



Accredited testing-laboratory

DAR registration number: DAT-P-176/94-D1

**Federal Motor Transport Authority (KBA)
DAR registration number: KBA-P 00070-97**

Recognized by the Federal Communications Commission

Anechoic chamber registration no.: 90462 (FCC)

Anechoic chamber registration no.: 3463A-1 (IC)

Certification ID: DE 0001

Accreditation ID: DE 0002

Accredited Bluetooth® Test Facility (BQTF)

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Test report no. : 2-4728-01-02/07
Type identification : CH5-E02 and CH5-E01
Applicant : Toshiba Information Systems (UK) Ltd.
FCC ID : SP2-CH5-E02 / SP2-CH5-E01
IC Certification No : N/A
Test standards : 47 CFR Part 15
RSS - 210 Issue 7

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1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The 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 the CETECOM ICT Services GmbH.

Test laboratory manager:

2007-11-12**Bertolino Marco**

Date

Name

Signature

Technical responsibility for area of testing:

2007-11-12**Harro Ames**

Date

Name

Signature

1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10

66117 Saarbrücken

Germany

Phone: + 49 681 5 98 - 0

Fax: + 49 681 5 98 - 9075

e-mail: info@ICT.cetecom.de

Internet: <http://www.cetecom-ict.de>

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

Accredited by: Federal Motor Transport Authority (KBA)
DAR registration number: KBA-P 00070-97

Testing location, if different from CETECOM ICT Services GmbH:

Name :
Street :
Town :
Country :
Phone :
Fax :

1.3 Details of applicant

Name:	Toshiba Information Systems (UK) Ltd. Mobile Communications Division
Street:	Delta House, The Crescent, Southwood Business Park
Town:	Farnborough, Hampshire, GU14 0NL
Country:	United Kingdom
Telephone:	
Fax:	+44 1252 532-326
Contact:	Adrian Coyle
E-mail:	
Telephone:	+44 1252 532-309

1.4 Application details

Date of receipt of order:	2007-07-25
Date of receipt of test item:	2007-11-07
Date of start test:	2007-11-08
Date of end test	2007-11-12
Persons(s) who have been present during the test:	

2 Test standard/s:

47 CFR Part 15	2006-08	Title 47 of the Code of Federal Regulations; Chapter I- Federal Communications Commission subchapter A - general, Part 15-Radio frequency devices
RSS - 210 Issue 7	2007-06	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

3 Technical tests

3.1 Details of manufacturer

Name:	Toshiba Corporation Mobile Communications Company
Street:	1-1, Asahigaoka 3-Chome, Hino-Shi
Town:	Tokyo 191-8555
Country:	Japan

3.1.1 Test item

Kind of test item	:	GSM 900/1800/1900 WCDMAFDDI/Bluetooth/WLAN
Type identification	:	CH5-E02
S/N serial number	:	MAC: 00-1C-7E-13-D1-07
HW hardware status	:	CS
SW software status	:	Version 12.07
Frequency Band [MHz]	:	ISM 2.400 - 2.483,5
Type of Modulation	:	DSSS & OFDM
Number of channels	:	11
Antenna	:	Integrated antenna
Power Supply	:	3.7 V Lithium-ion Battery DC
Temperature Range	:	- 20 °C to + 60 °C

Max. power radiated: 12.10 dBm (g – Mode)

Max. power conducted: 22.41dBm (g – Mode) Peak

FCC ID: SP2-CH5-E02 / SP2-CH5-E01

IC: N/A

3.1.2 Additional EUT information For IC Canada (appendix 2)

IC Registration Number:	N/A
Model Name:	CH5-E02
Manufacturer (complete Address):	Toshiba Corporation 1-1, Asahigaoka 3-Chome, Hino-Shi Tokyo 191-8555 Japan
Tested to Radio Standards Specification (RSS) No.:	RSS-210 Issue 7
Open Area Test Site Industry Canada Number:	IC 3463A-1
Frequency Range (or fixed frequency) [MHz]:	2400 – 2483.5 MHz
RF: Power [W] (max):	Rad. EIRP: 10.23 mW (b – Mode) Conducted : 59.7 mW (b – Mode) Rad. EIRP: 16.22 mW (g – Mode) Conducted : 174.2 mW (g – Mode)
Antenna Type:	Integrated antenna
Occupied Bandwidth (99% BW) [kHz]:	16.506 MHz
Type of Modulation:	DSSS
Emission Designator (TRC-43):	16M5G7D (OFDM)
Transmitter Spurious (worst case) [μ V/m in 3m]:	Nothing found
Receiver Spurious (worst case) [μ V/m in 3m]:	Nothing found

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

Signature:



Test engineer: Marco Bertolino

Date: 2007-11-12

3.1.3 RF Technical Brief Cover Sheet acc. To RSS-102

not applicable

All Fields must be completed with the requested information or the following codes: N/A for Not Applicable, N/P for Not Performed or N/V for Not Available. Where applicable, check appropriate box.

1. COMPANY NUMBER:

2. MODEL NUMBER:

3. MANUFACTURER:

4. TYPE OF EVALUATION:

(c) RF Evaluation

- Evaluated against exposure limits: General Public Use x Controlled Use
- Duty cycle used in evaluation: > 30%
- Standard used for evaluation: RSS-102 Issue 2 (2005-11)
- Measurement distance: m
- RF value: _____ W/m² ☒
- Measured Computed Calculated x

Declaration of RF Exposure Compliance

ATTESTATION: I attest that the information provided in this test report are correct; that a Technical Brief was prepared and the information it contains is correct; that the device evaluation was performed or supervised by me; that applicable measurement methods and evaluation methodologies have been followed and that the device meets the SAR and/or RF exposure limits of RSS-102.

Name: Harro Ames

Title: Senior engineer

Company: Cetecom ICT Services GmbH

3.1.4 EUT operating modes

EUT operating mode no. *)	Description of operating modes	Additional information
Op. 0	Normal mode	Normal temperature and power source conditions
Op. 1		low temperature, low power source conditions
Op. 2		low temperature, high power source conditions
Op. 3		high temperature, low power source conditions
Op. 4		high temperature, high power source conditions

*) EUT operating mode no. is used to simplify the test plan

3.1.5 Extreme conditions testing values

Description	Shortcut	Unit	Value
Nominal Temperature	T _{nom}	°C	23
Nominal Humidity	H _{nom}	%	50
Nominal Power Source	V _{nom}	V	3.7 V

Type of power source: **Lithium-ion Battery DC**

Deviations from these values are reported in chapter 2

4 Summary of Measurement Results and list of all performed test cases

- ☒ No deviations from the technical specifications were ascertained
☐ There were deviations from the technical specifications ascertained

TC identifier	Description	verdict	date	Remark
RF-Testing	FCC Part 15 §15.247	PASS	2007-11-08	PASS

Test Specification Clause	Test Case	Pass	Fail	Not applicable	Not performed
None	Antenna Gain	Yes			
§15.247 (e)	Peak power spectral density	Yes			
§15.247(a)(2)	Spectrum Bandwidth of a DSSS System / 6dB BW	Yes			
§ 15.247 (b)(3)	Maximum output power (conducted)	Yes			
§ 15.247 (b)(3)	Max. peak output power (radiated)	Yes			
§15.247 (d)	Band-edge compliance of conducted emissions	Yes			
§15.205	Band-edge compliance of radiated emissions	Yes			
§15.247 (d)	Spurious Emission - conducted (Transmitter)	Yes			
§ 15.209	Spurious Emission -radiated (Transmitter)	Yes			
§ 15.109	Spurious Emissions-radiated (Receiver)	Yes			
§ 15.209	Spurious Emissions-radiated <30 MHz	Yes			
§ 15.107/207	Conducted Emissions <30 MHz	Yes			

5 RF measurement testing

5.1 Description of test set-up

5.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 20 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 C63.4-2003 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 set-ups 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 C63.4-2003 clause 4.2.

