel 11, power index 45, 0 MHz – 1 GHz



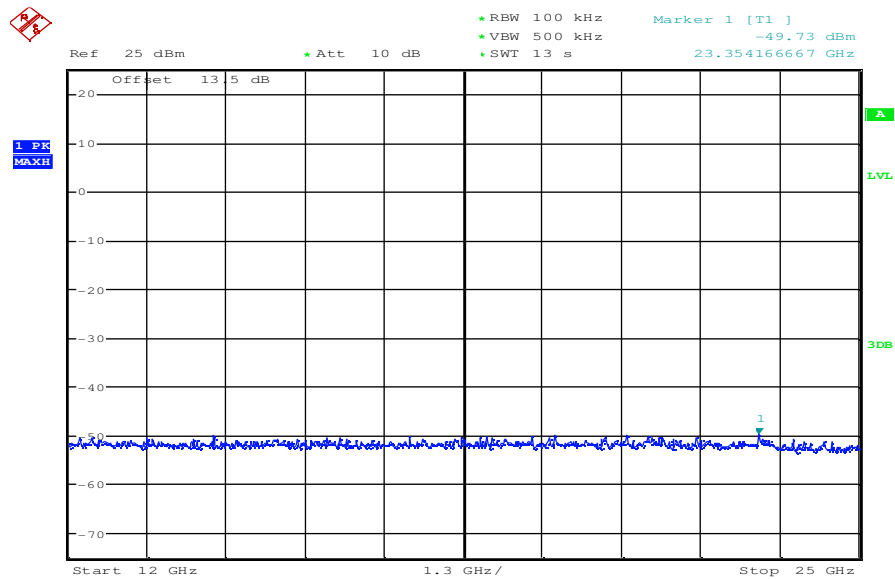
Date: 7.DEC.2010 09:04:15

Plot 26: OFDM, n – mode, mcs 7, channel 11, power index 45, 1 GHz – 12 GHz



Date: 7.DEC.2010 09:05:30

Plot 27: OFDM, n – mode, mcs 7, channel 11, power index 45, 12 GHz – 25 GHz



Date: 7.DEC.2010 09:12:10

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
Sweep time:	Auto
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold
Measured Modulation	☒ DSSS ☒ OFDM

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	
CFR Part 15.247(d)	RSS 210, Issue 8, A 8.5	
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)).		
§15.209		
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: Also see plots

TX Spurious Emissions Radiated [dB μ V/m]								
DSSS - 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]
1080.4	PP	V 26.89 H 28.37	4874	PP	V 48.79 H 48.53	4924	PP	V 50.03 H 49.70
4824	PP	V 46.70 H 46.27	-/-	-/-	-/-	-/-	-/-	-/-
Measurement results below 1 GHz → please take a look at the table below the plot.			Measurement results below 1 GHz → please take a look at the table below the plot.			Measurement results below 1 GHz → please take a look at the table below the plot.		
Measurement uncertainty			± 3 dB					

Result: The result of the measurement is passed.

Results: Also see plots

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]
4824	PP	V 41.70 H 45.86	4874	PP	V 44.04 H 48.05	4924	PP	V 45.93 H 49.72
Measurement results below 1 GHz → please take a look at the table below the 1 GHz plot.			Measurement results below 1 GHz → please take a look at the table below the 1 GHz plot.			Measurement results below 1 GHz → please take a look at the table below the 1 GHz plot.		
Measurement uncertainty			± 3 dB					

Result: The result of the measurement is passed.

Results: Also see plots

TX Spurious Emissions Radiated [dBμV/m]								
OFDM n – mode								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBμV/m]	F [MHz]	Detector	Level [dBμV/m]	F [MHz]	Detector	Level [dBμV/m]
4824	PP	V 44.90 H 49.77	4874	PP	V 46.39 H 50.07	4924	PP	V 47.99 H 50.68
19290	PP	37.66	19492	PP	37.61	19694	PP	35.66
Measurement results below 1 GHz → please take a look at the table below the 1 GHz plot.			Measurement results below 1 GHz → please take a look at the table below the 1 GHz plot.			Measurement results below 1 GHz → please take a look at the table below the 1 GHz plot.		
Measurement uncertainty			± 3 dB					

Result: The result of the measurement is passed.

DSSS mode:

Plot 1: DSSS mode, 11 MBit/s, channel 1, power index 45, 30 MHz – 1 GHz, verti. & horiz. Polarization

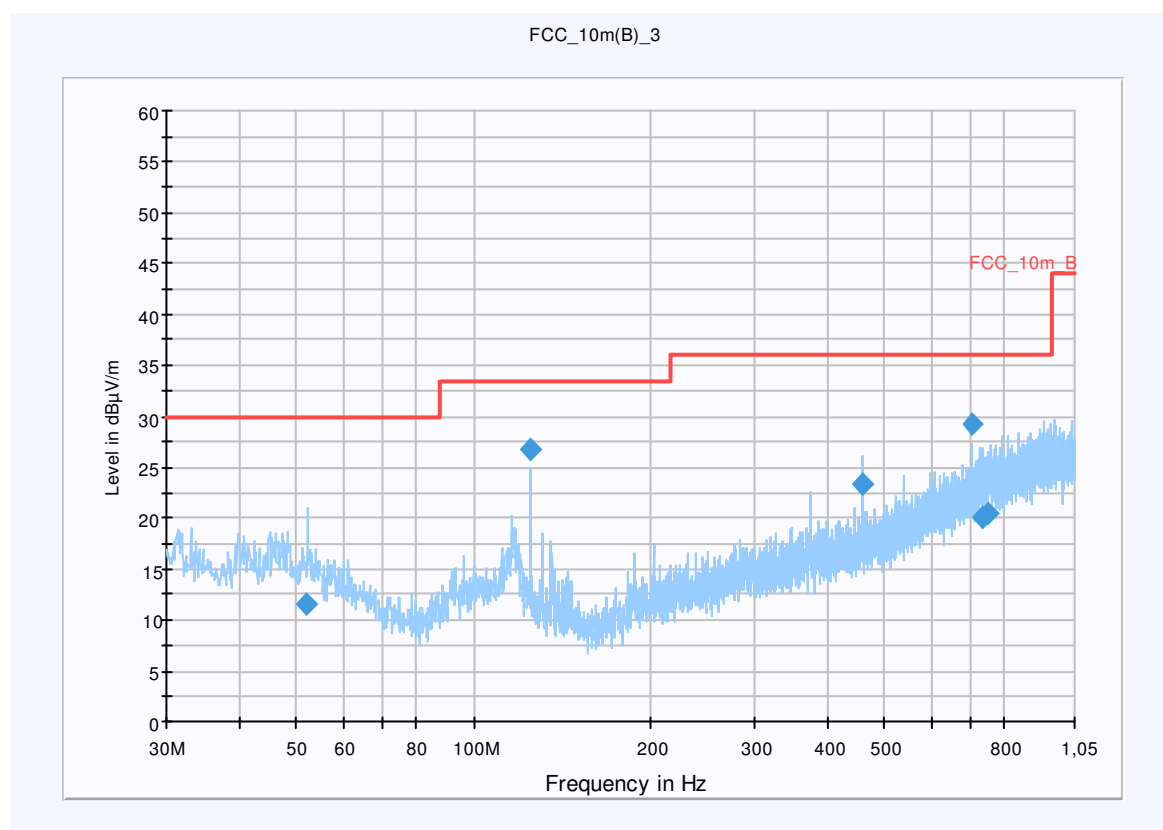
Common Information

EUT: i.MX51
 Serial Number: Prototype
 Test Description: FCC part 15 C @ 10 m
 Operating Conditions: cont. TX; b-mode, 11 MBit/s, power index 45 CH:1
 Operator Name: LNG
 Comment: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dB μ V/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver

**Final Result 1**

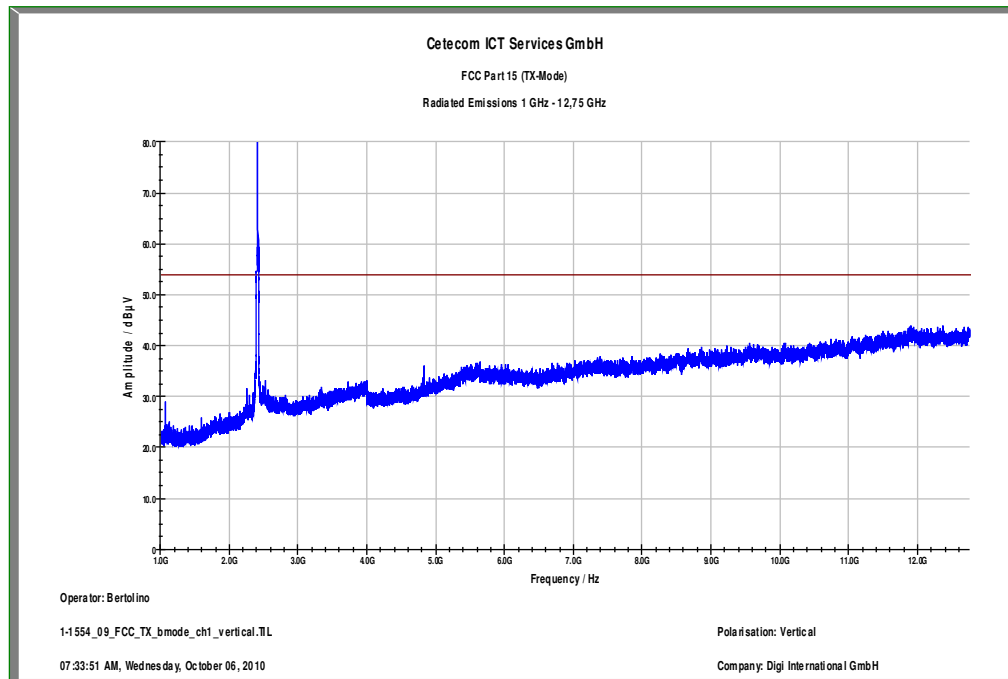
Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
52.071750	11.6	15000.000	120.000	98.0	V	217.0	13.2	18.4	30.0	
124.684800	26.7	15000.000	120.000	120.0	V	51.0	9.8	6.8	33.5	
457.223550	23.4	15000.000	120.000	174.0	H	190.0	17.8	12.6	36.0	
706.547250	29.4	15000.000	120.000	105.0	H	146.0	22.7	6.6	36.0	
732.171000	20.1	15000.000	120.000	220.0	V	61.0	23.3	15.9	36.0	
747.924450	20.4	15000.000	120.000	220.0	V	43.0	23.6	15.6	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

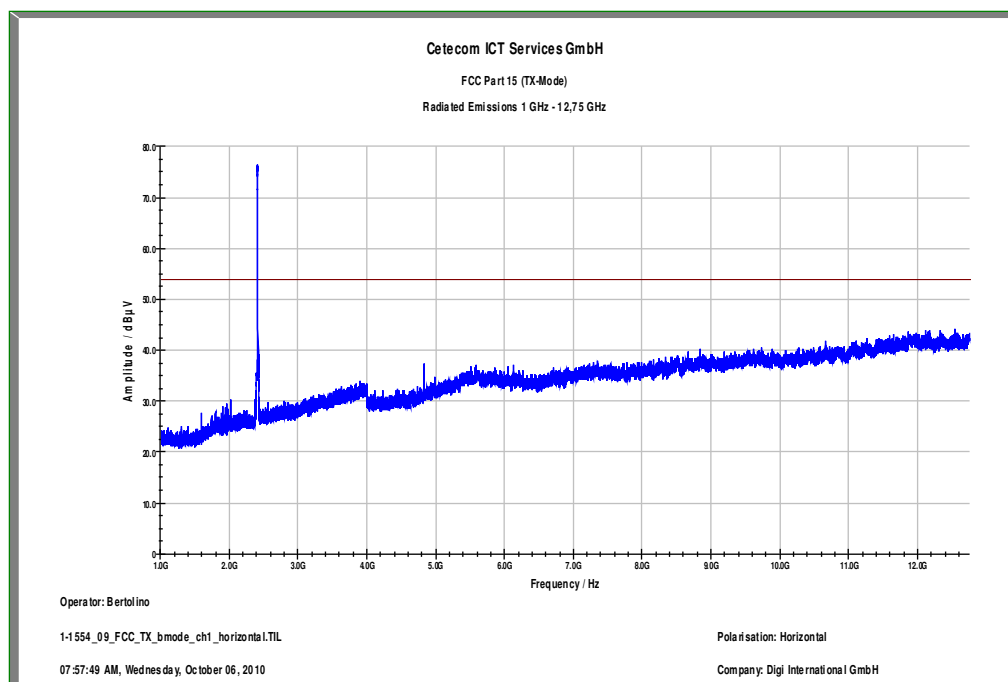
Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

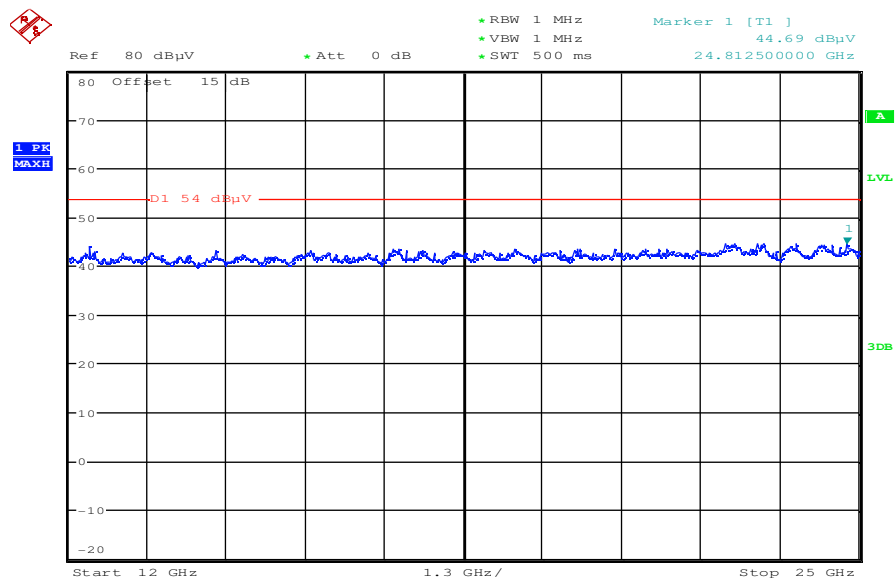
Plot 2 DSSS mode, 11 MBit/s, channel 1, power index 45, 1 GHz – 12.75 GHz, vertical polarization



Plot 3: DSSS mode, 11 MBit/s, channel 1, power index 45, 1 GHz – 12.75 GHz, horizontal polarization



Plot 4: DSSS mode, 11 MBit/s, channel 1, power index 45, 12 GHz – 25 GHz, verti. & horiz. polarization



Date: 7.OCT.2010 09:03:09

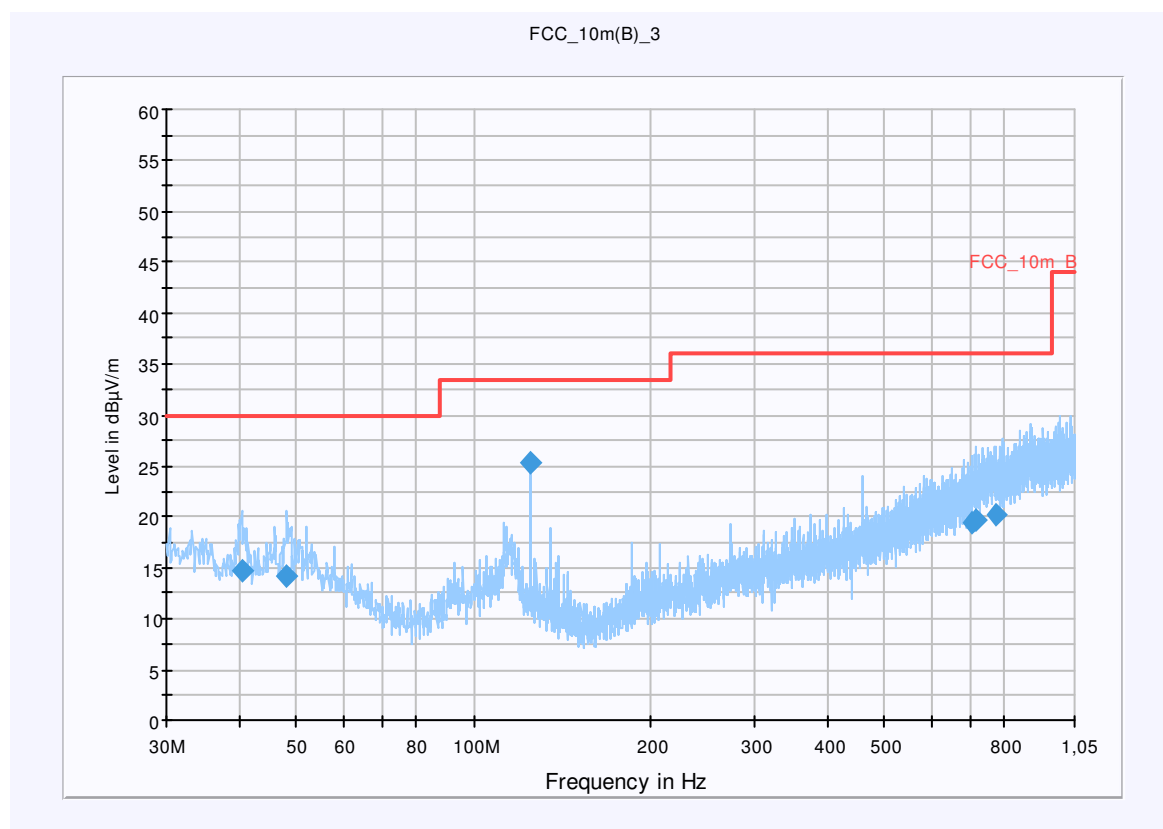
Plot 5: DSSS mode, 11 MBit/s, channel 6, power index 45, 30 MHz – 1 GHz, verti. & horiz. polarization
Common Information

EUT:	i.MX51
Serial Number:	Prototype
Test Description:	FCC part 15 C @ 10 m
Operating Conditions:	cont. TX; b-mode, 11 MBit/s, power index 45 CH:6
Operator Name:	LNG
Comment:	115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dB μ V/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver


Final Result 1

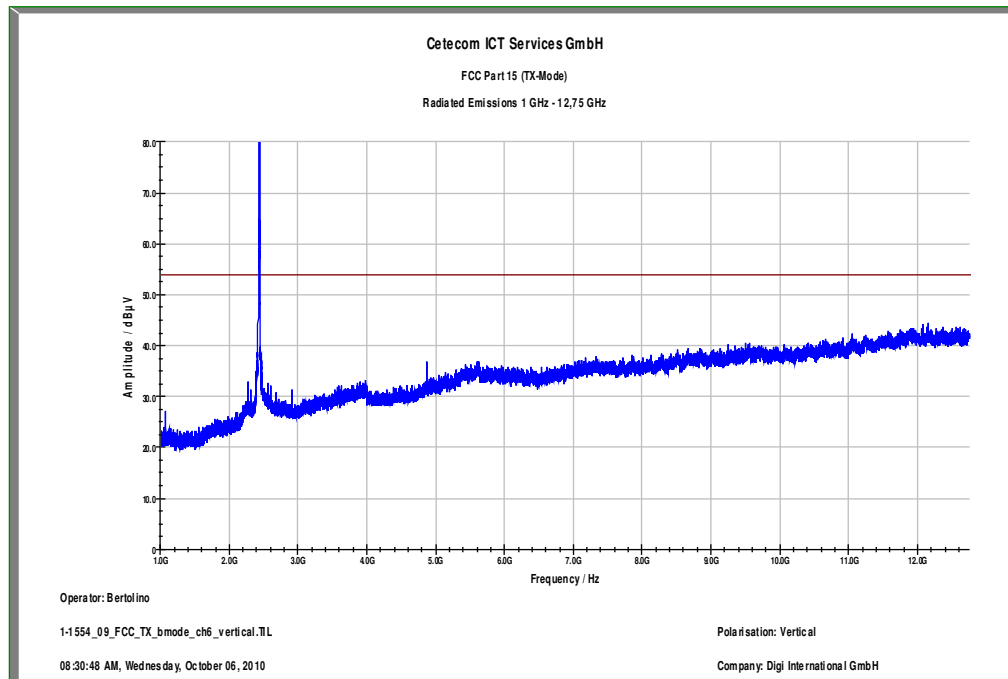
Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
40.405350	14.8	15000.000	120.000	98.0	V	168.0	13.4	15.2	30.0	
48.081150	14.1	15000.000	120.000	194.0	V	149.0	13.3	15.9	30.0	
124.683900	25.3	15000.000	120.000	98.0	V	194.0	9.8	8.2	33.5	
702.751200	19.4	15000.000	120.000	220.0	H	236.0	22.6	16.6	36.0	
714.687900	19.7	15000.000	120.000	132.0	H	112.0	22.8	16.3	36.0	
771.817800	20.3	15000.000	120.000	220.0	H	52.0	23.7	15.7	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