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

9 kHz - 150 MHz: Quasi Peak measurement, 200 Hz Bandwidth, passive loop antenna.

150 kHz - 30 MHz: Quasi Peak measurement, 9 kHz Bandwidth, passive loop antenna.

30 MHz - 200 MHz: Quasi Peak measurement, 120 kHz Bandwidth, biconical antenna

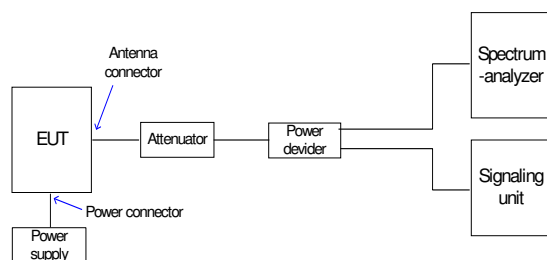
200MHz - 1GHz: Quasi Peak measurement, 120 kHz Bandwidth, log periodic antenna

>1GHz: Average, RBW 1MHz, VBW 10 Hz, wave guide horn

All measurement settings are according to FCC 15.209 and 15.207

5.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is connected to the spectrum analyzer. The specific losses for signal path are first checked within a calibration. The measurement readings on the 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.



5.2 Referenced Documents

None

5.3 Additional comments

The tested sample has two different subtypes.

The model SP2-CH5-E02 / SP2-CH5-E0 has the build-in GPS activated, the SP2-CH5-E01 not.

This is the only difference between the two samples.

In the report we tested the SP2-CH5-E02 with activated GPS.

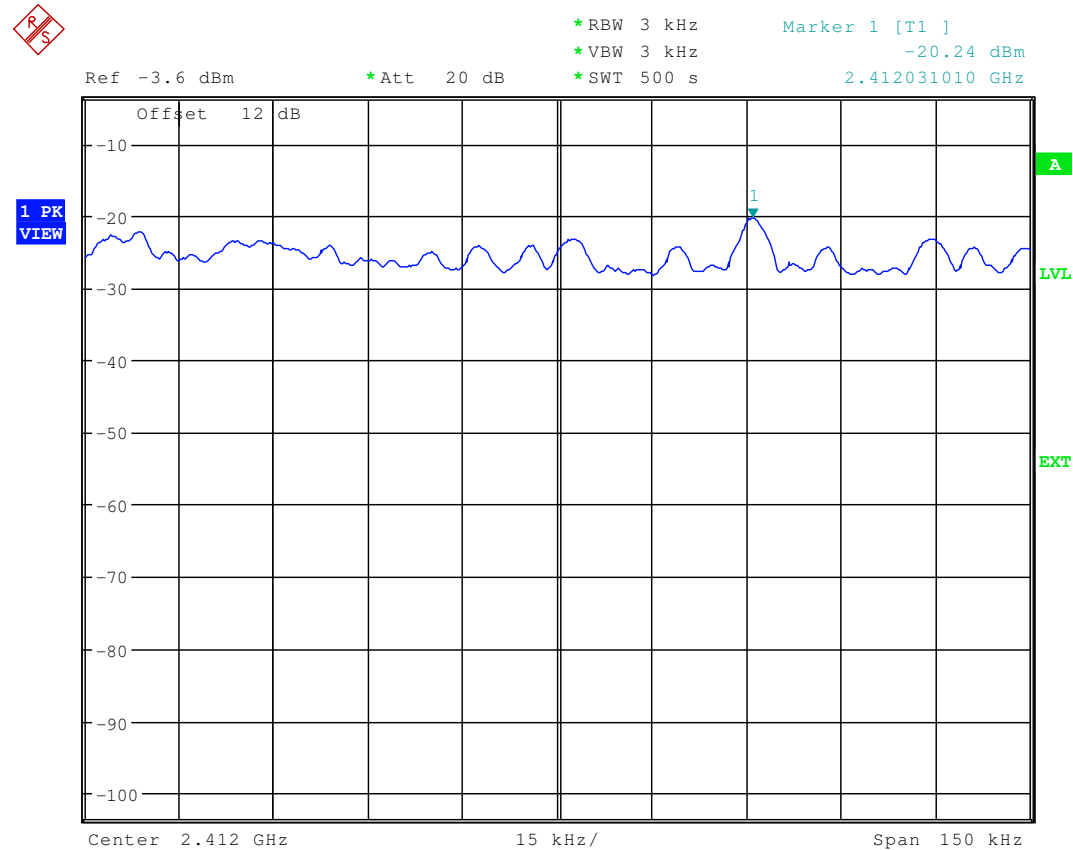
5.4 Antenna gain

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

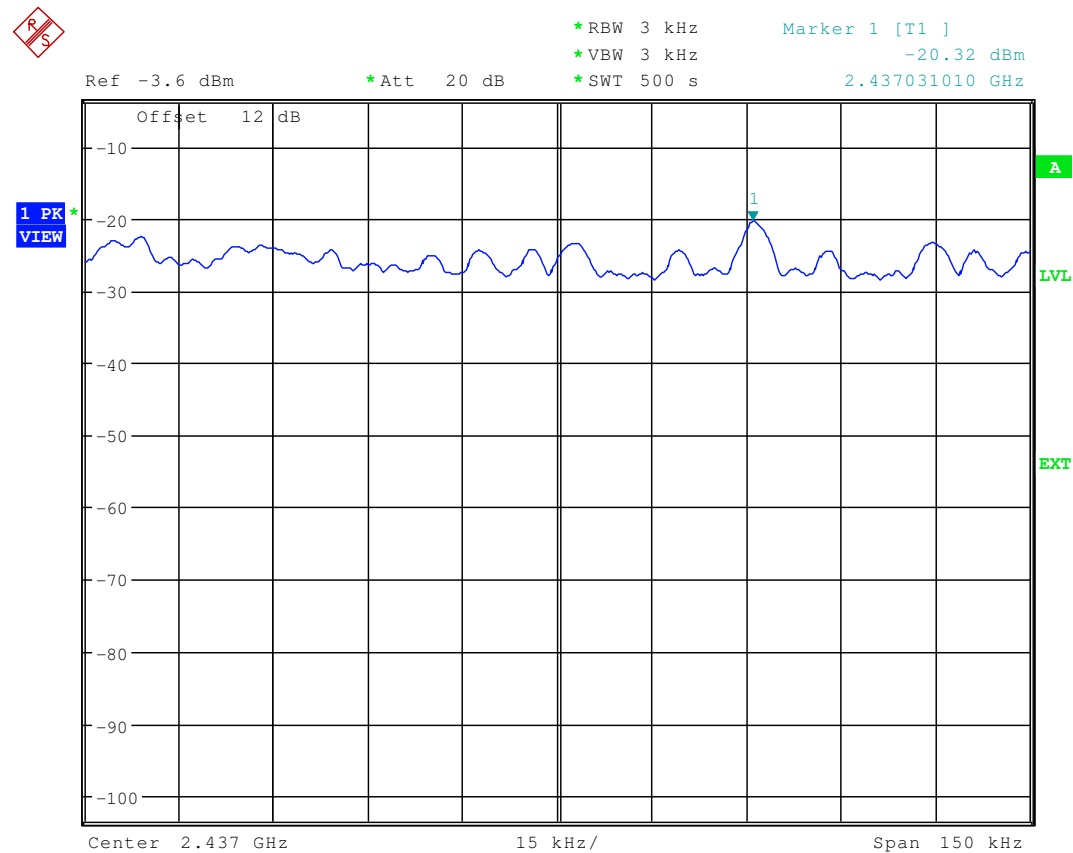
	low channel	mid channel	high channel
Conducted power [dBm] b – mode ; measured	16.8	17.8	16.4
Radiated power [dBm] b – mode ; measured	9.36	9.09	10.10
Gain [dBi] calculated	-7.44	-8.61	-6.3

5.5 Peak Power Spectral density (digitally modulated systems) §15.247(e) (DSSS)

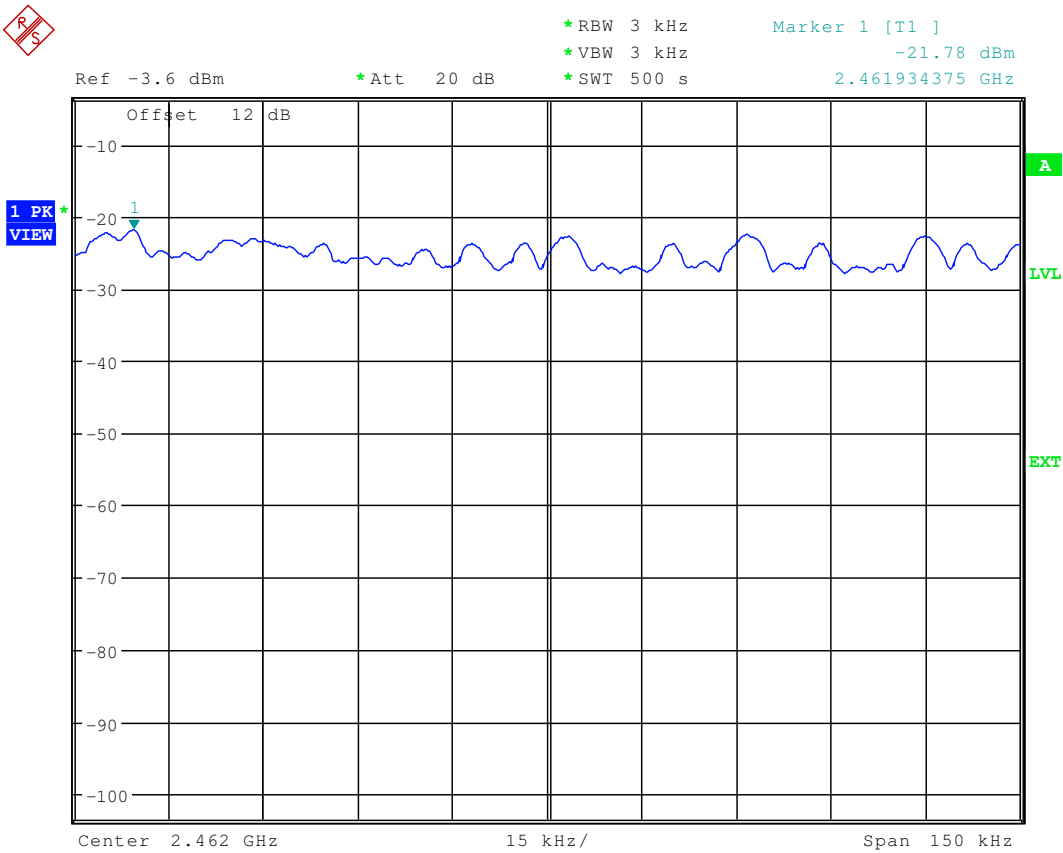
Plot 1:



Plot 2:



Plot 3:



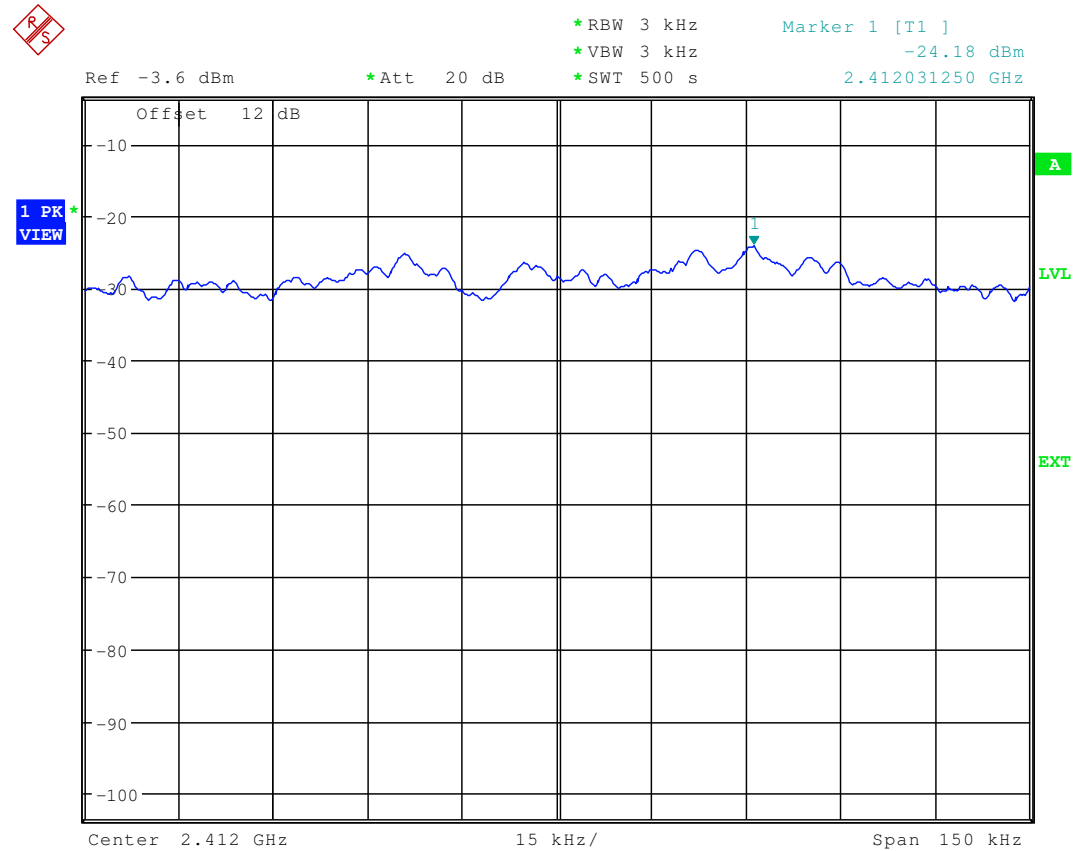
Results: Plot 1: Power density: - 20.24 dBm / 3 kHz
 Plot 2: Power density: - 20.32 dBm / 3 kHz
 Plot 3: Power density: - 21.78 dBm / 3 kHz