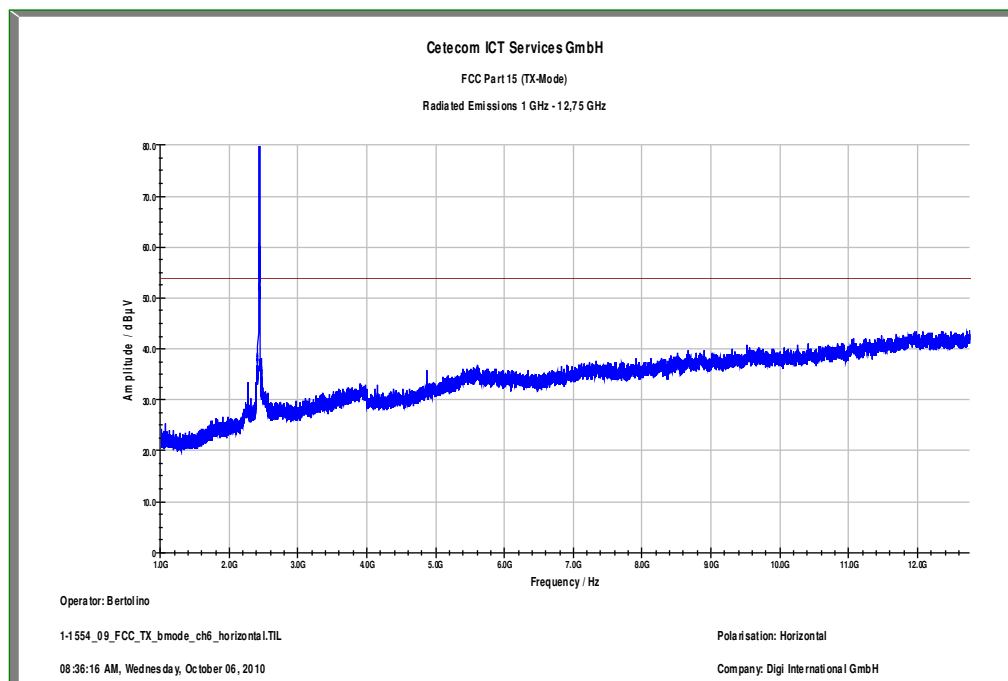
Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

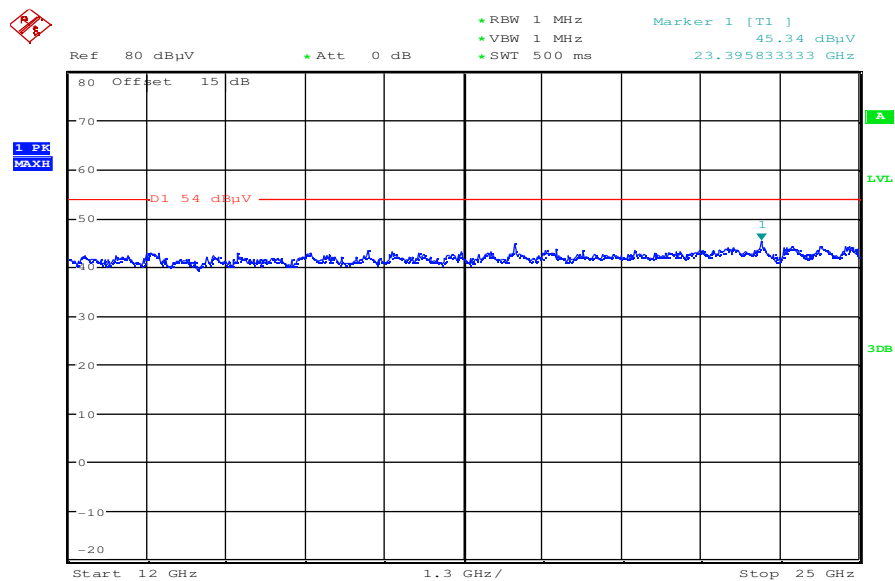
Plot 6: DSSS mode, 11 MBit/s, channel 6, power index 45, 1 GHz – 12.75 GHz, vertical polarization



Plot 7: DSSS mode, 11 MBit/s, channel 6, power index 45, 1 GHz – 12.75 GHz, horizontal polarization



Plot 8: DSSS mode, 11 MBit/s, channel 6, power index 45, 12 GHz – 25 GHz, verti. & horiz. polarization



Date: 7.OCT.2010 09:04:16

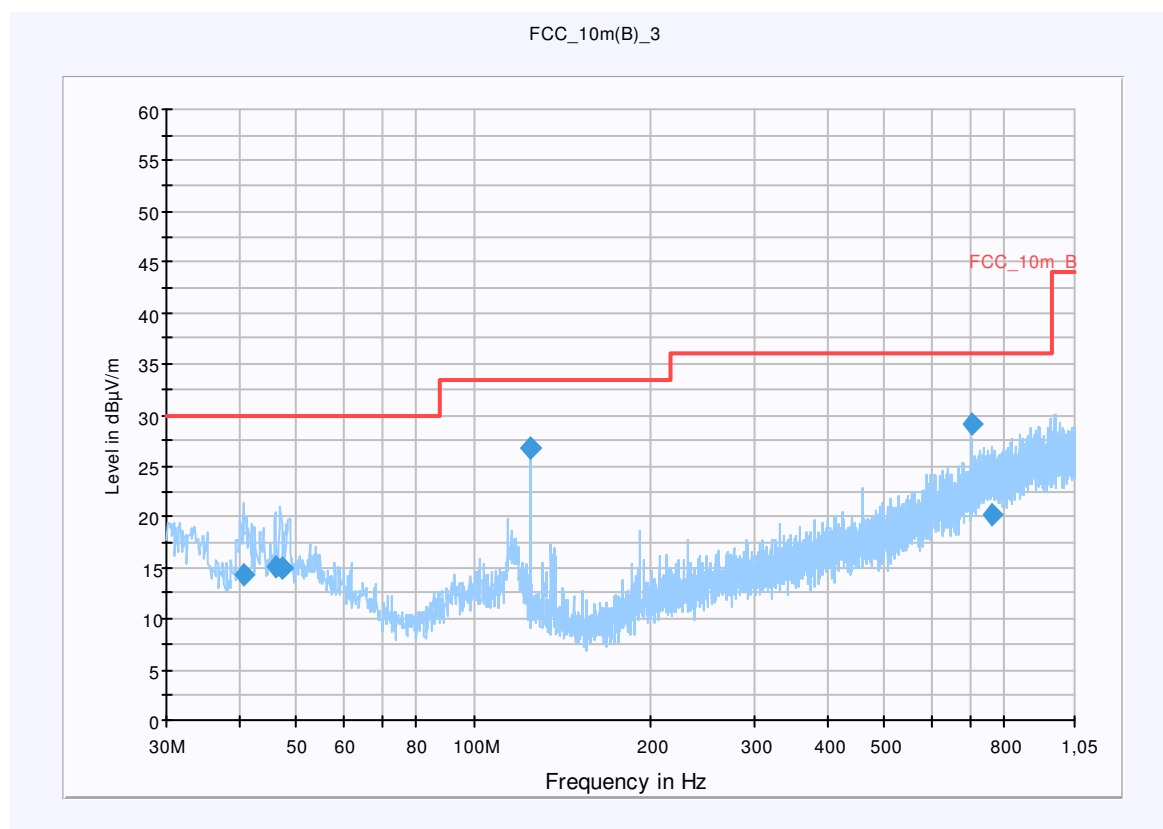
Plot 9: DSSS mode, 11 MBit/s, channel 11, power index 45, 30 MHz – 1 GHz, verti. & horiz. polarization
Common Information

EUT:	i.MX51
Serial Number:	Prototype
Test Description:	FCC part 15 C @ 10 m
Operating Conditions:	cont. TX; b-mode, 11 MBit/s, power index 45 CH:11
Operator Name:	LNG
Comment:	115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dB μ V/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver

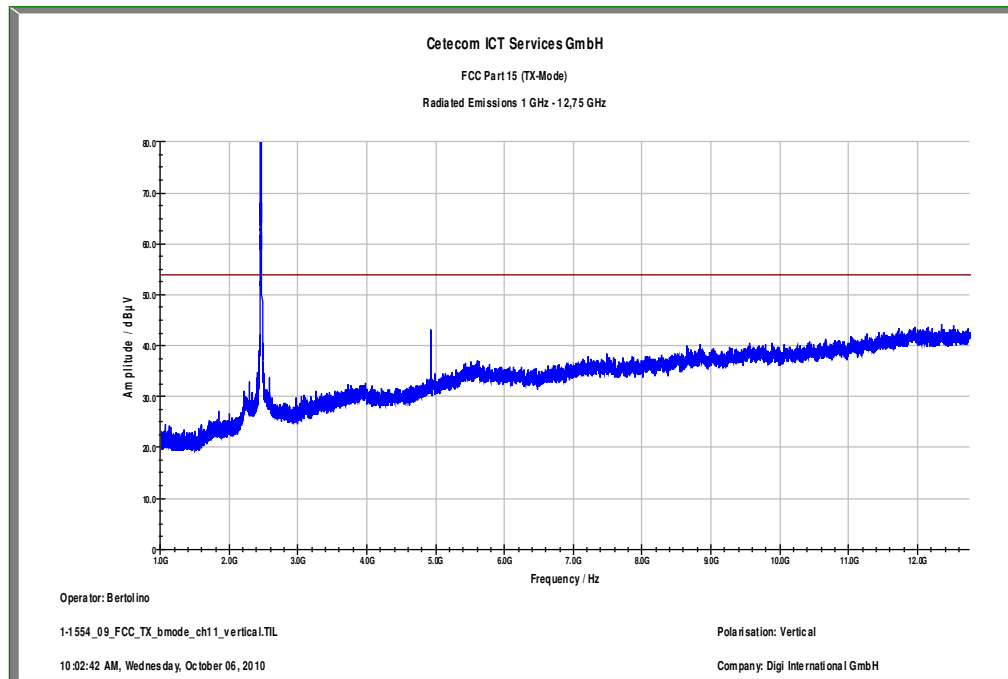
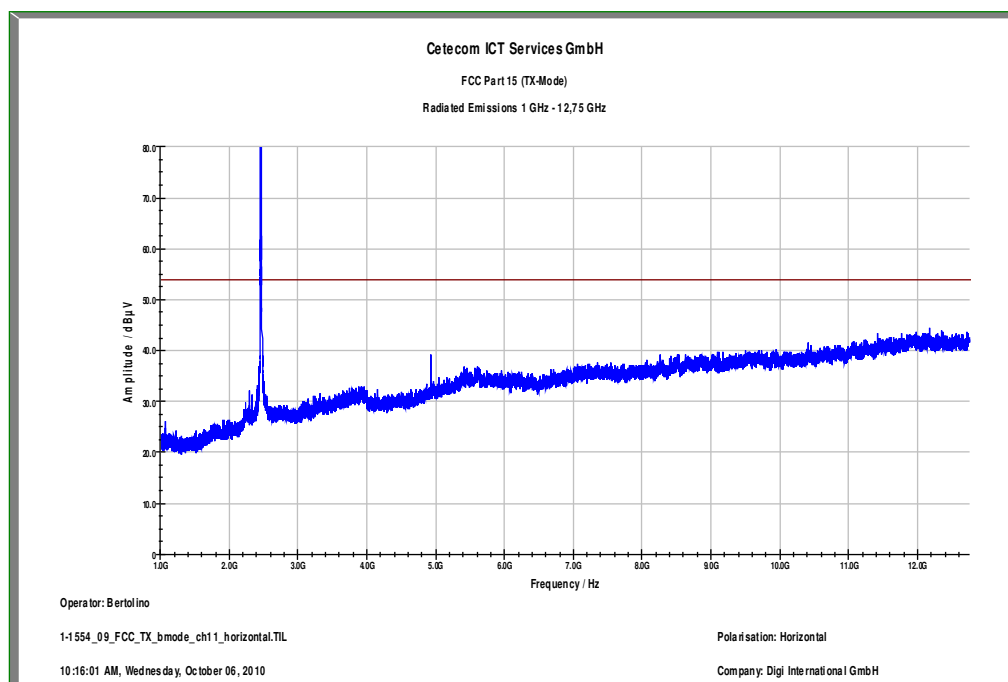

Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
40.830900	14.3	15000.000	120.000	112.0	V	142.0	13.4	15.7	30.0	
46.287750	15.2	15000.000	120.000	154.0	V	142.0	13.3	14.8	30.0	
47.323050	14.9	15000.000	120.000	126.0	V	212.0	13.3	15.1	30.0	
124.692300	26.8	15000.000	120.000	98.0	V	43.0	9.8	6.7	33.5	
706.515750	29.2	15000.000	120.000	127.0	H	142.0	22.7	6.8	36.0	
762.386100	20.3	15000.000	120.000	147.0	V	226.0	23.7	15.7	36.0	

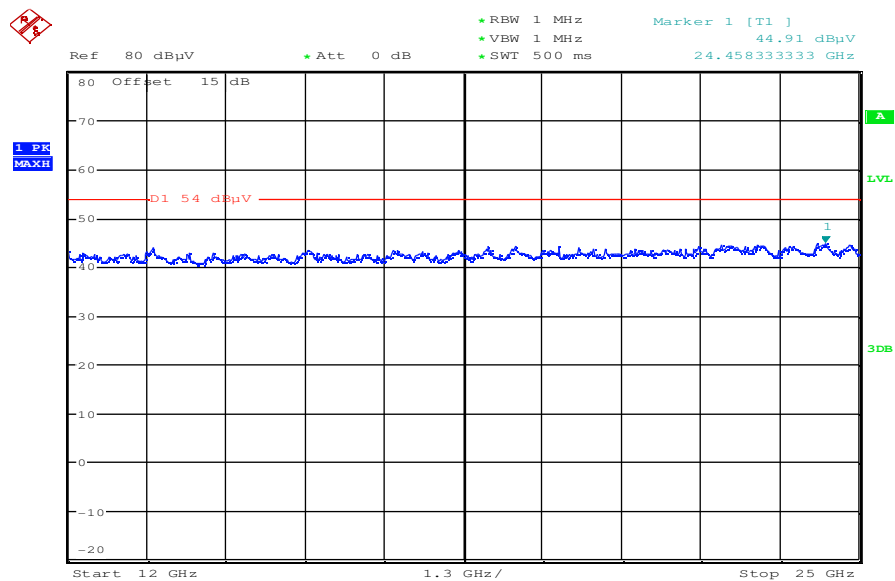
Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

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Plot 10: DSSS mode, 11 MBit/s, channel 11, power index 45, 1 GHz – 12.75 GHz, vertical polarization**Plot 11: DSSS mode, 11 MBit/s, channel 11, power index 45, 1 GHz – 12.75 GHz, horizontal polarization**

Plot 12: DSSS mode, 11 MBit/s, channel 11, power index 45, 12 GHz – 25 GHz, verti. & horiz. polarization



Date: 7.OCT.2010 09:08:47

OFDM mode / g – mode:

Plot 1: OFDM mode, 24 MBit/s, channel 1, power index 45, 30 MHz – 1 GHz, verti. & horiz. polarization

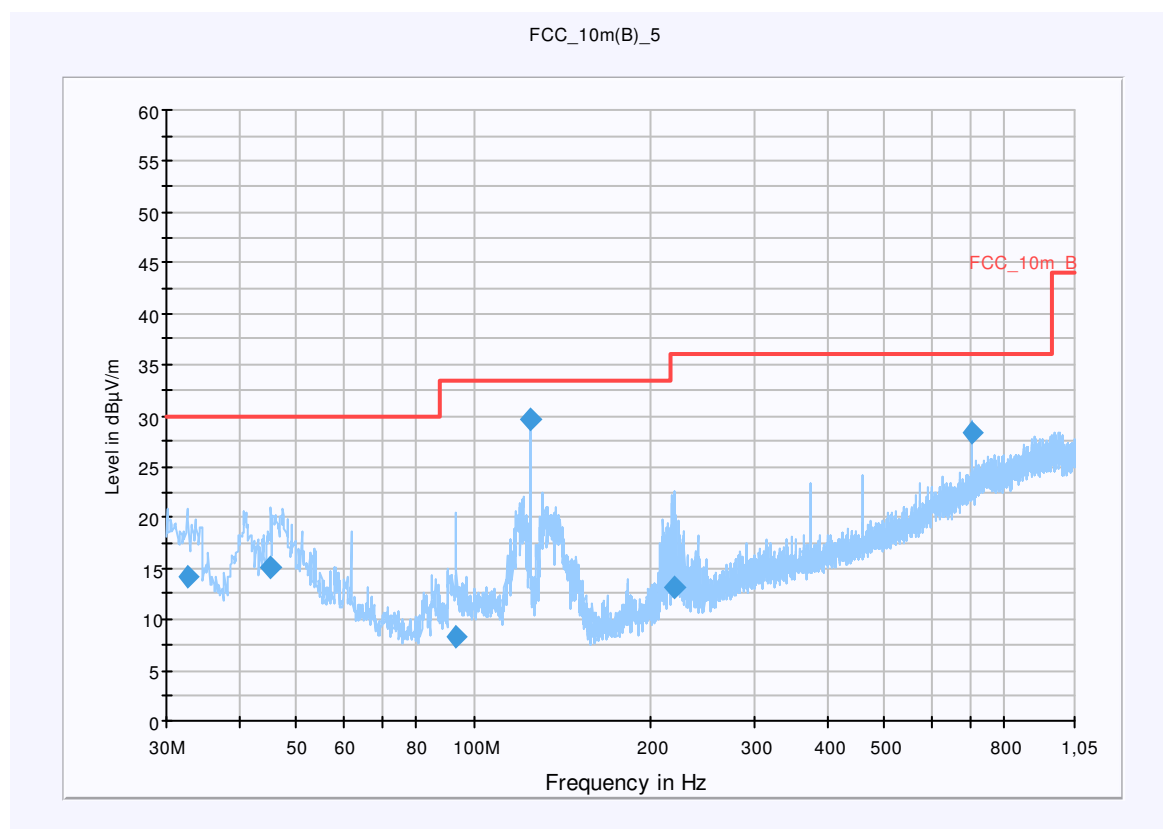
Common Information

EUT: i.MX51
 Serial Number: Prototype
 Test Description: FCC part 15 C @ 10 m
 Operating Conditions: cont. TX; g-mode, 24 MBit/s, power index 45 CH:1
 Operator Name: Merten
 Comment: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dB μ V/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver

**Final Result 1**

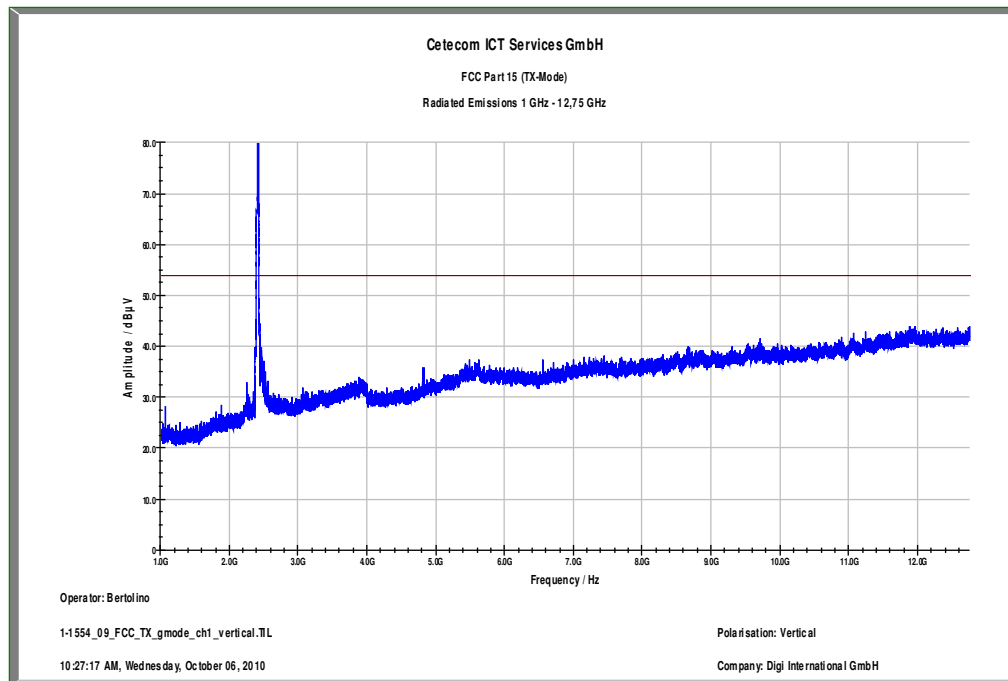
Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
32.640000	14.1	15000.000	120.000	136.0	V	55.0	12.8	15.9	30.0	
45.240000	15.2	15000.000	120.000	98.0	V	181.0	13.3	14.8	30.0	
93.600000	8.3	15000.000	120.000	192.0	V	248.0	11.0	25.2	33.5	
124.680000	29.7	15000.000	120.000	105.0	V	38.0	9.8	3.8	33.5	
219.000000	13.2	15000.000	120.000	181.0	V	38.0	12.4	22.8	36.0	
706.560000	28.3	15000.000	120.000	98.0	H	352.0	22.7	7.7	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

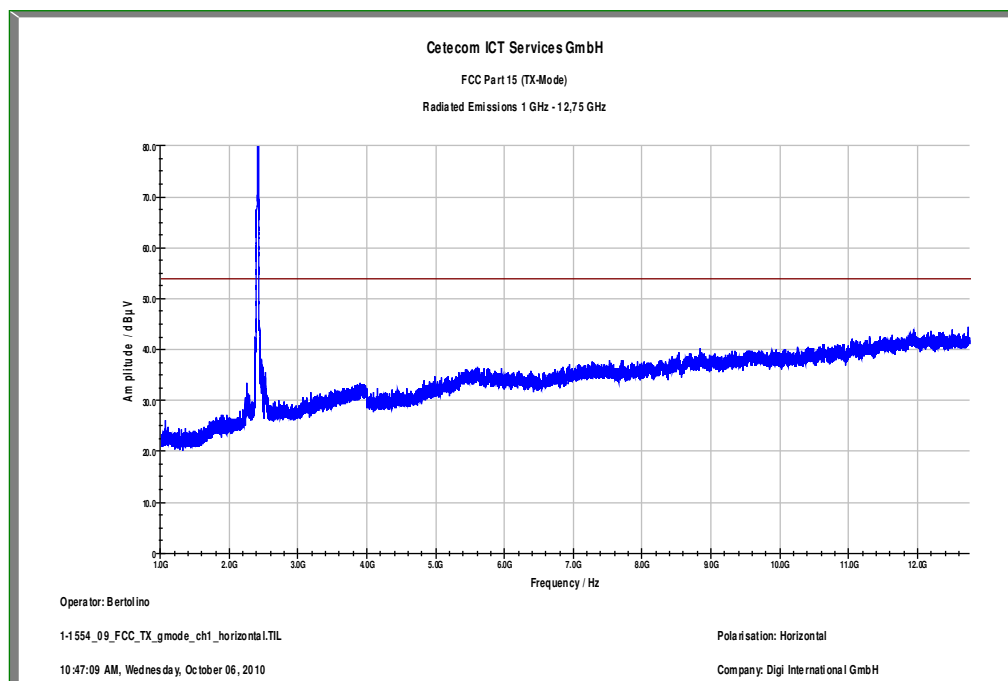
Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

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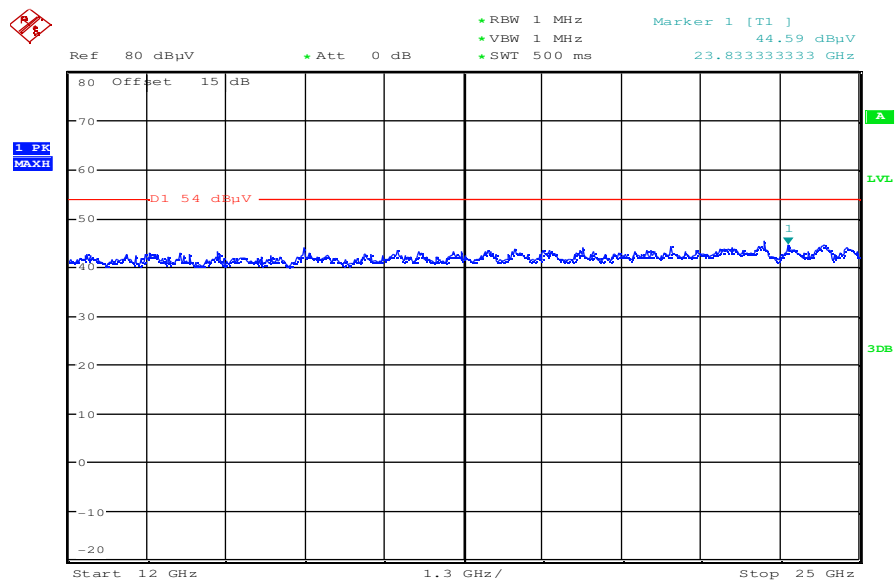
Plot 2: OFDM mode, 24 MBit/s, channel 1, power index 45, 1 GHz – 12.75 GHz, vertical polarization



Plot 3: OFDM mode, 24 MBit/s, channel 1, power index 45, 1 GHz – 12.75 GHz, horizontal polarization



Plot 4: OFDM mode, 24 MBit/s, channel 1, power index 45, 12 GHz – 25 GHz, verti. & horiz. polarization



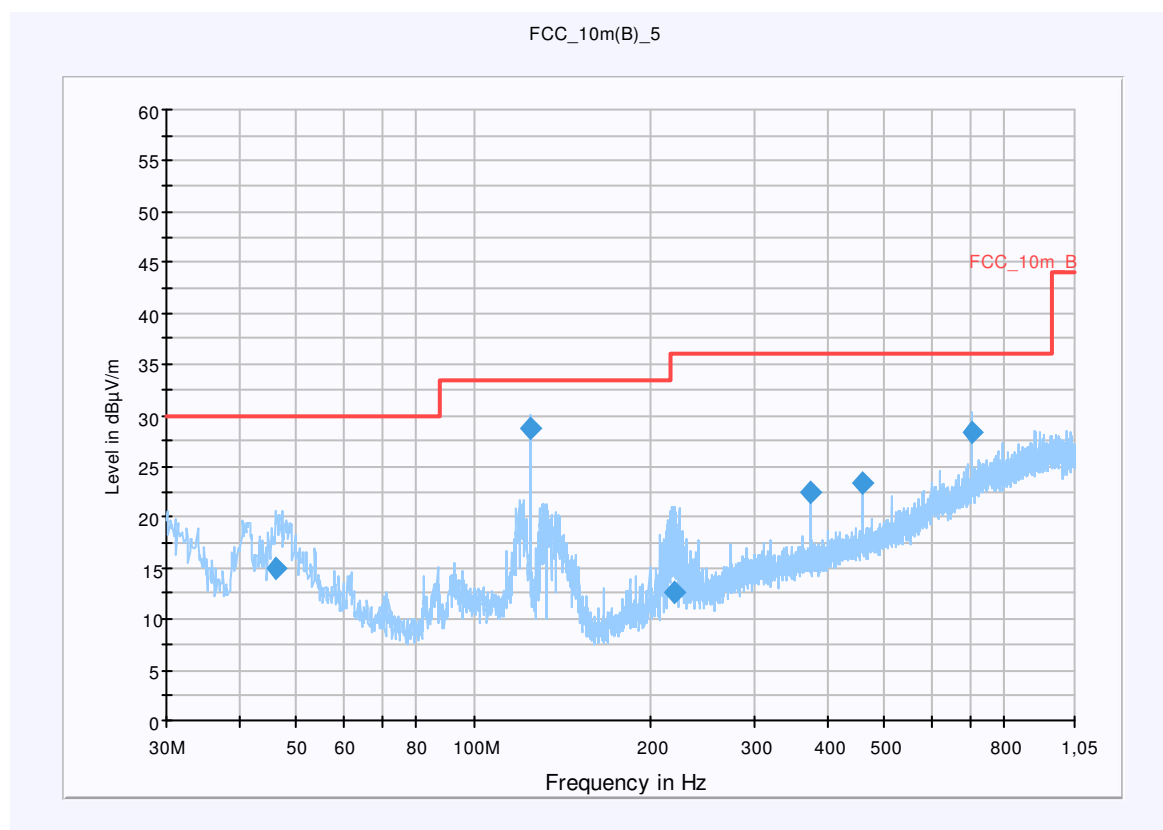
Date: 7.OCT.2010 09:10:17

Plot 5: OFDM mode, 24 MBit/s, channel 6, power index 45, 30 MHz – 1 GHz, verti. & horiz. polarization
Common Information

EUT: i.MX51
 Serial Number: Prototype
 Test Description: FCC part 15 C @ 10 m
 Operating Conditions: cont. TX; g-mode, 24 MBit/s, power index 45 CH:6
 Operator Name: Merten
 Comment: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dB μ V/m
Subrange **Detectors** **IF Bandwidth** **Meas. Time** **Receiver**
 30 MHz - 1,05 GHz QuasiPeak 120 kHz 15 s Receiver

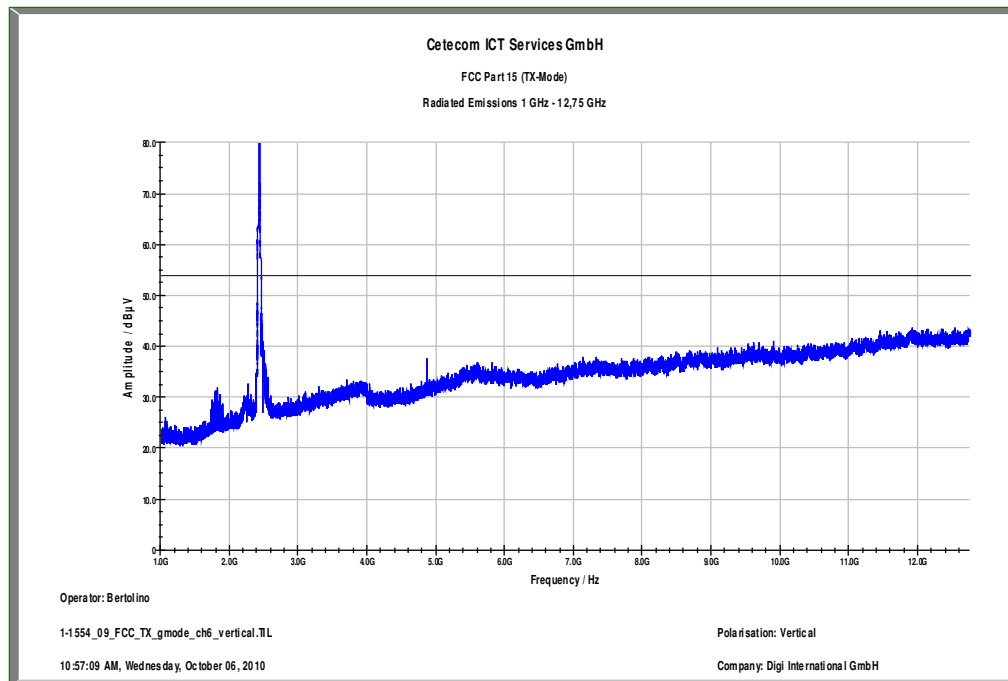
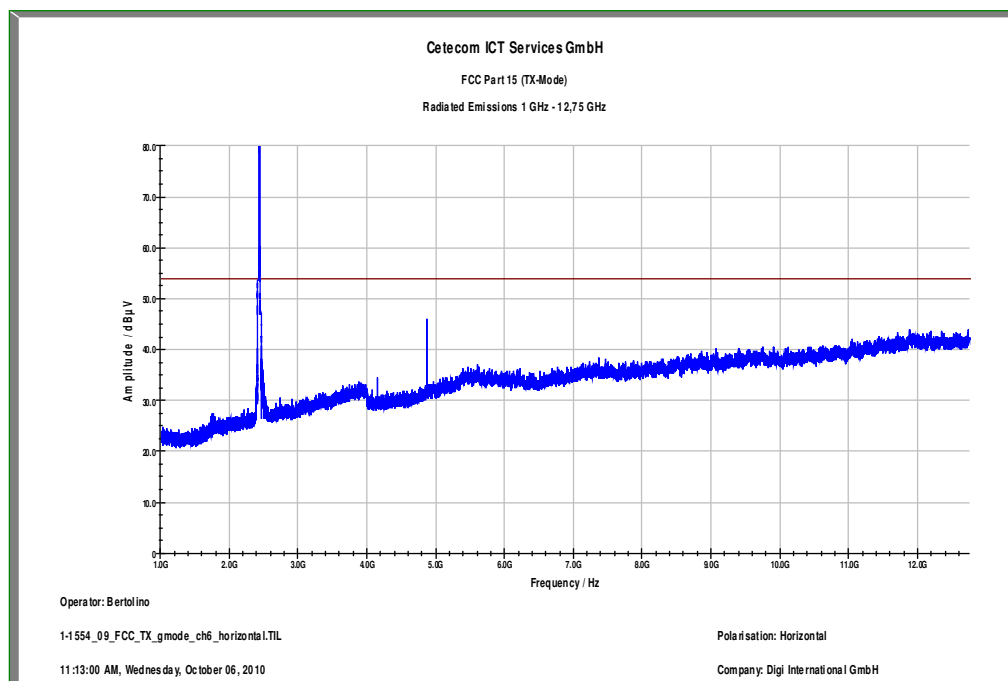

Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
46.200000	15.0	15000.000	120.000	98.0	V	296.0	13.3	15.0	30.0	
124.680000	28.7	15000.000	120.000	120.0	V	219.0	9.8	4.8	33.5	
219.720000	12.6	15000.000	120.000	260.0	V	38.0	12.4	23.4	36.0	
374.040000	22.5	15000.000	120.000	241.0	H	200.0	16.5	13.5	36.0	
457.200000	23.4	15000.000	120.000	197.0	H	316.0	17.8	12.6	36.0	
706.560000	28.4	15000.000	120.000	98.0	H	352.0	22.7	7.6	36.0	

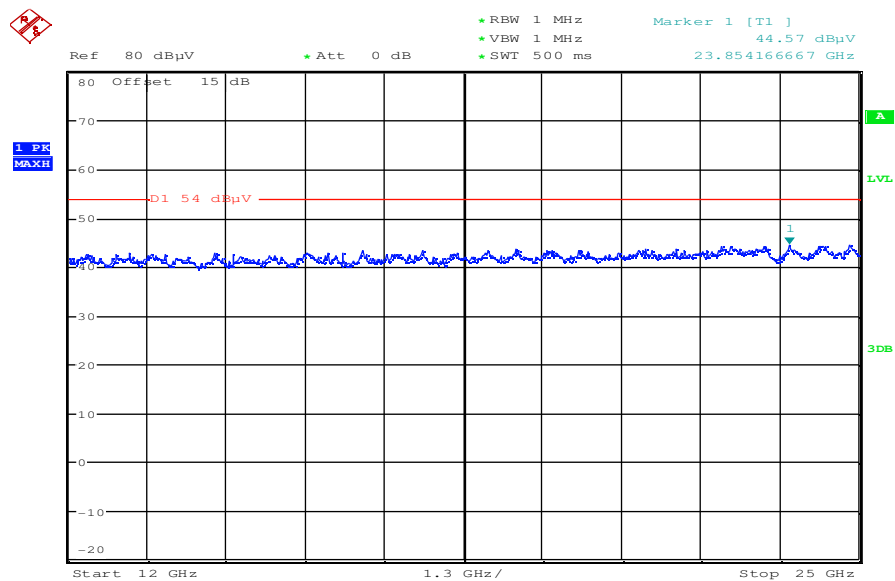
Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

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Plot 6: OFDM mode, 24 MBit/s, channel 6, power index 45, 1 GHz – 12.75 GHz, vertical polarization**Plot 7: OFDM mode, 24 MBit/s, channel 6, power index 45, 1 GHz – 12.75 GHz, horizontal polarization**

Plot 8: OFDM mode, 24 MBit/s, channel 6, power index 45, 12 GHz – 25 GHz, verti. & horiz. polarization



Date: 7.OCT.2010 09:11:36

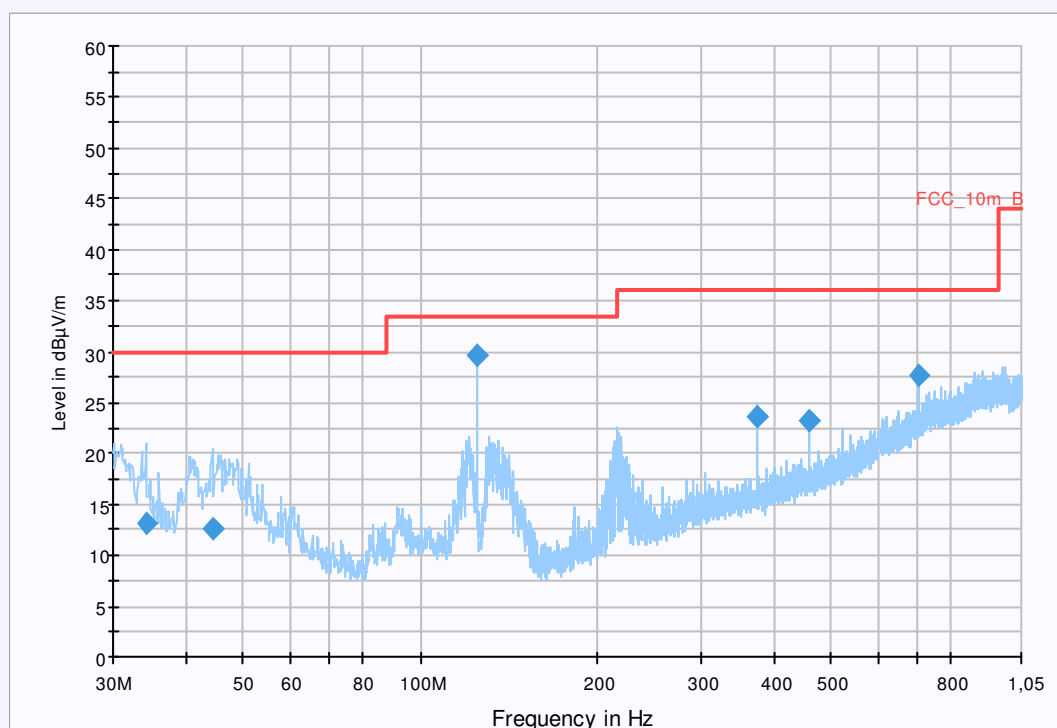
Plot 9: OFDM mode, 24 MBit/s, channel 11, power index 45, 30 MHz – 1 GHz, verti. & horiz. polarization
Common Information