Limits :

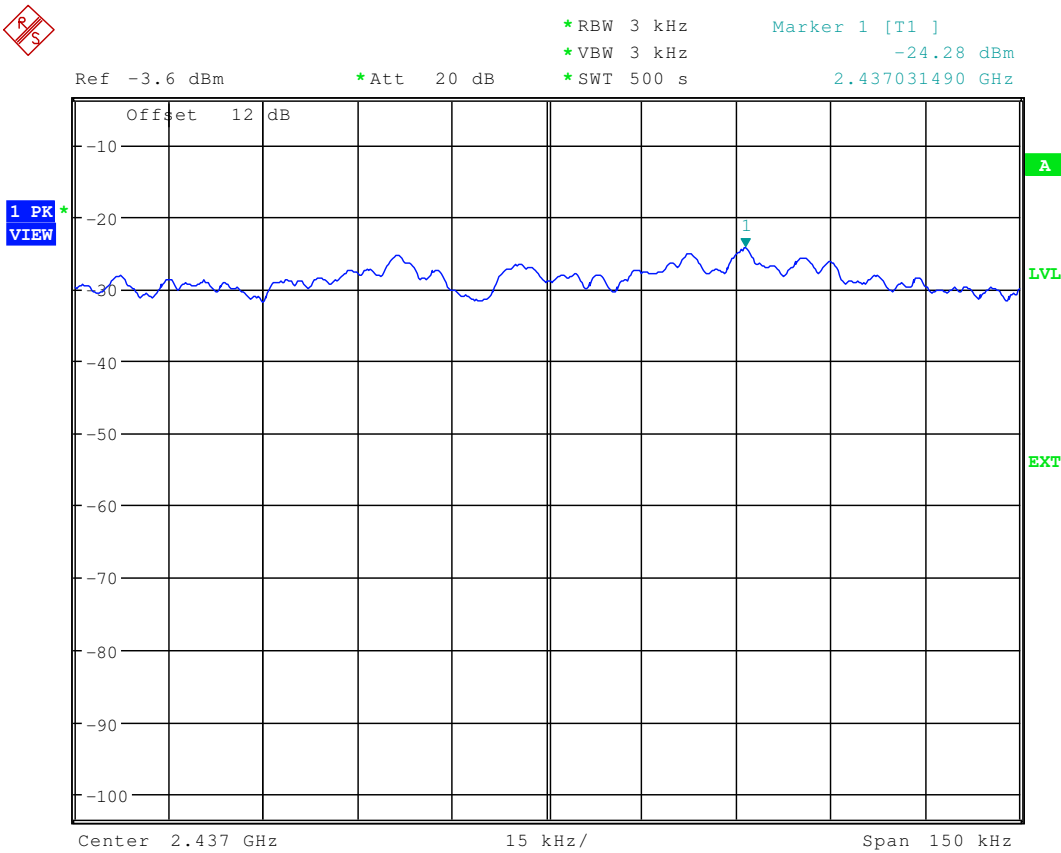
Under normal test conditions only	For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission
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Peak Power Spectral density (digitally modulated systems) §15.247(e)
(OFDM)

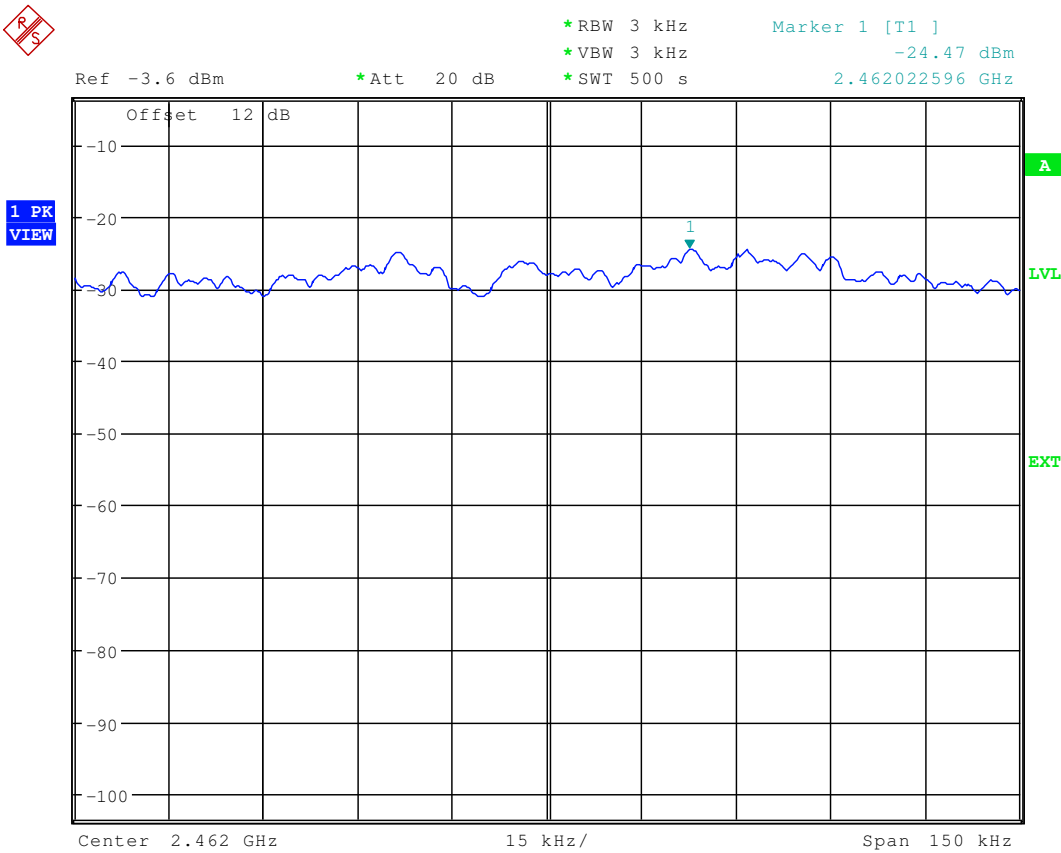
Plot 1:



Plot 2:



Plot 3:



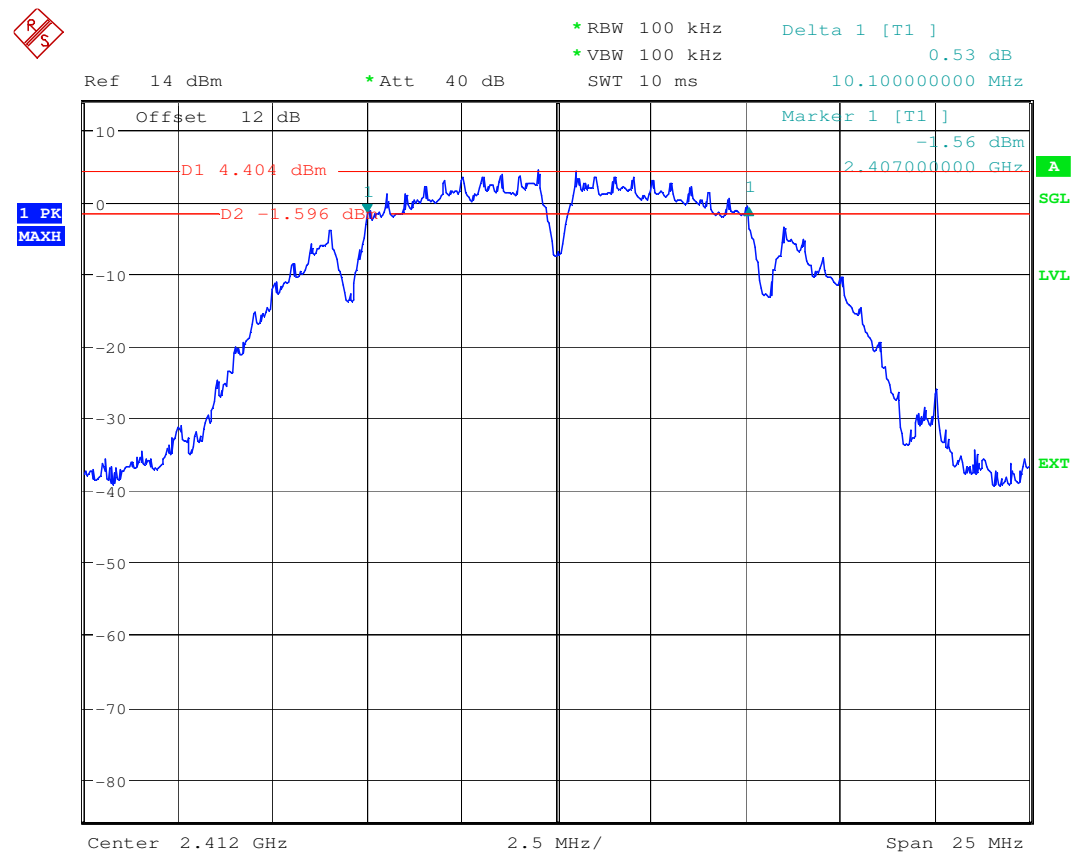
Results: Plot 1: Power density: - 24.18 dBm / 3 kHz
Plot 2: Power density: - 24.28 dBm / 3 kHz
Plot 3: Power density: - 24.47 dBm / 3 kHz

Limits :

Under normal test conditions only	For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission
-----------------------------------	---

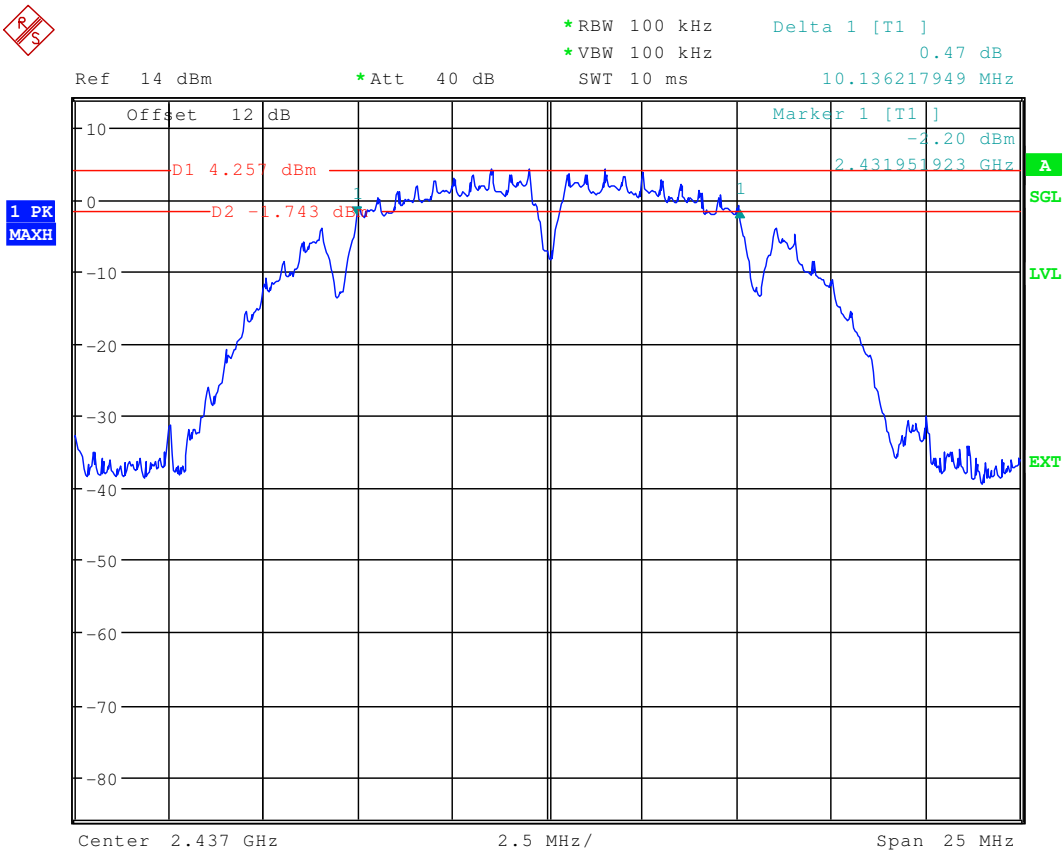
5.6 Spectrum Bandwidth of a DSSS System / 6 dB Bandwidth §15.247(a)(2)

Plot 1:

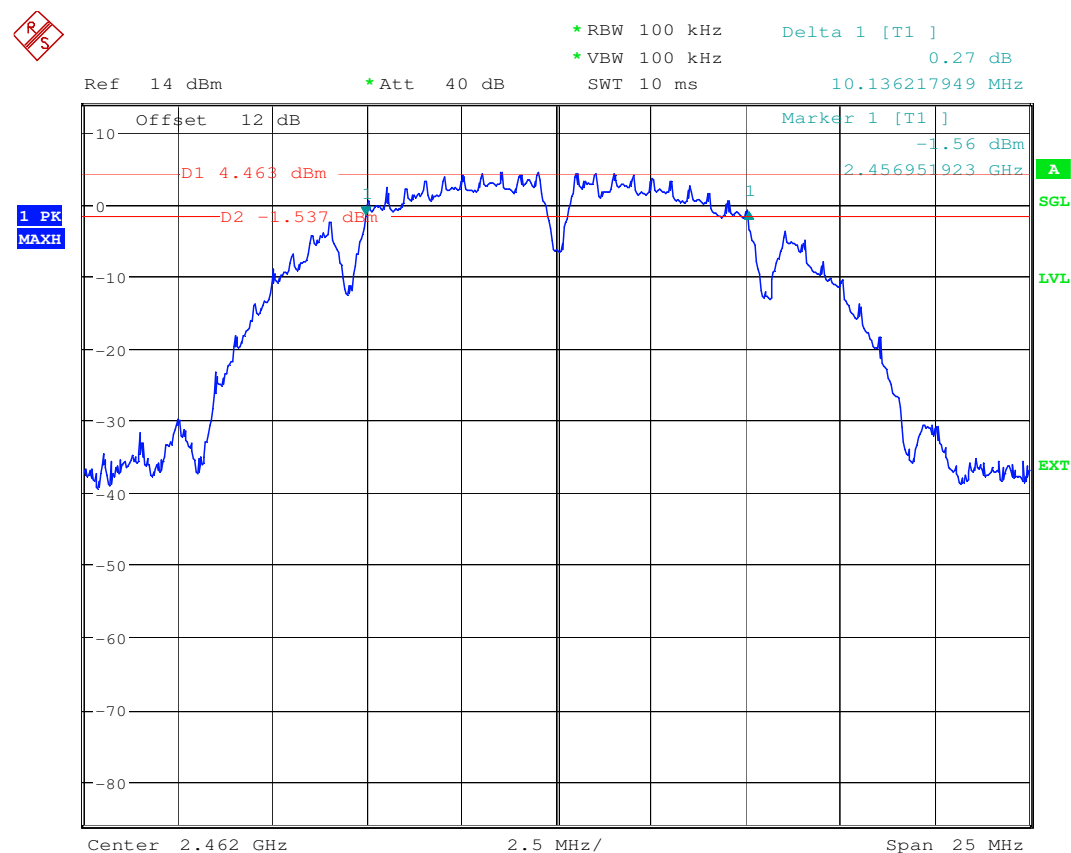


Date: 12.NOV.2007 16:52:08

Plot 2:



Plot 3:



Date: 12.NOV.2007 16:50:01

Results:

Test conditions		6 dB BANDWIDTH [MHz]		
Frequency [MHz]		2412	2437	2462
T _{nom}	V _{nom}	10.100	10.136	10.136
Measurement uncertainty		±1kHz		

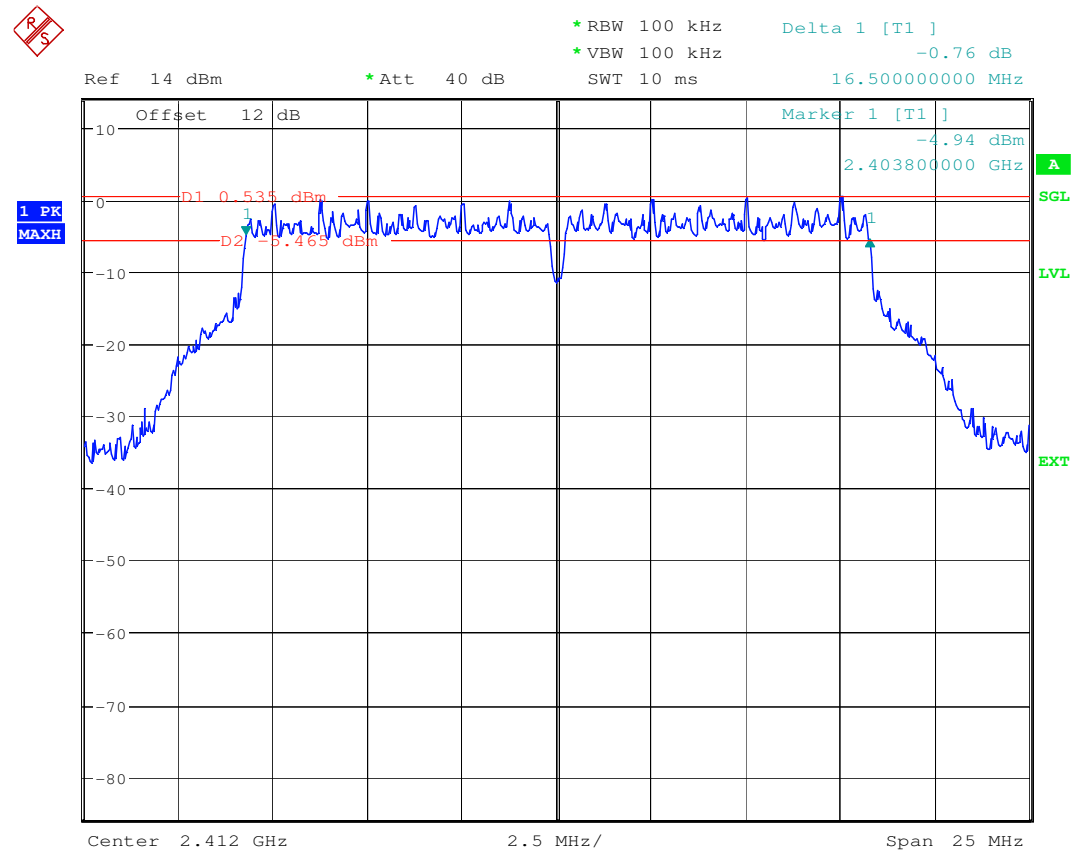
RBW: 100 kHz / VBW 100 kHz

Limits:

Under normal test conditions only	> 500 kHz
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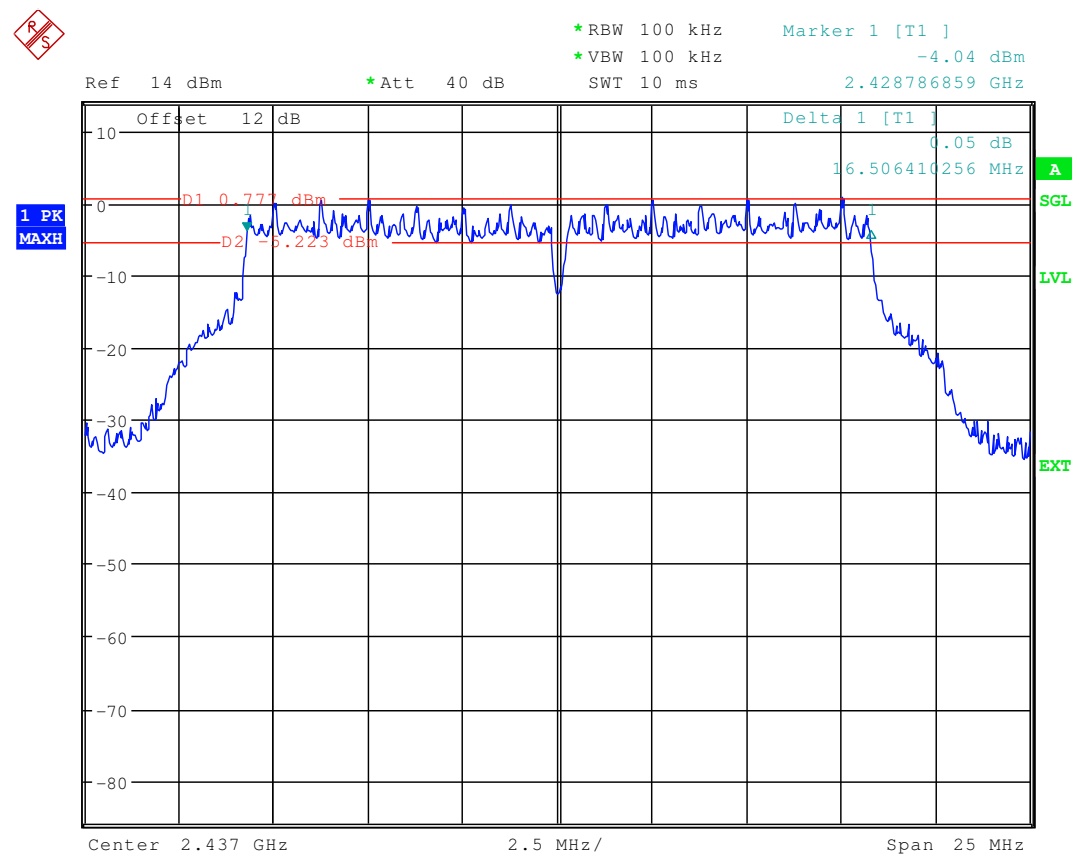
Spectrum Bandwidth of a OFDM System / 6 dB Bandwidth §15.247(a)(2)