EUT:	i.MX51
Serial Number:	Prototype
Test Description:	FCC part 15 C @ 10 m
Operating Conditions:	cont. TX; g-mode, 24 MBit/s, power index 45 CH:11
Operator Name:	Merten
Comment:	115 V / 60 Hz

can Setup: STAN_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)			
Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver

FCC_10m(B)_5


Final Result 1

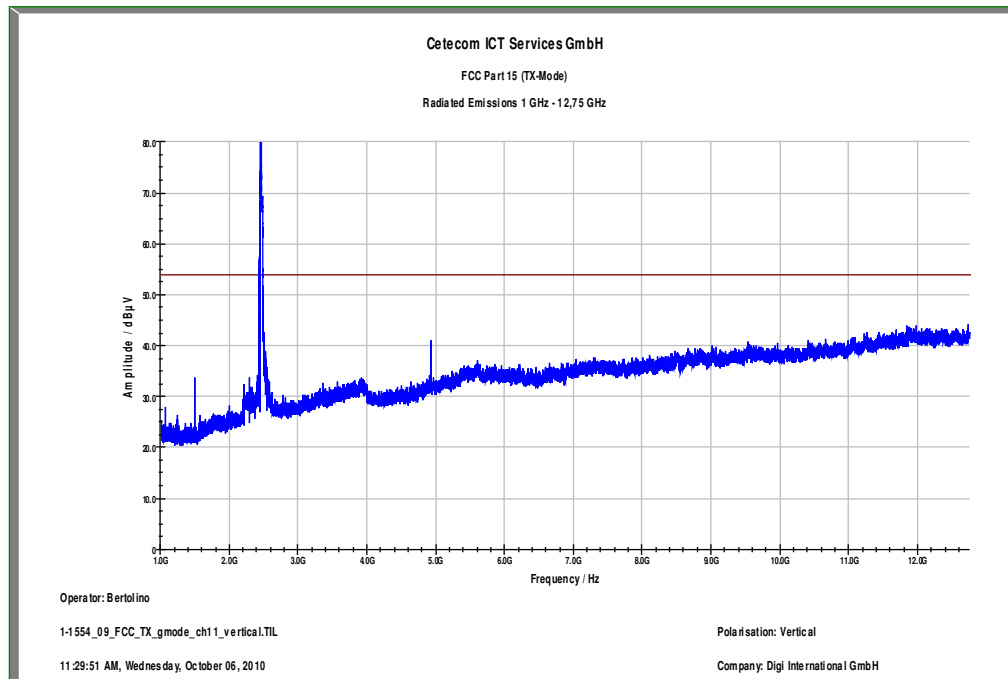
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
34.200000	13.2	15000.000	120.000	98.0	V	141.0	12.9	16.8	30.0	
44.280000	12.6	15000.000	120.000	168.0	V	180.0	13.3	17.4	30.0	
124.680000	29.8	15000.000	120.000	98.0	V	11.0	9.8	3.7	33.5	
374.040000	23.5	15000.000	120.000	234.0	H	-2.0	16.5	12.5	36.0	
457.200000	23.1	15000.000	120.000	247.0	H	356.0	17.8	12.9	36.0	
706.560000	27.8	15000.000	120.000	98.0	H	334.0	22.7	8.2	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

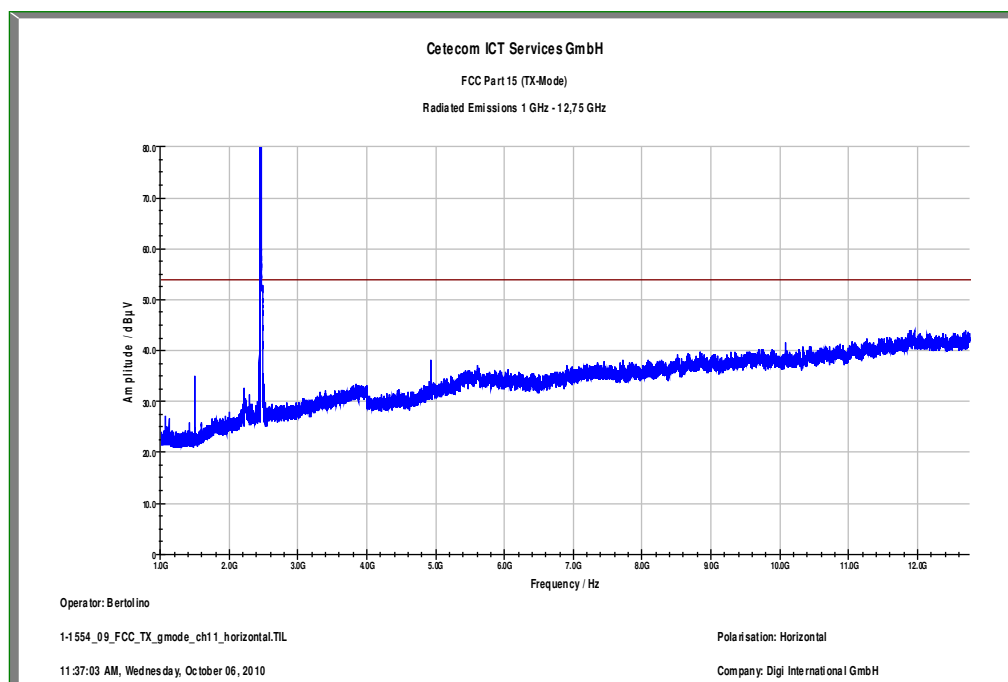
Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

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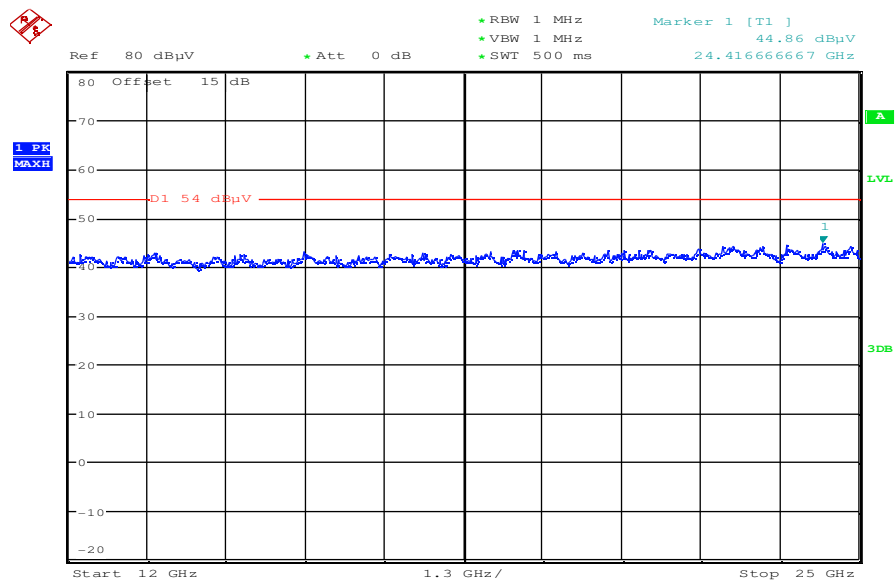
Plot 10: OFDM mode, 24 MBit/s, channel 11, power index 45, 1 GHz – 12.75 GHz, vertical polarization



Plot 11: OFDM mode, 24 MBit/s, channel 11, power index 45, 1 GHz – 12.75 GHz, horizontal polarization



Plot 12: OFDM mode, 24 MBit/s, channel 11, power index 45, 12 GHz – 25 GHz, verti. & horiz. polarization



Date: 7.OCT.2010 09:12:35

OFDM mode / n – mode:

Plot 1: OFDM mode, mcs 7, channel 1, power index 45, 30 MHz – 1 GHz, verti. & horiz. polarization

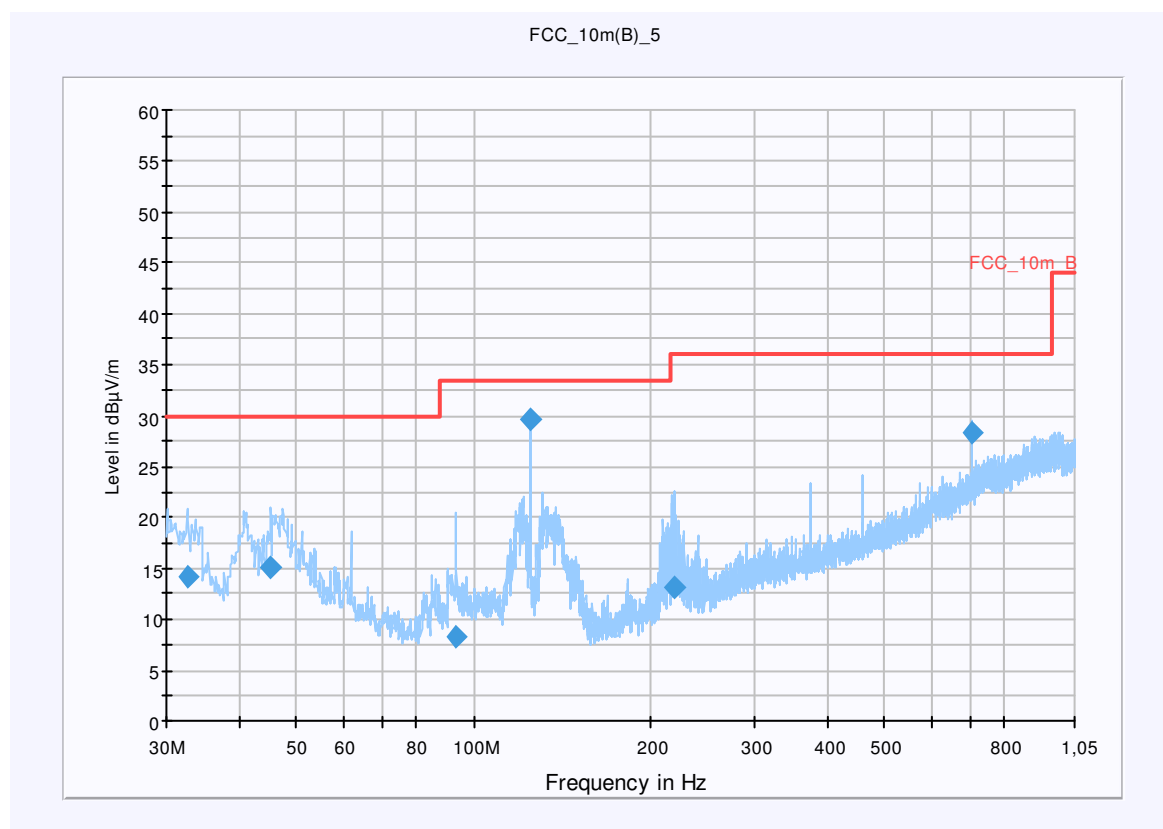
Common Information

EUT: i.MX51
 Serial Number: Prototype
 Test Description: FCC part 15 C @ 10 m
 Operating Conditions: cont. TX; n-mode, mcs 7, power index 45 CH:1
 Operator Name: Merten
 Comment: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dB μ V/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver

**Final Result 1**

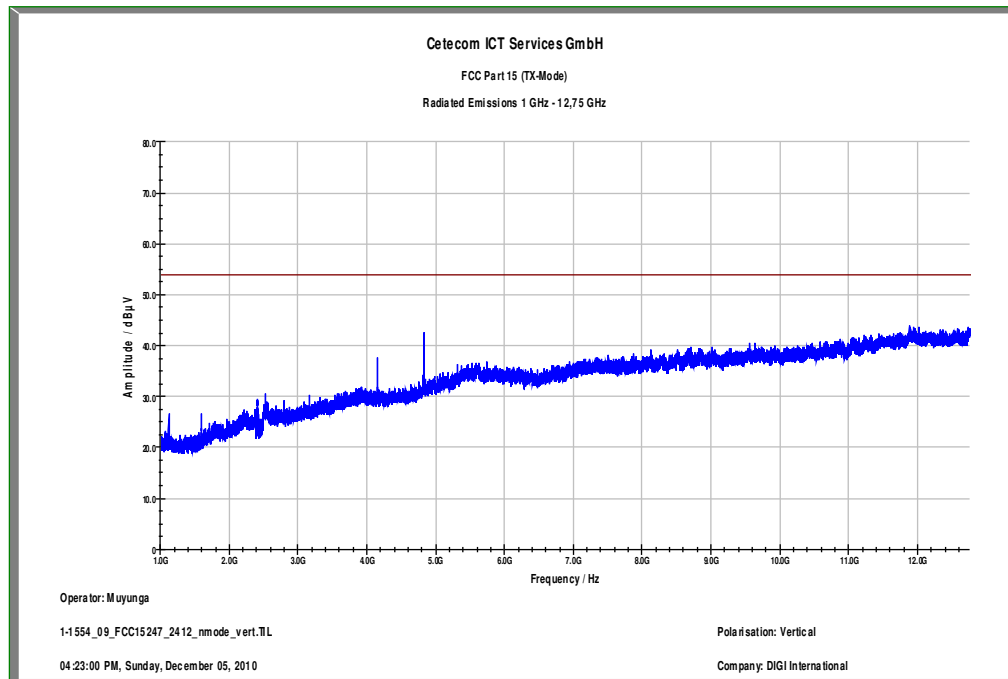
Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
32.647200	14.0	15000.000	120.000	136.0	V	55.0	12.8	16.0	30.0	
45.242000	15.4	15000.000	120.000	98.0	V	181.0	13.3	14.6	30.0	
93.600000	8.3	15000.000	120.000	192.0	V	248.0	11.0	25.2	33.5	
124.679000	29.6	15000.000	120.000	105.0	V	38.0	9.8	3.9	33.5	
219.004500	13.5	15000.000	120.000	181.0	V	38.0	12.4	22.5	36.0	
706.560000	28.9	15000.000	120.000	98.0	H	352.0	22.7	7.1	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

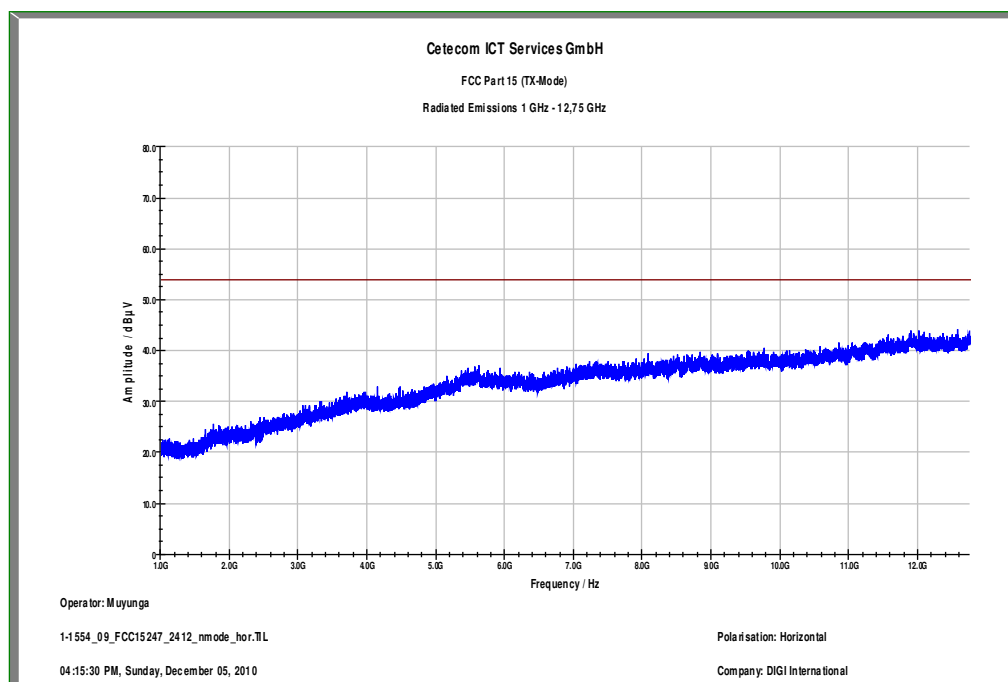
EMC 32 Version 8.10.00

Plot 2: OFDM mode, mcs 7, channel 1, power index 45, 1 GHz – 12.75 GHz, vertical polarization

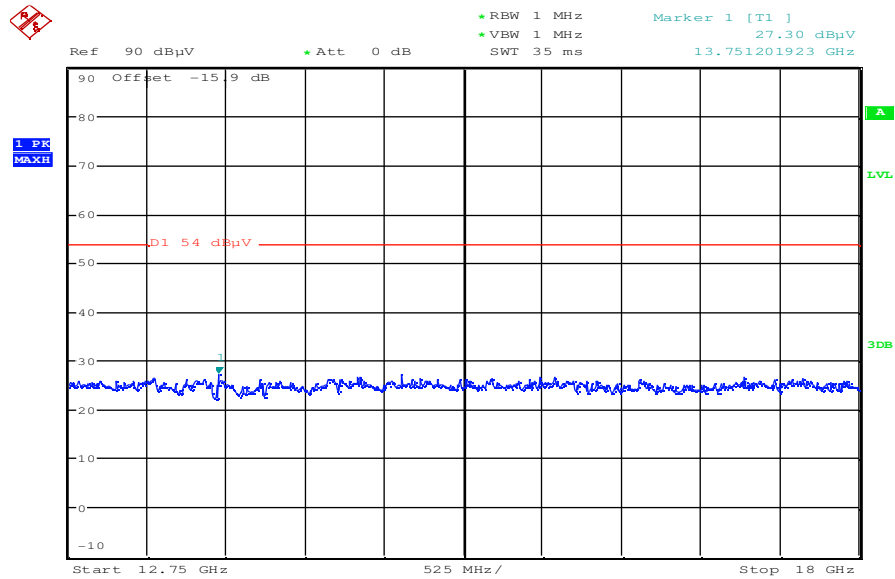


The carrier signal is notched with a 2.4 GHz band rejection.

Plot 3: OFDM mode, mcs 7, channel 1, power index 45, 1 GHz – 12.75 GHz, horizontal polarization

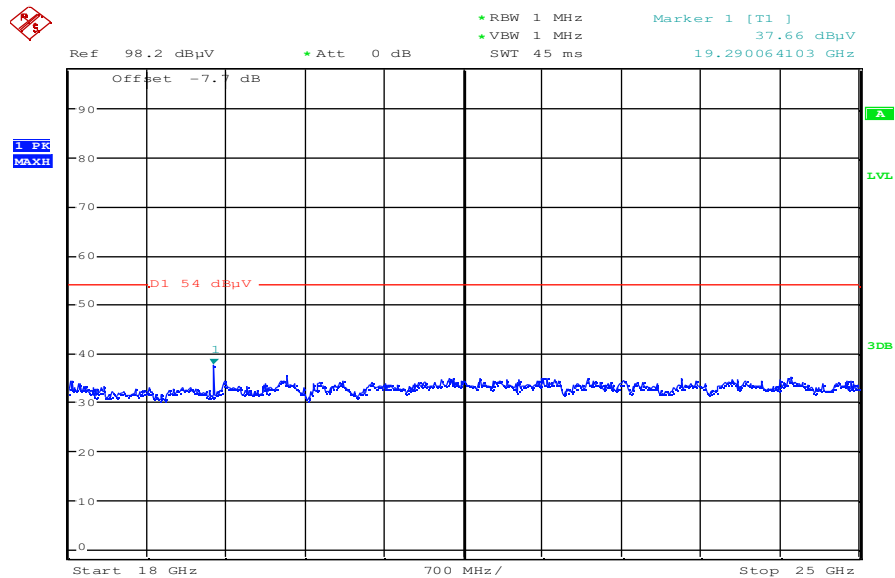


Plot 4: OFDM mode, mcs 7, channel 1, power index 45, 12.75 GHz – 18 GHz, verti. & horiz. polarization



Date: 7.DEC.2010 09:44:07

Plot 5: OFDM mode, mcs 7, channel 1, power index 45, 18 GHz – 25 GHz, verti. & horiz. polarization



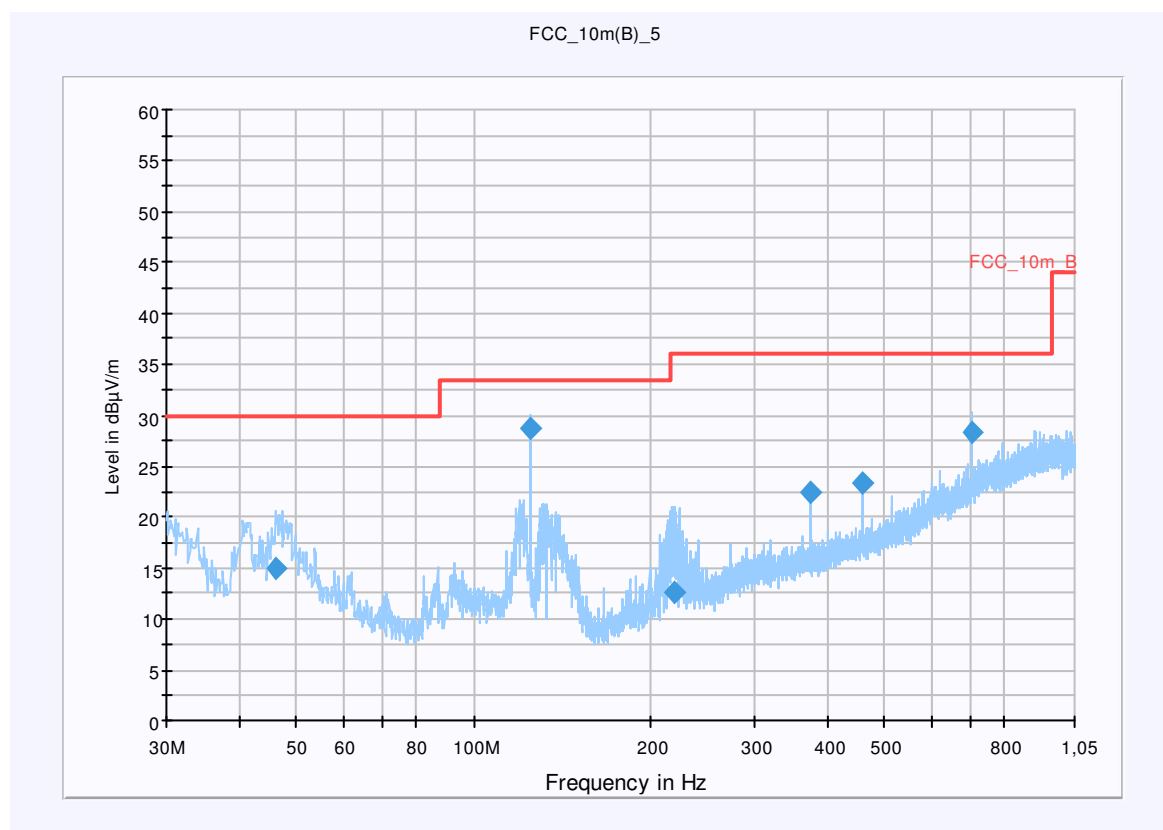
Date: 7.DEC.2010 09:50:14

Plot 6: OFDM mode, mcs 7, channel 6, power index 45, 30 MHz – 1 GHz, verti. & horiz. polarization
Common Information

EUT: i.MX51
 Serial Number: Prototype
 Test Description: FCC part 15 C @ 10 m
 Operating Conditions: cont. TX; n-mode, mcs 7, power index 45 CH:6
 Operator Name: Merten
 Comment: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dB μ V/m
Subrange **Detectors** **IF Bandwidth** **Meas. Time** **Receiver**
 30 MHz - 1,05 GHz QuasiPeak 120 kHz 15 s Receiver

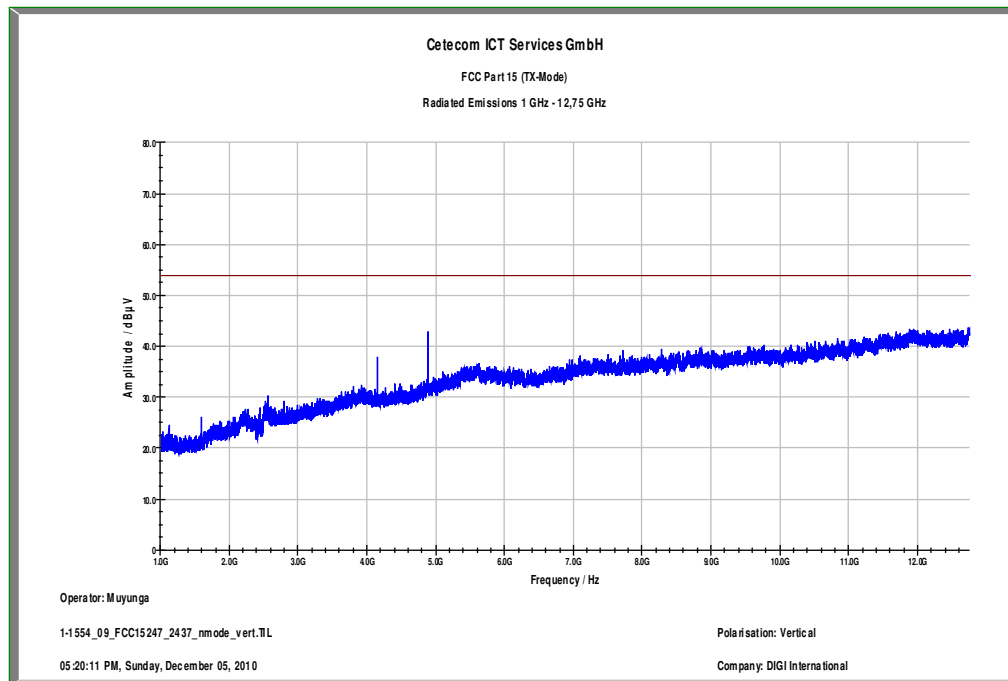

Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
46.240000	15.3	15000.000	120.000	98.0	V	296.0	13.3	14.7	30.0	
124.683000	28.7	15000.000	120.000	120.0	V	219.0	9.8	4.8	33.5	
219.714700	12.3	15000.000	120.000	260.0	V	38.0	12.4	23.7	36.0	
374.047920	22.8	15000.000	120.000	241.0	H	200.0	16.5	13.2	36.0	
457.201000	23.4	15000.000	120.000	197.0	H	316.0	17.8	12.6	36.0	
706.553000	28.3	15000.000	120.000	98.0	H	352.0	22.7	7.7	36.0	

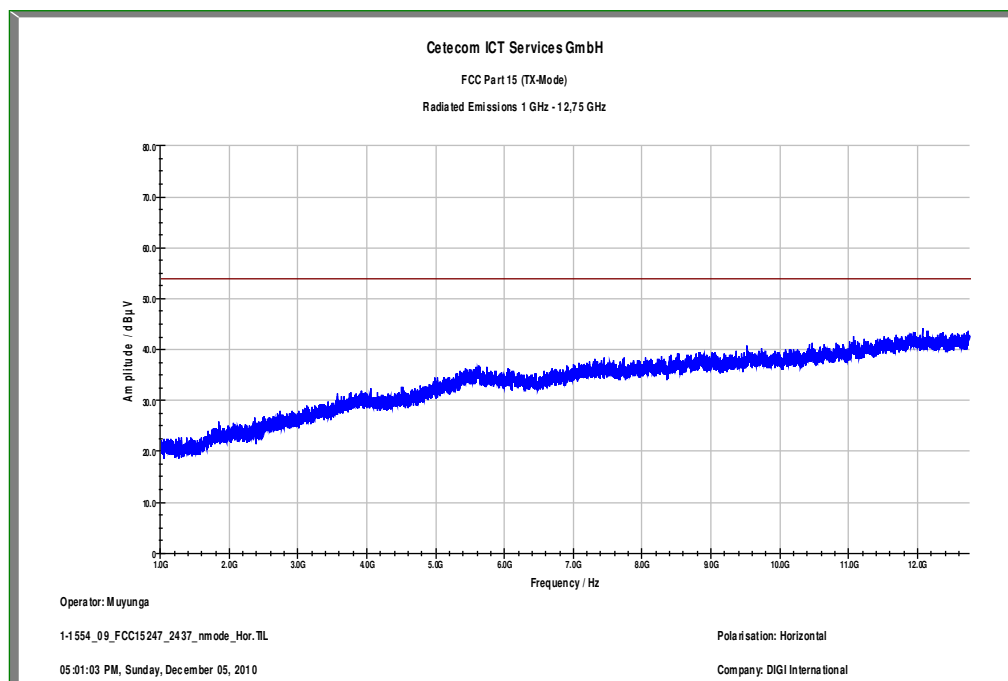
Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

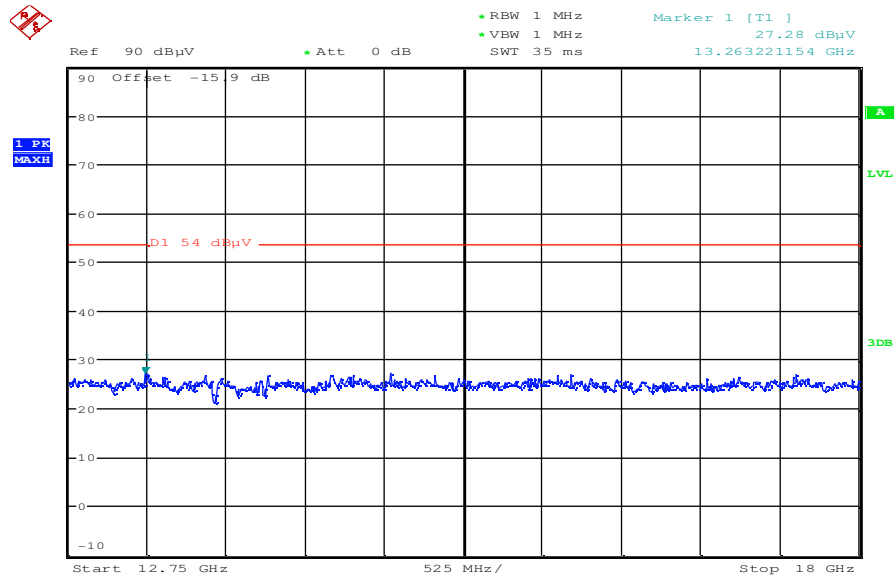
EMC 32 Version 8.10.00

Plot 7: OFDM mode, mcs 7, channel 6, power index 45, 1 GHz – 12.75 GHz, vertical polarization

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

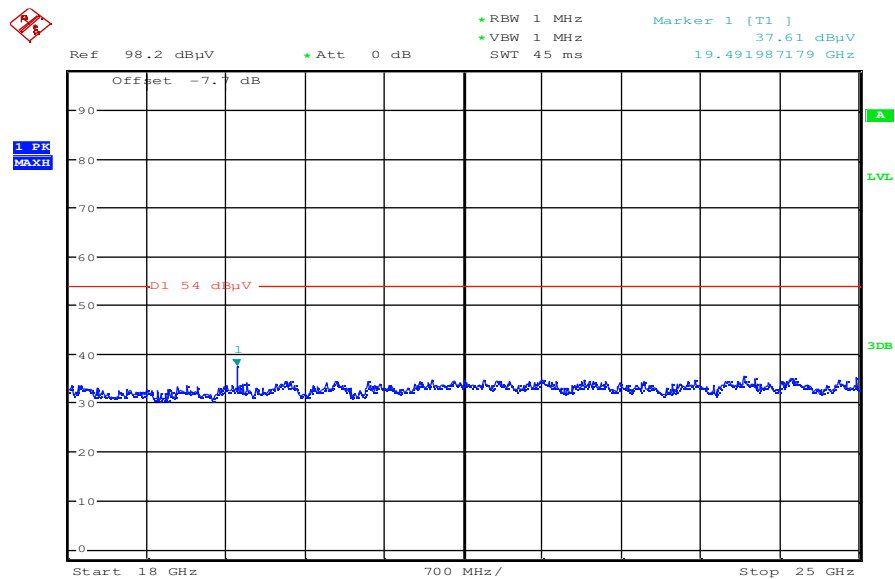
Plot 8: OFDM mode, mcs 7, channel 6, power index 45, 1 GHz – 12.75 GHz, horizontal polarization

Plot 9: OFDM mode, mcs 7, channel 6, power index 45, 12.75 GHz – 18 GHz, verti. & horiz. polarization



Date: 7.DEC.2010 09:43:12

Plot 10: OFDM mode, mcs 7, channel 6, power index 45, 18 GHz – 25 GHz, verti. & horiz. polarization



Date: 7.DEC.2010 09:49:07

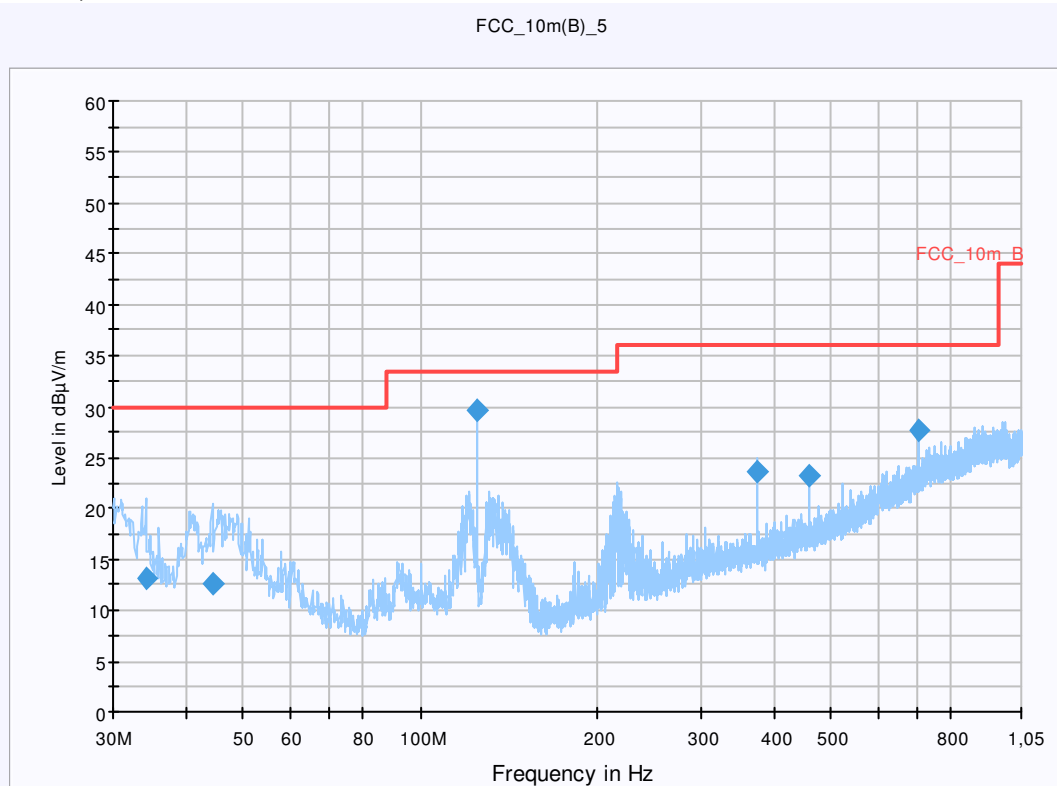
Plot 11: OFDM mode, mcs 7, channel 11, power index 45, 30 MHz – 1 GHz, verti. & horiz. polarization

Common Information

EUT: i.MX51
 Serial Number: Prototype
 Test Description: FCC part 15 C @ 10 m
 Operating Conditions: cont. TX; n-mode, mcs 7, power index 45 CH:11
 Operator Name: Merten
 Comment: 115 V / 60 Hz

can Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
Subrange **Detectors** **IF Bandwidth** **Meas. Time** **Receiver**
 30 MHz - 1,05 GHz QuasiPeak 120 kHz 15 s Receiver



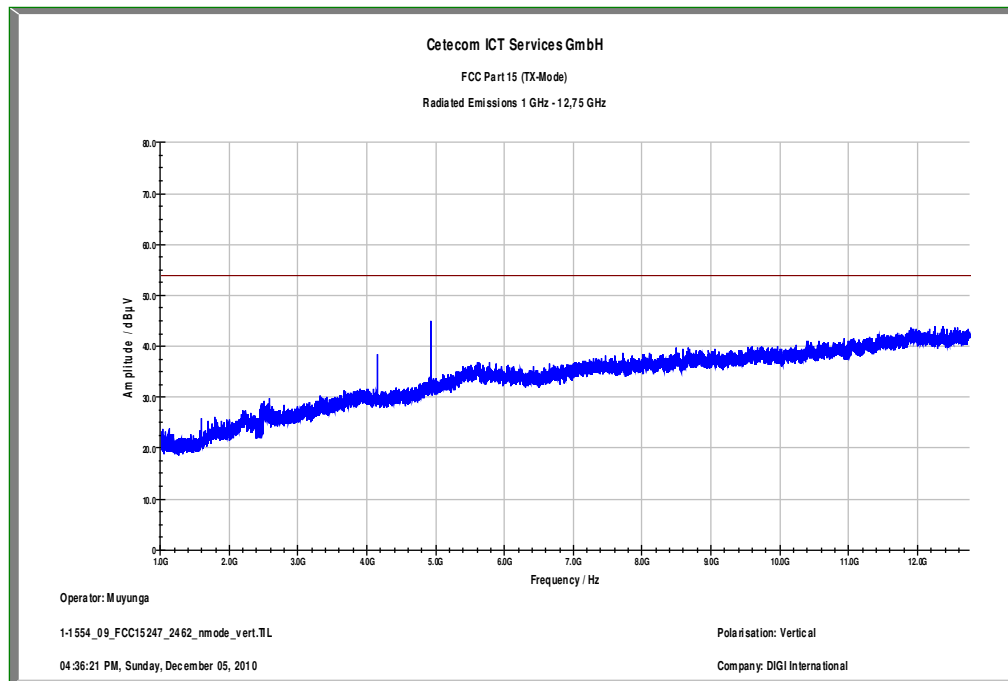
Fnal Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
34.197600	13.0	15000.000	120.000	98.0	V	141.0	12.9	17.0	30.0	
44.280000	12.7	15000.000	120.000	168.0	V	180.0	13.3	17.3	30.0	
124.669600	29.9	15000.000	120.000	98.0	V	11.0	9.8	3.6	33.5	
374.040120	23.1	15000.000	120.000	234.0	H	-2.0	16.5	12.9	36.0	
457.200000	23.3	15000.000	120.000	247.0	H	356.0	17.8	12.7	36.0	
706.560000	27.7	15000.000	120.000	98.0	H	334.0	22.7	8.3	36.0	

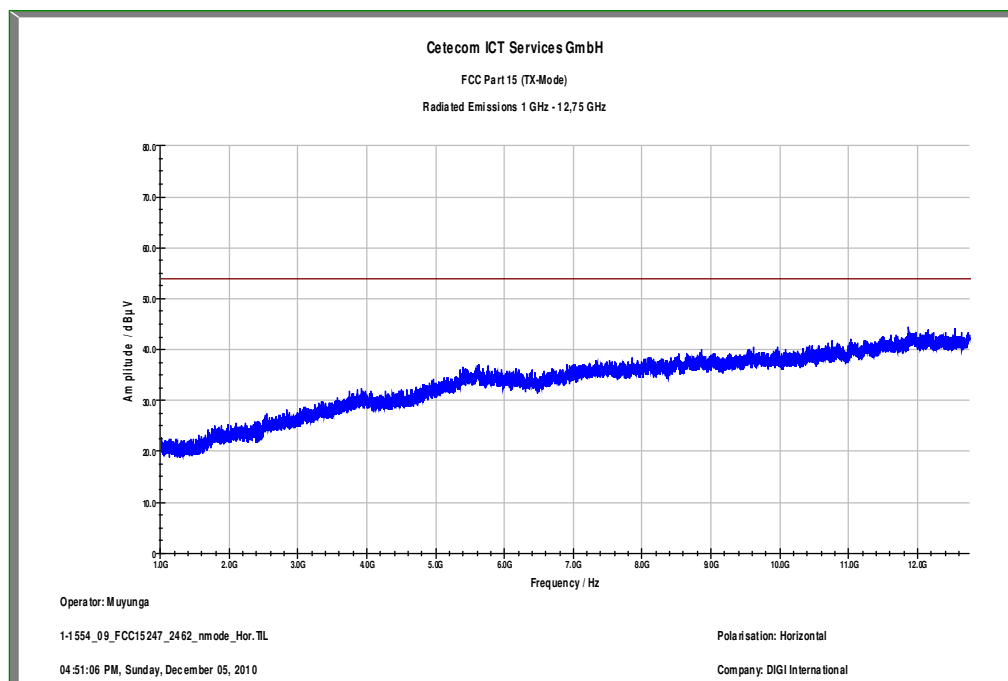
Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

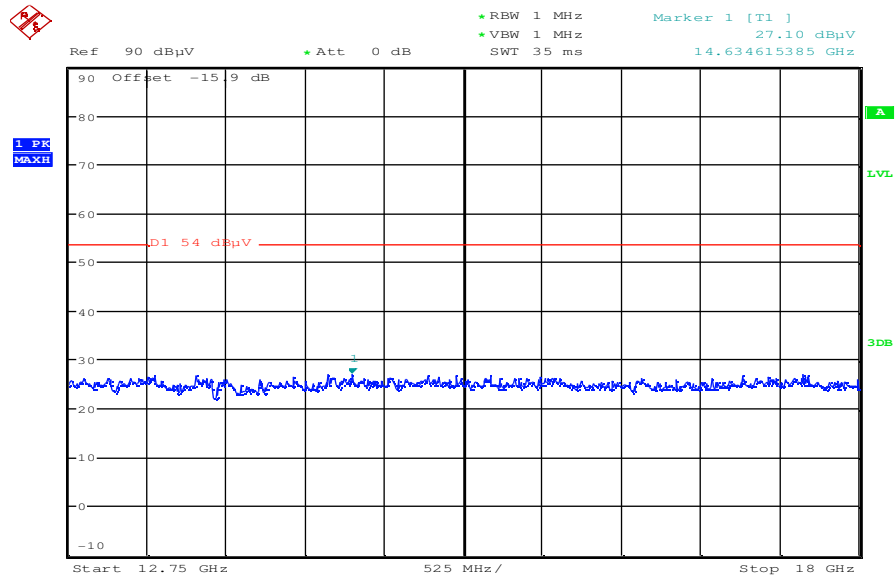
EMC 32 Version 8.10.00

Plot 12: OFDM mode, mcs 7, channel 11, power index 45, 1 GHz – 12.75 GHz, vertical polarization

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

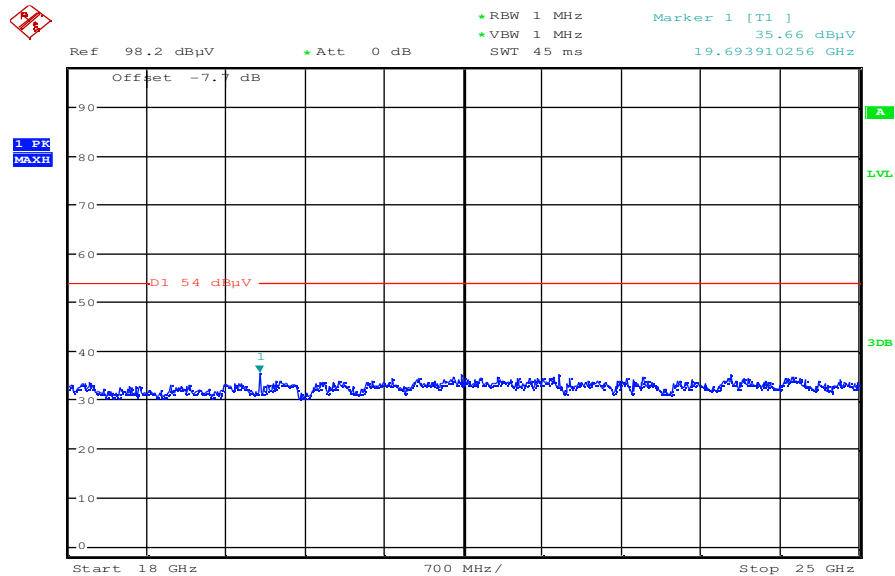
Plot 13: OFDM mode, mcs 7, channel 11, power index 45, 1 GHz – 12.75 GHz, horizontal polarization

Plot 14: OFDM mode, mcs 7, channel 11, power index 45, 12.75 GHz – 18 GHz, verti. & horiz. polarization



Date: 7.DEC.2010 09:45:28

Plot 15: OFDM mode, mcs 7, channel 11, power index 45, 18 GHz – 25 GHz, verti. & horiz. polarization



Date: 7.DEC.2010 09:47:40

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
Sweep time:	Auto
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
CFR Part 15.109		RSS Gen, Issue 2, 4.10
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

Result: Also see plots

RX Spurious Emissions Radiated [dB μ V/m]		
F [MHz]	Detector	Level [dB μ V/m]
No critical peaks found.		
Measurement results below 1 GHz → please take a look at the table below the 1 GHz plot.		
Measurement uncertainty	± 3 dB	

Result: The result of the measurement is passed.

Plot 1: RX / Idle mode, 30 MHz – 1 GHz, vertical & horizontal polarization

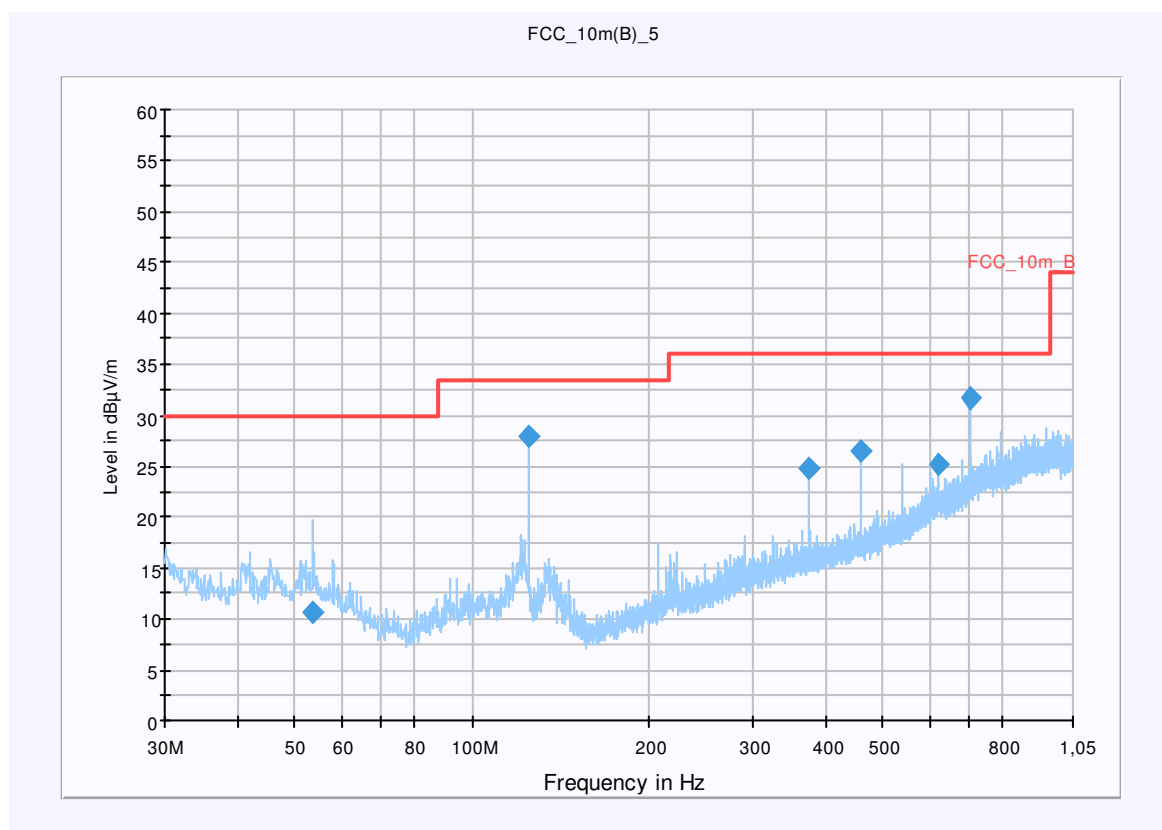
Common Information

EUT: i.MX51
 Serial Number: Prototype
 Test Description: FCC part 15 C @ 10 m
 Operating Conditions: Idle mode
 Operator Name: Merten
 Comment: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dB μ V/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

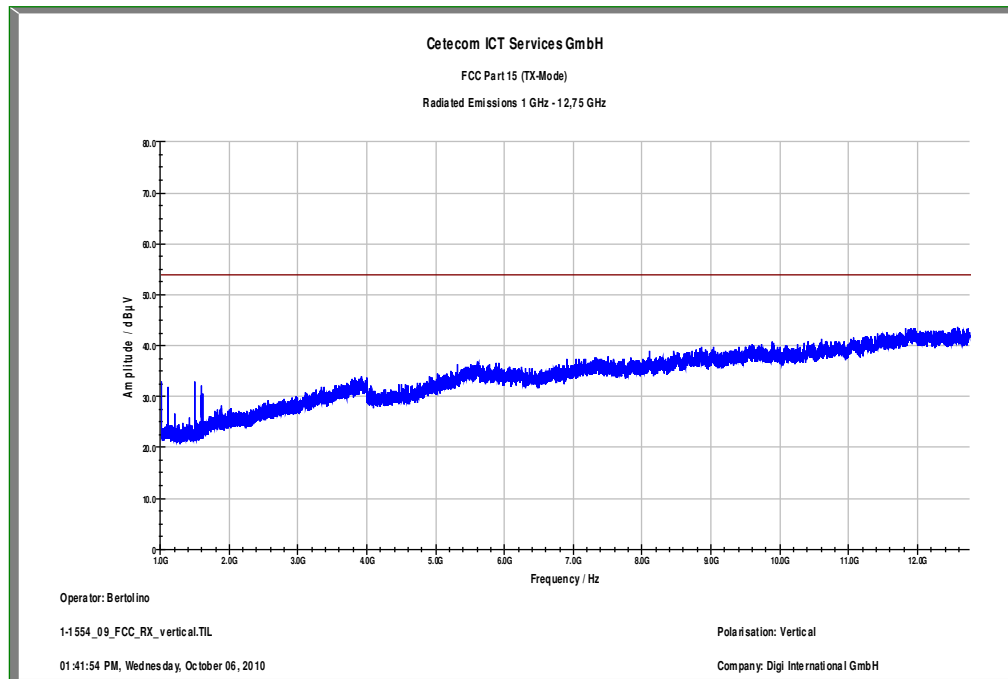
Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
53.640000	10.7	15000.000	120.000	270.0	V	-2.0	13.0	19.3	30.0	
124.680000	27.9	15000.000	120.000	119.0	V	220.0	9.8	5.6	33.5	
374.040000	24.7	15000.000	120.000	251.0	H	339.0	16.5	11.3	36.0	
457.200000	26.6	15000.000	120.000	165.0	H	-2.0	17.8	9.4	36.0	
623.400000	25.1	15000.000	120.000	110.0	H	201.0	20.9	10.9	36.0	
706.560000	31.7	15000.000	120.000	98.0	H	352.0	22.7	4.3	36.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

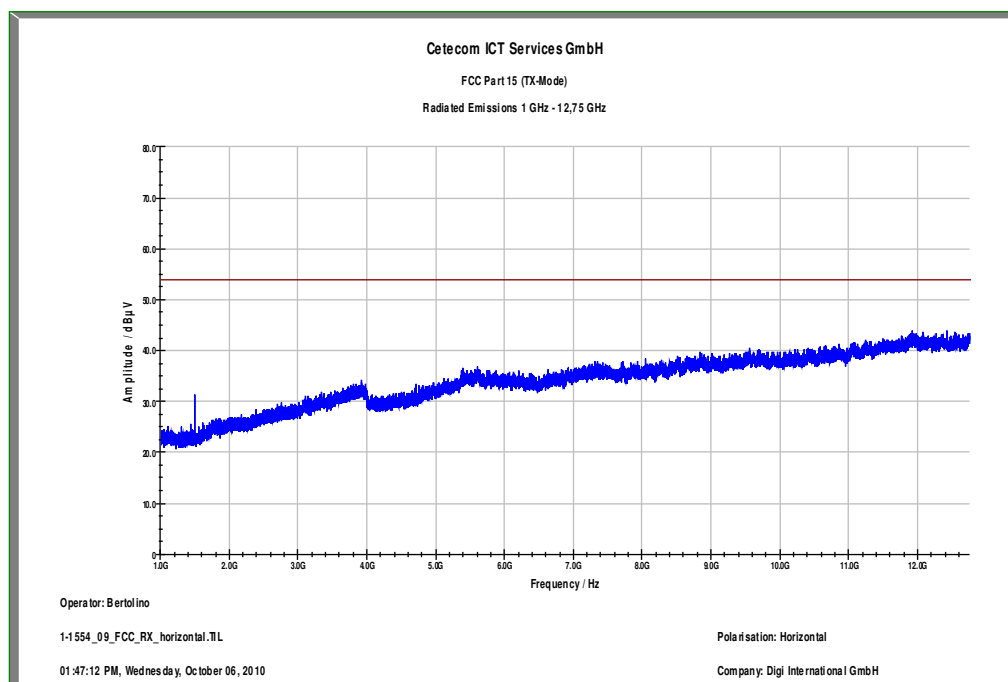
Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
Antenna Tower:	Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

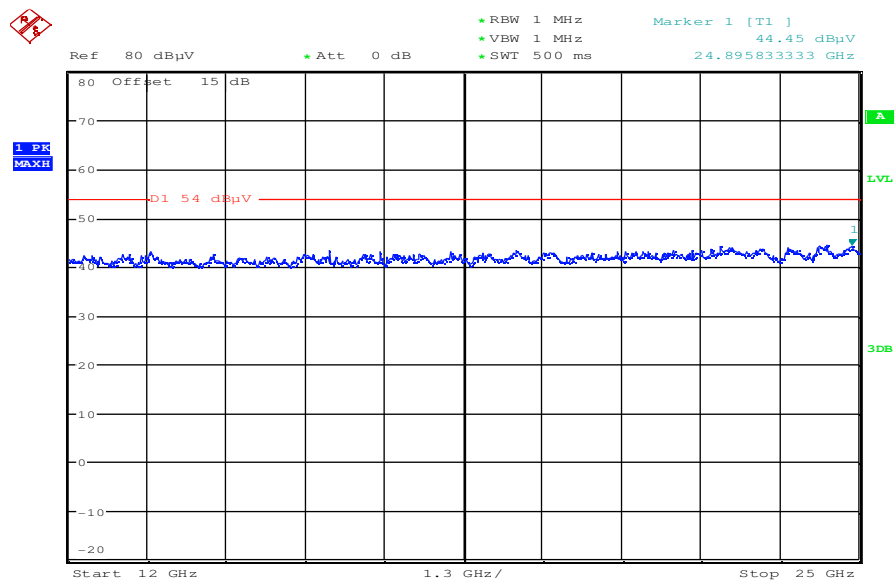
Plot 2: RX / Idle mode, 1 GHz – 12.75 GHz, vertical polarization



Plot 3: RX / Idle mode, 1 GHz – 12.75 GHz, horizontal polarization



Plot 4: RX / Idle mode, 12 GHz – 25 GHz, vertical & horizontal polarization



Date: 7.OCT.2010 09:13:18

9.12 TX 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

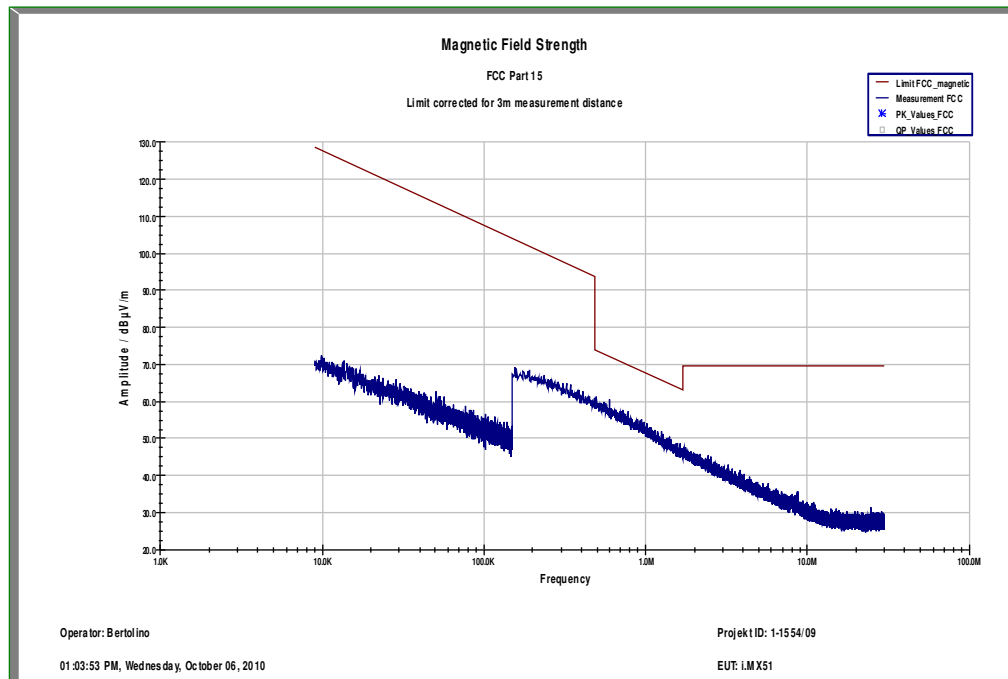
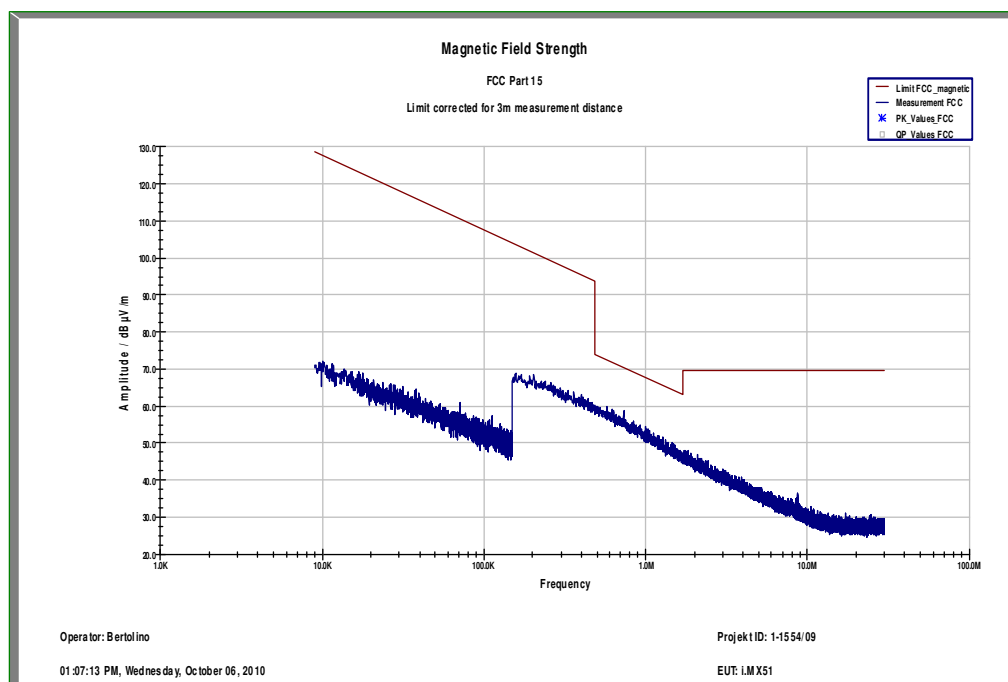
Limits:

FCC		IC
CFR Part 15.209(a)		RSS –Gen
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

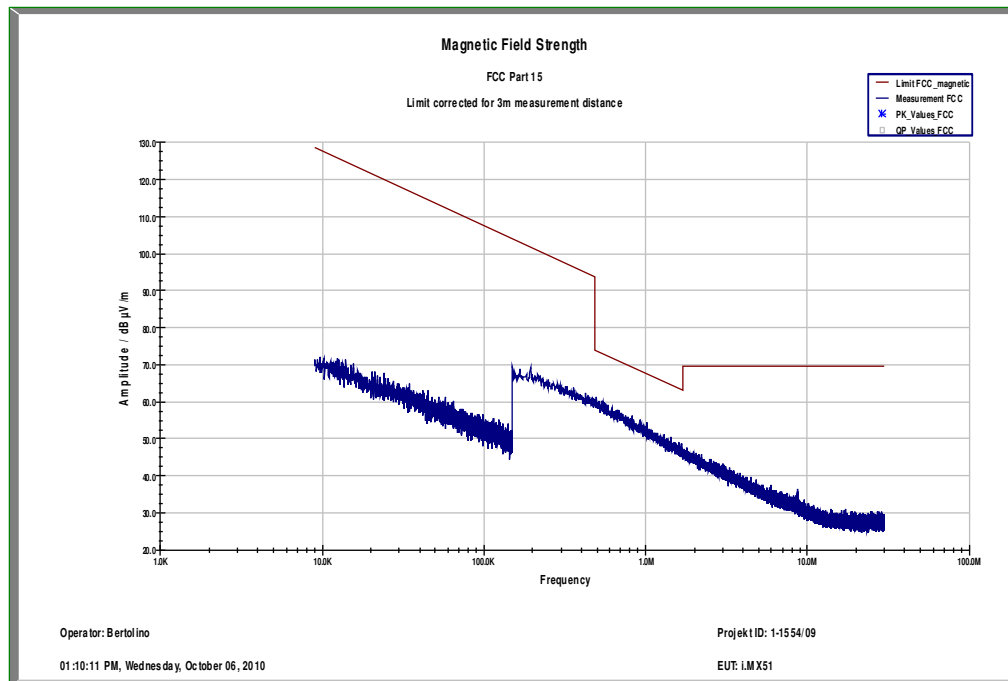
Result: Also see plots

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

Result: The result of the measurement is passed.

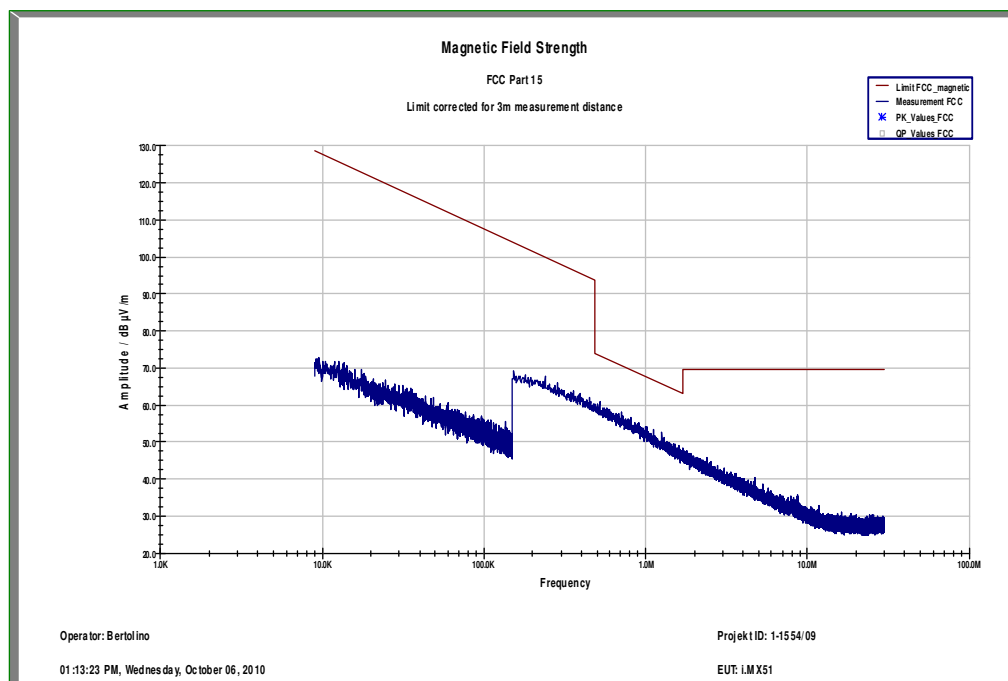
DSSS mode:**Plot 1: DSSS mode, 11 MBit/s, channel 1, power index 45, up to 30 MHz, magnetic****Plot 2: DSSS mode, 11 MBit/s, channel 6, power index 45, up to 30 MHz, magnetic**

Plot 3: DSSS mode, 11 MBit/s, channel 11, power index 45, up to 30 MHz, magnetic

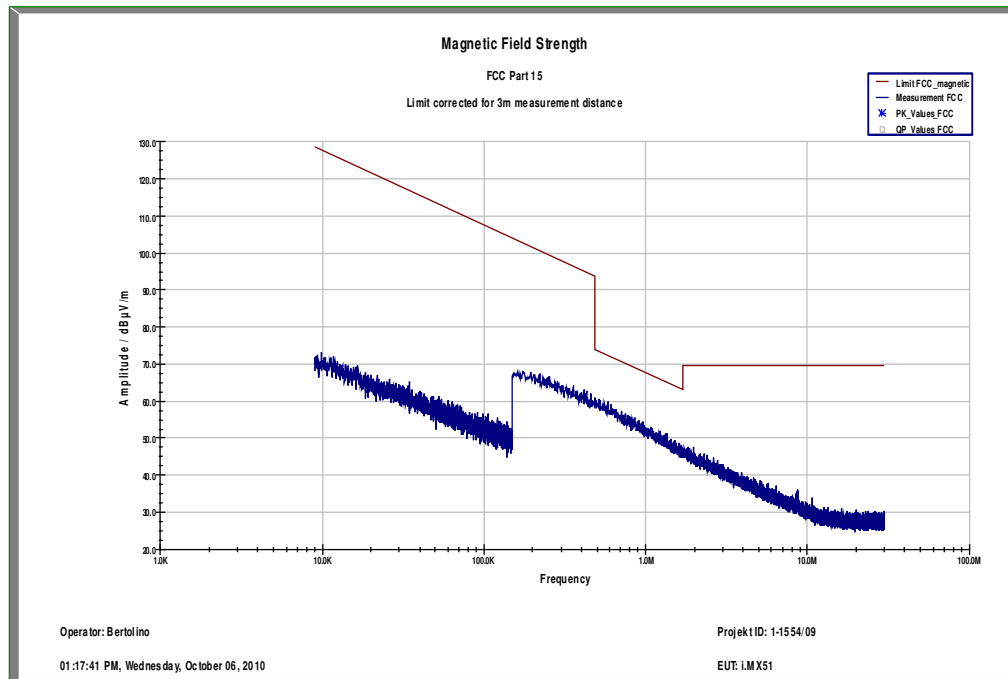


OFDM g – mode:

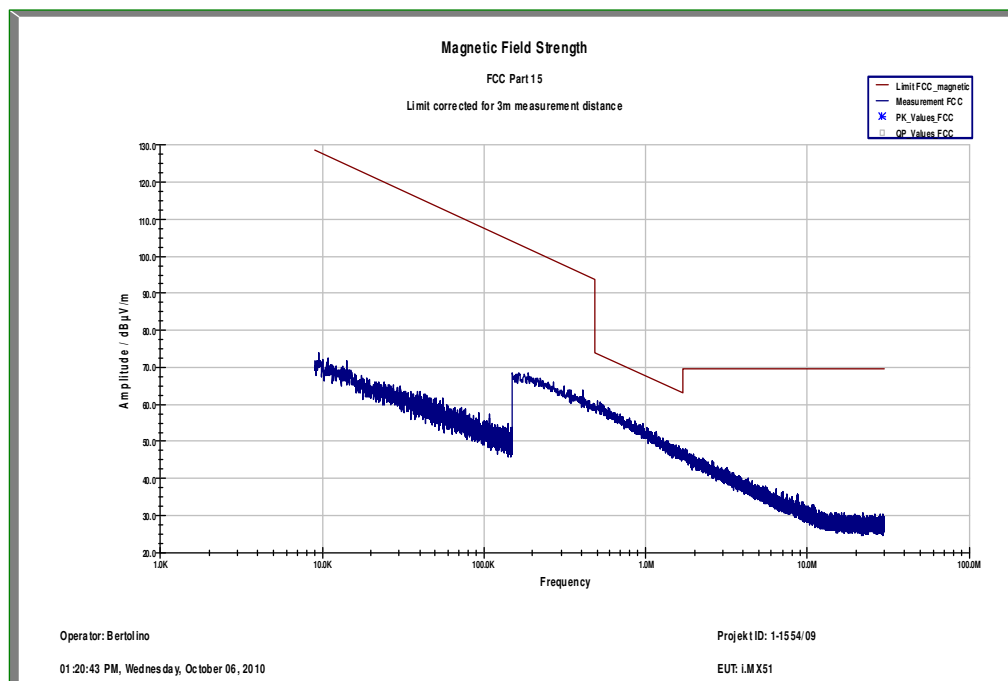
Plot 1: OFDM mode, 24 MBit/s, channel 1, power index 45, up to 30 MHz, magnetic

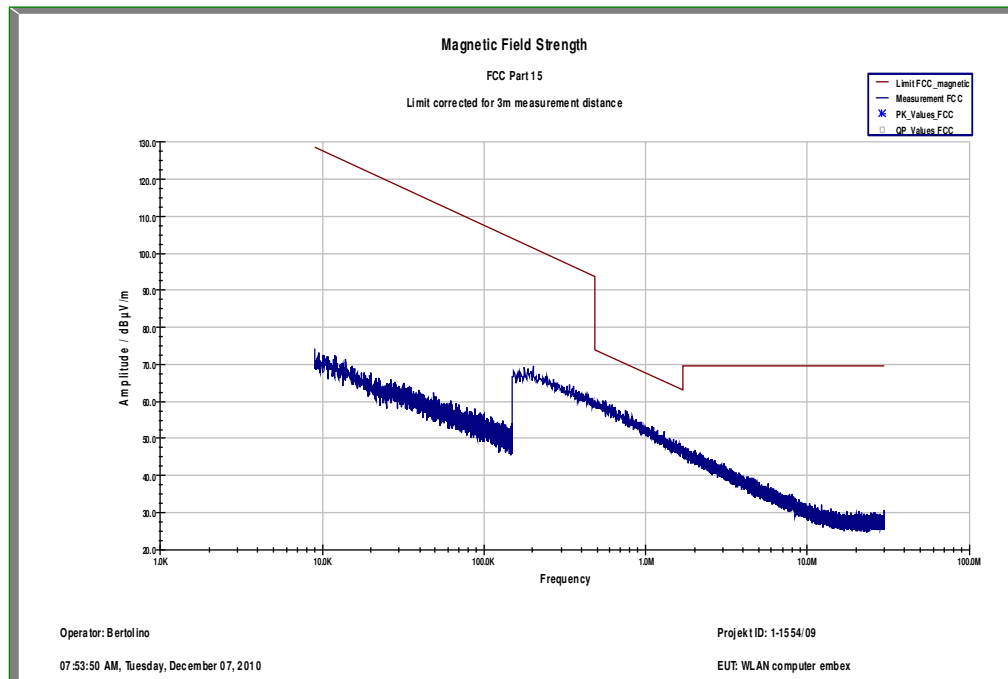
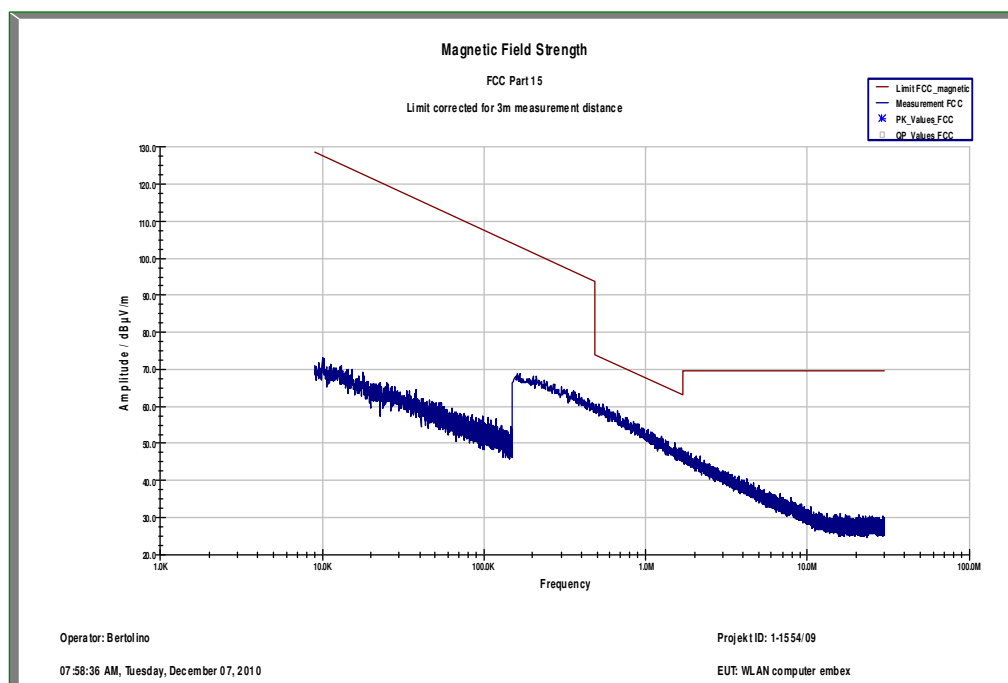


Plot 2: OFDM mode, 24 MBit/s, channel 6, power index 45, up to 30 MHz, magnetic

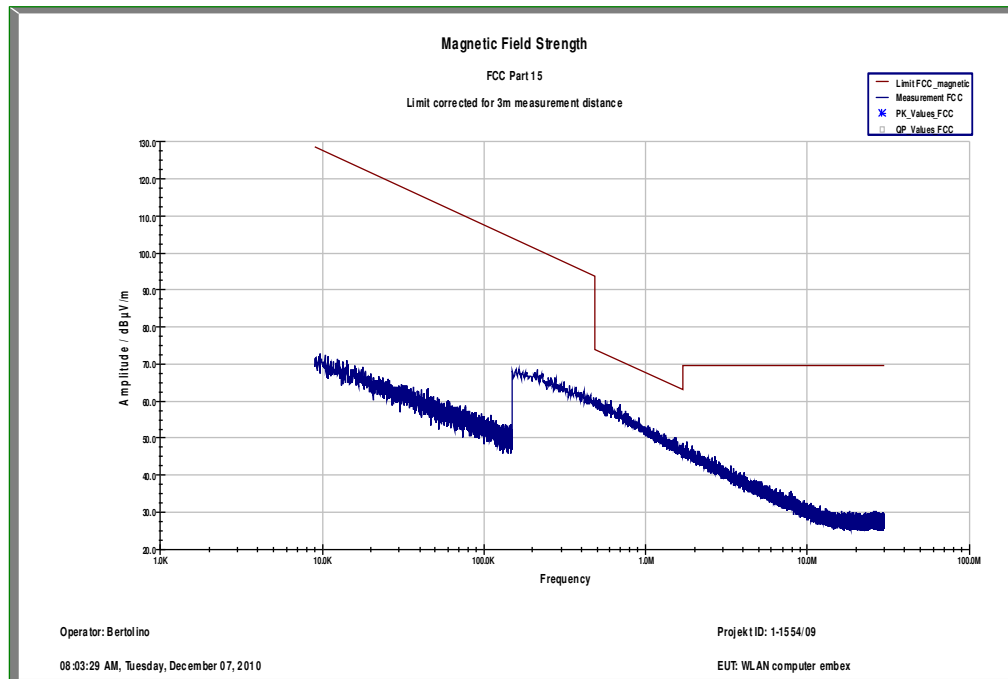


Plot 3: OFDM mode, 24 MBit/s, channel 11, power index 45, up to 30 MHz, magnetic

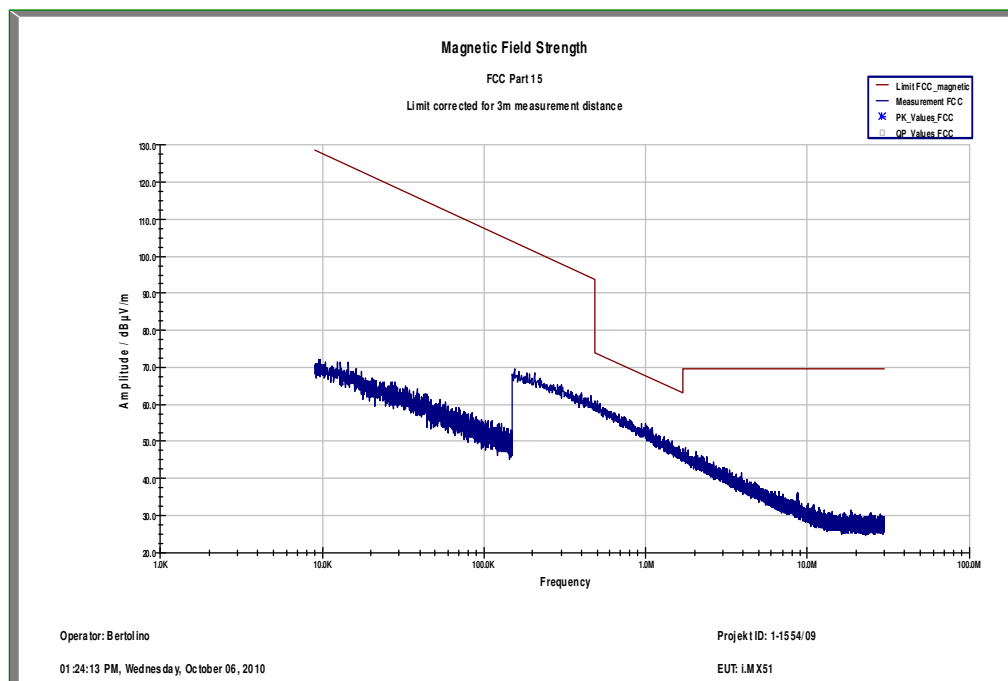


OFDM n – mode:**Plot 1: OFDM mode, mcs 7, channel 1, power index 45, up to 30 MHz, magnetic****Plot 2: OFDM mode, mcs 7, channel 6, power index 45, up to 30 MHz, magnetic**

Plot 3: OFDM mode, mcs 7, channel 11, power index 45, up to 30 MHz, magnetic



Plot 1: RX / Idle mode, up to 30 MHz, magnetic



9.13 TX 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	
CFR Part 15.107(a)		ICES-003, Issue 4	
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	

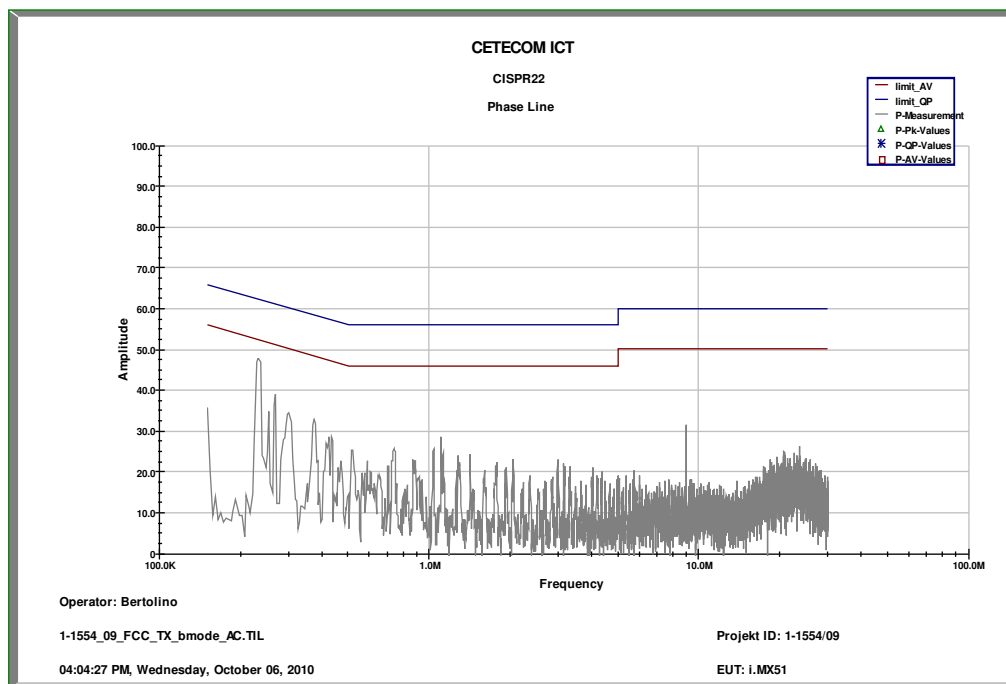
*Decreases with the logarithm of the frequency

Result: Also see plots

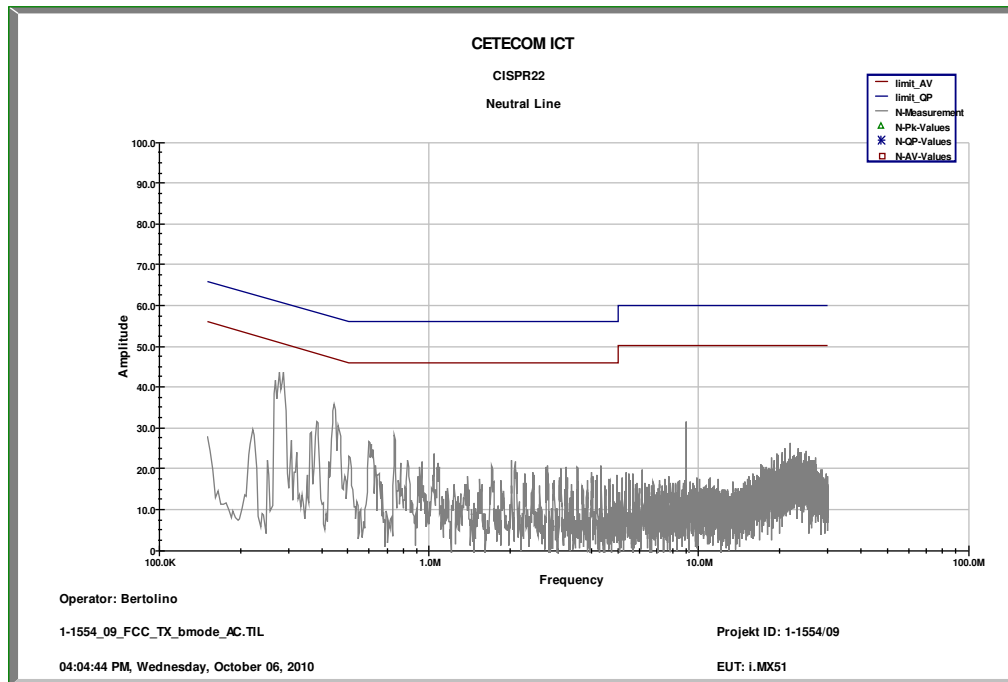
TX Spurious Emissions Conducted < 30 MHz [dB μ V/m]		
F [MHz]	Detector	Level [dB μ V/m]
No critical peaks found.		
Measurement uncertainty	± 3 dB	

Result: The result of the measurement is passed.

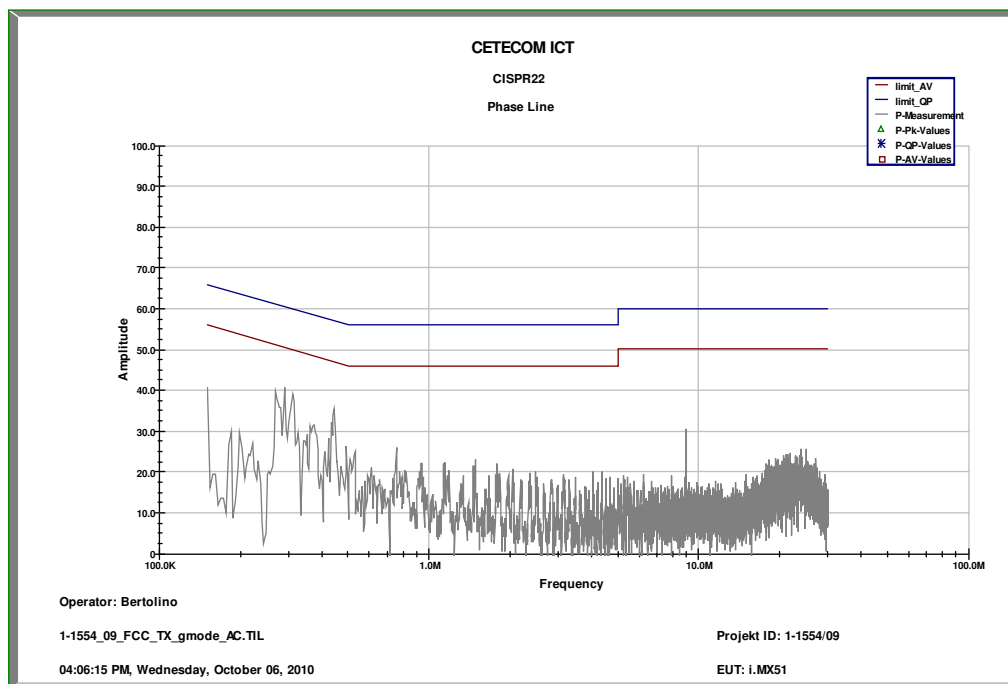
Plot 1: 9 kHz to 30 MHz / Phase Line – DSSS mode, channel 6, power index 45



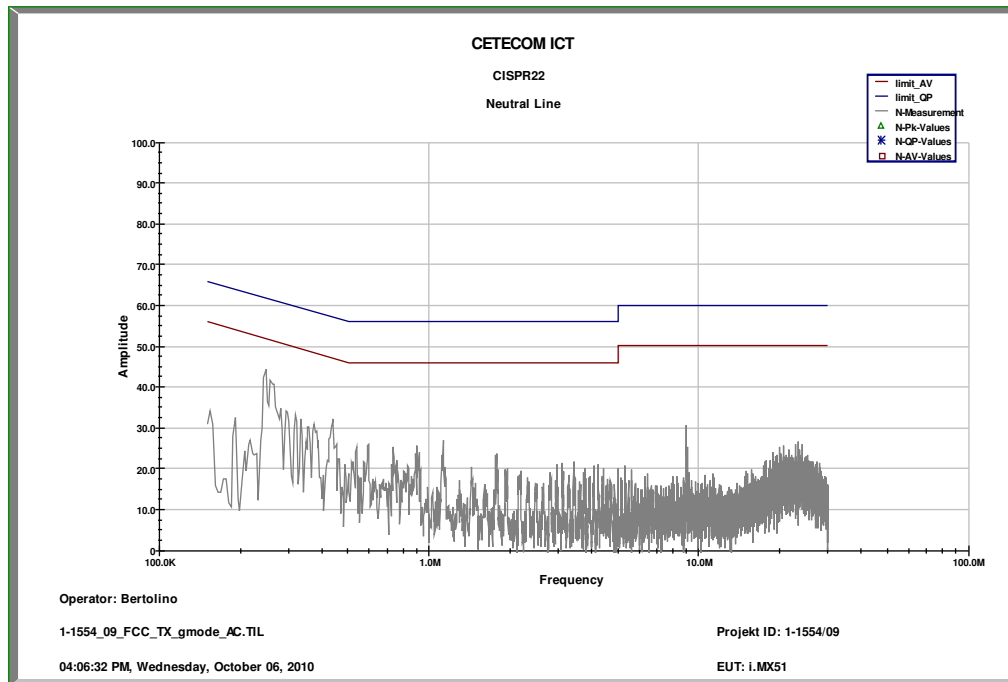
Plot 2: 9 kHz to 30 MHz / Neutral Line – DSSS mode, channel 6, power index 45



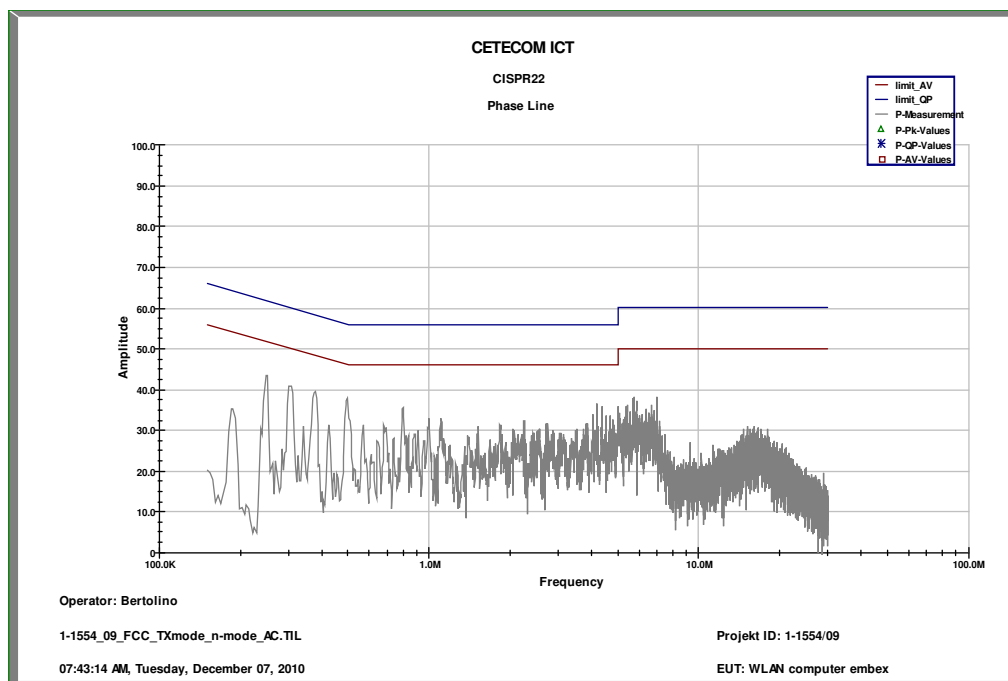
Plot 3: 9 kHz to 30 MHz / Phase Line – OFDM mode, g – mode, channel 6, power index 45



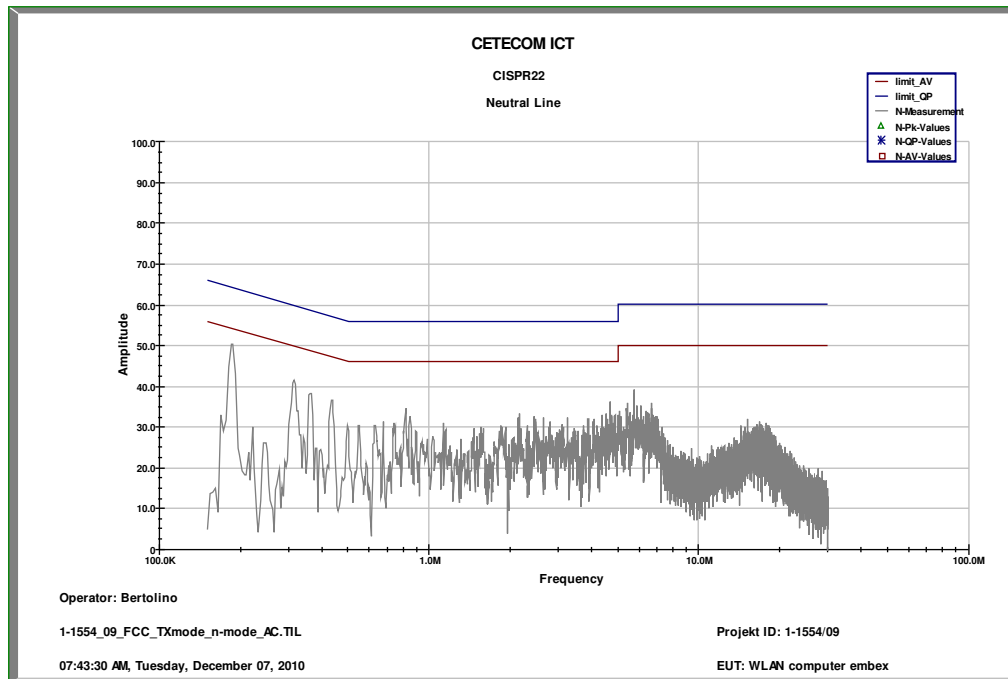
Plot 4: 9 kHz to 30 MHz / Neutral Line – OFDM mode, g – mode, channel 6, power index 45



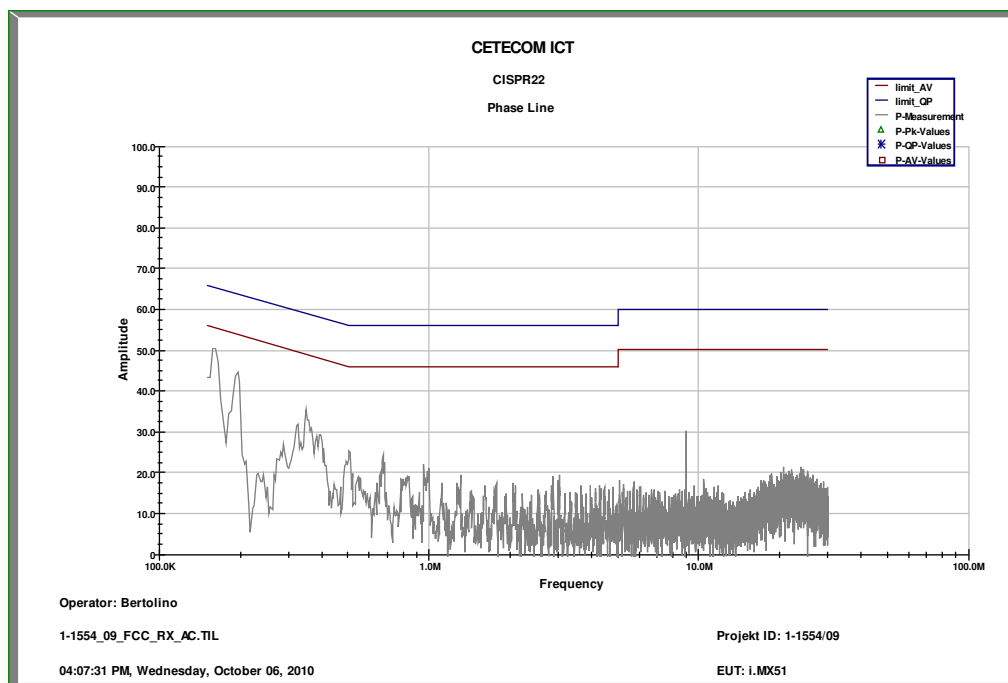
Plot 5: 9 kHz to 30 MHz / Phase Line – OFDM mode, n – mode, channel 6, power index 45



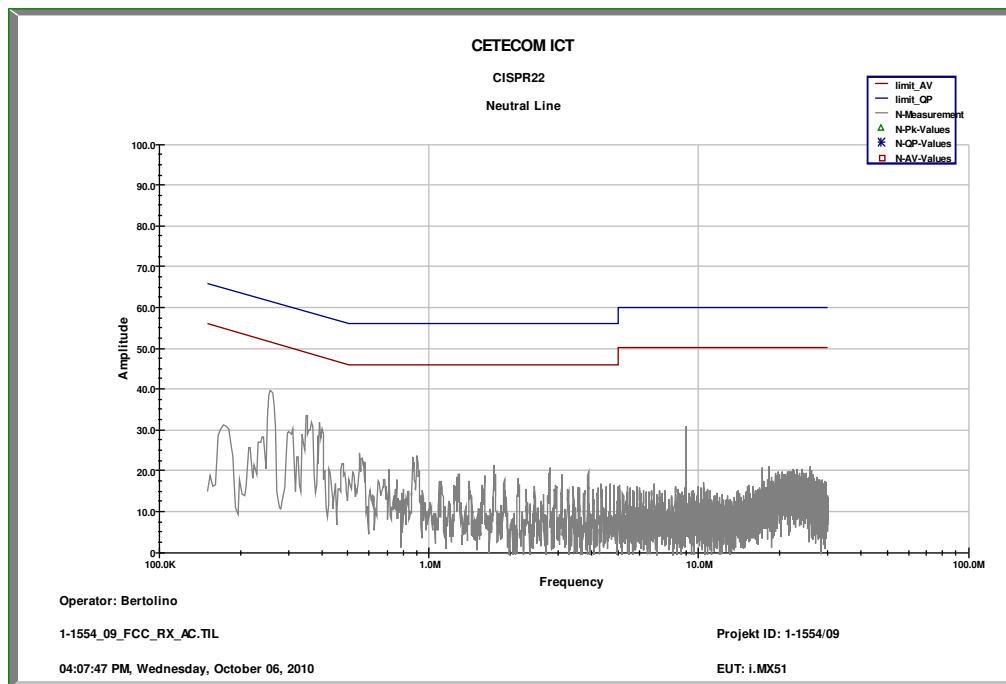
Plot 6: 9 kHz to 30 MHz / Neutral Line – OFDM mode, n – mode, channel 6, power index 45



Plot 7: 9 kHz to 30 MHz / Phase Line – RX mode



Plot 8: 9 kHz to 30 MHz / Neutral Line – RX mode



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.	Labor / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKI!	05.03.2009	05.03.2011
2	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
3	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996		23.03.2009	
4	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2010	06.01.2012
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.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
11	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
12	n. a.	Highpass Filter	WHKX2.9/18G-12SS	Wainwright	1	300003492	ev		
13	n. a.	Highpass Filter	WHK1.1/15G-10SS	Wainwright	3	300003255	ev		
14	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
15	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Technologies	MY48250080	300003812	k	08.09.2010	08.09.2012
16	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Technologies	MY48260003	300003825	vlKI!	08.09.2010	08.09.2012
17	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKI!	17.12.2008	17.12.2011
18	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	ve	01.07.2010	01.07.2012
19	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
20	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	k	06.01.2009	06.01.2011
21	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081; B5979	300000210	ne		
22	n. a.	EMI Test Receiver	ESCI 1166.5950.03	R&S	100083	300003312	k	08.01.2010	08.01.2012

23	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	01.06.2009	01.06.2011
24	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
25	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
26	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
27	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
28	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	01.04.2010	01.04.2012
29	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	08.01.2010	08.01.2012

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
 vlk! 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

Annex A Document history

Version	Applied changes	Date of release
1.0	Initial release	2010-10-07
1.0-A	Additional WLAN mode (n – mode)	2010-12-07
1.0-B	Without photos	2011-01-12

Annex B Further information**Glossary**

DUT	-	Device under Test
EMC	-	Electromagnetic Compatibility
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	not applicable
S/N	-	Serial Number
SW	-	Software