Plot 1:



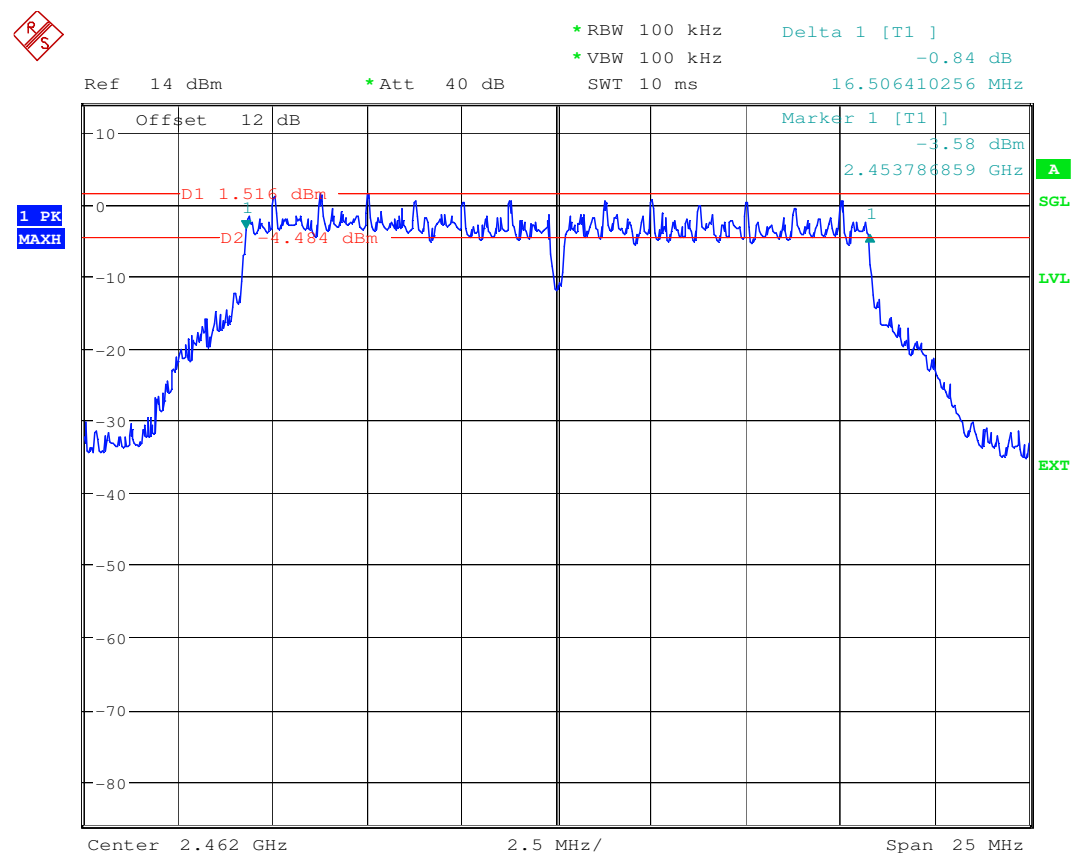
Date: 12.NOV.2007 16:41:57

Plot 2:



Date: 12.NOV.2007 16:44:56

Plot 3:



Date: 12.NOV.2007 16:47:01

Results:

Test conditions		6 dB BANDWIDTH [MHz]		
Frequency [MHz]		2412	2437	2462
T _{nom}	V _{nom}	16.500	16.506	16.506
Measurement uncertainty		±1kHz		

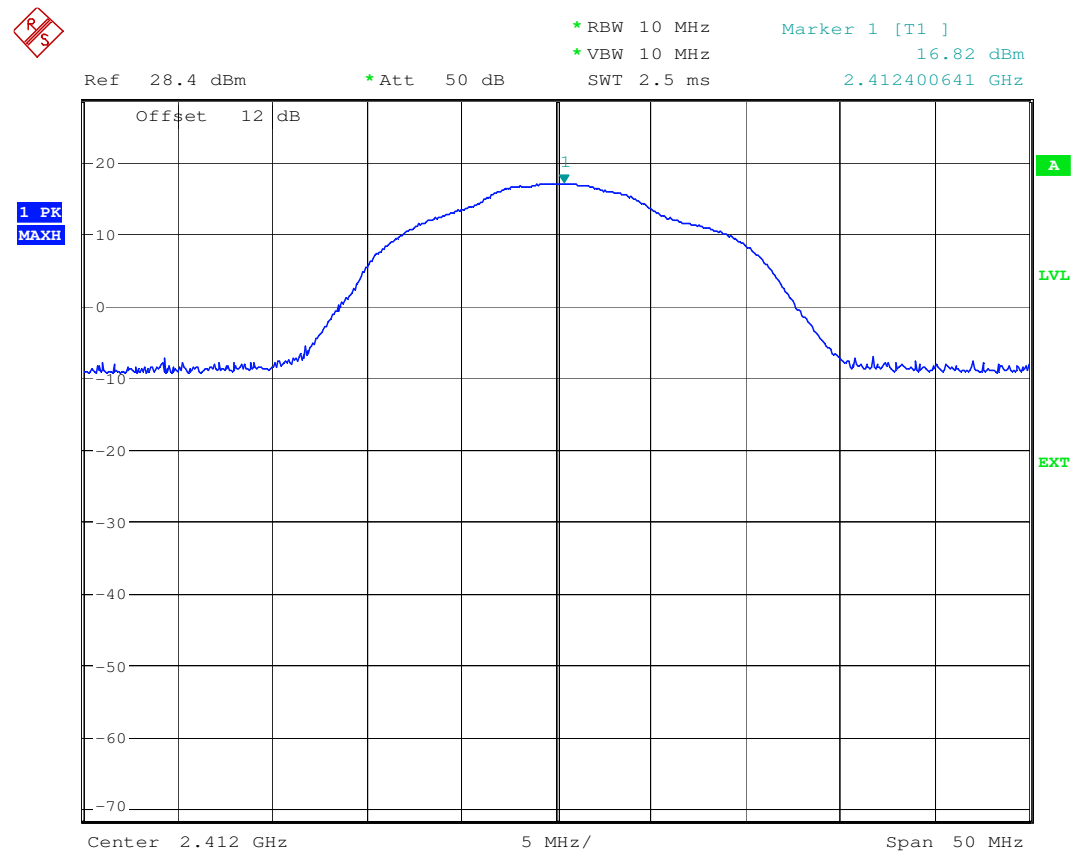
RBW: 100 kHz / VBW 100 kHz

Limits:

Under normal test conditions only	> 500 kHz
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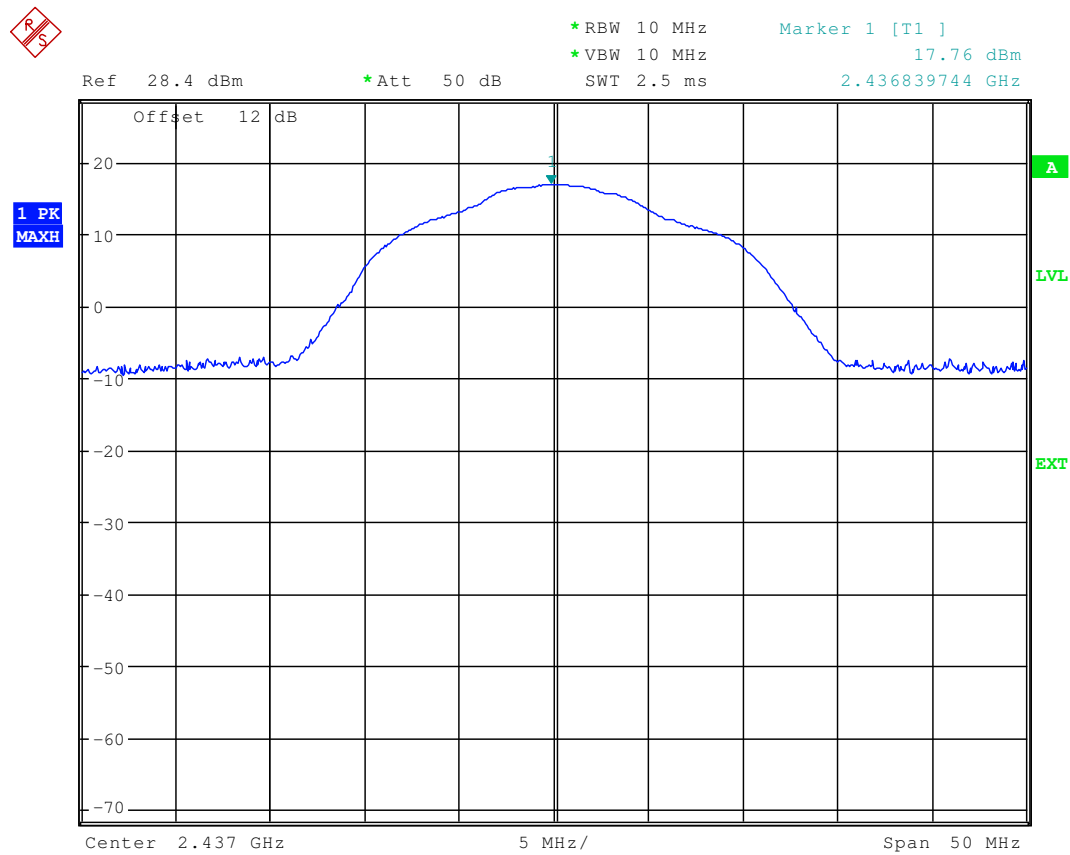
5.7 Maximum output power (conducted) §15.247 (b)(3)

Plot 1:

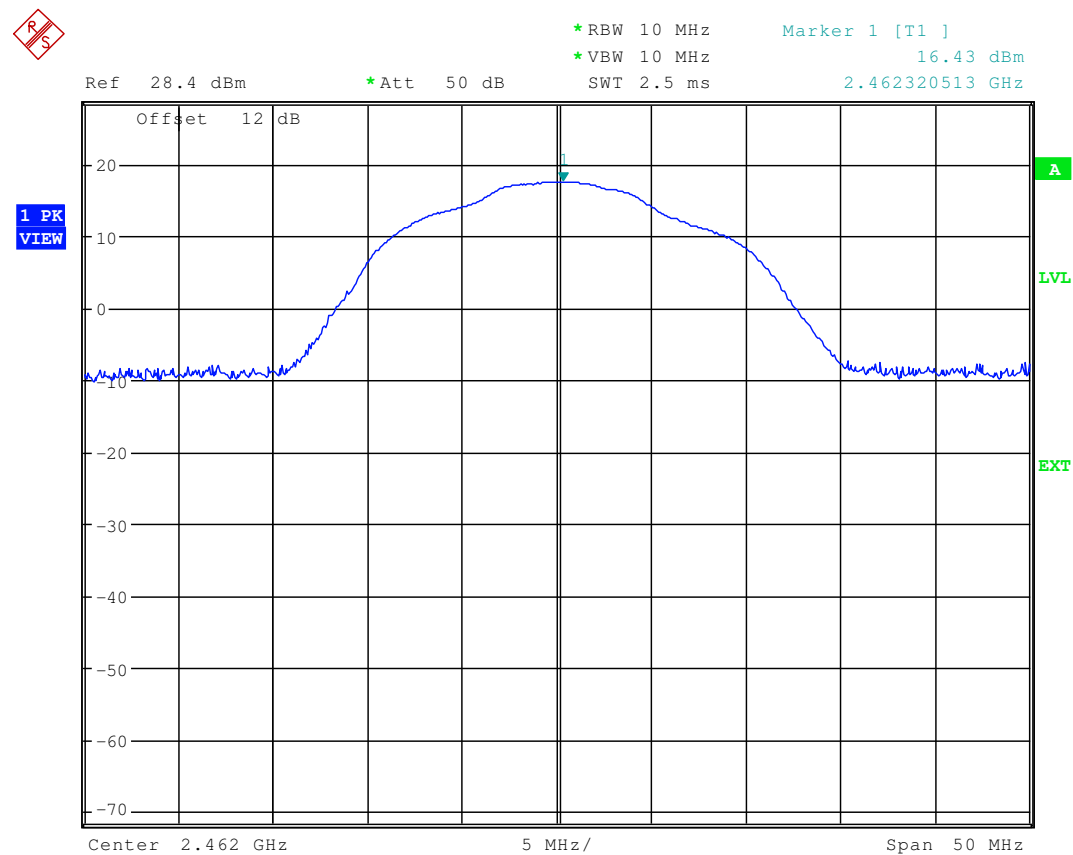


Date: 12.NOV.2007 16:54:21

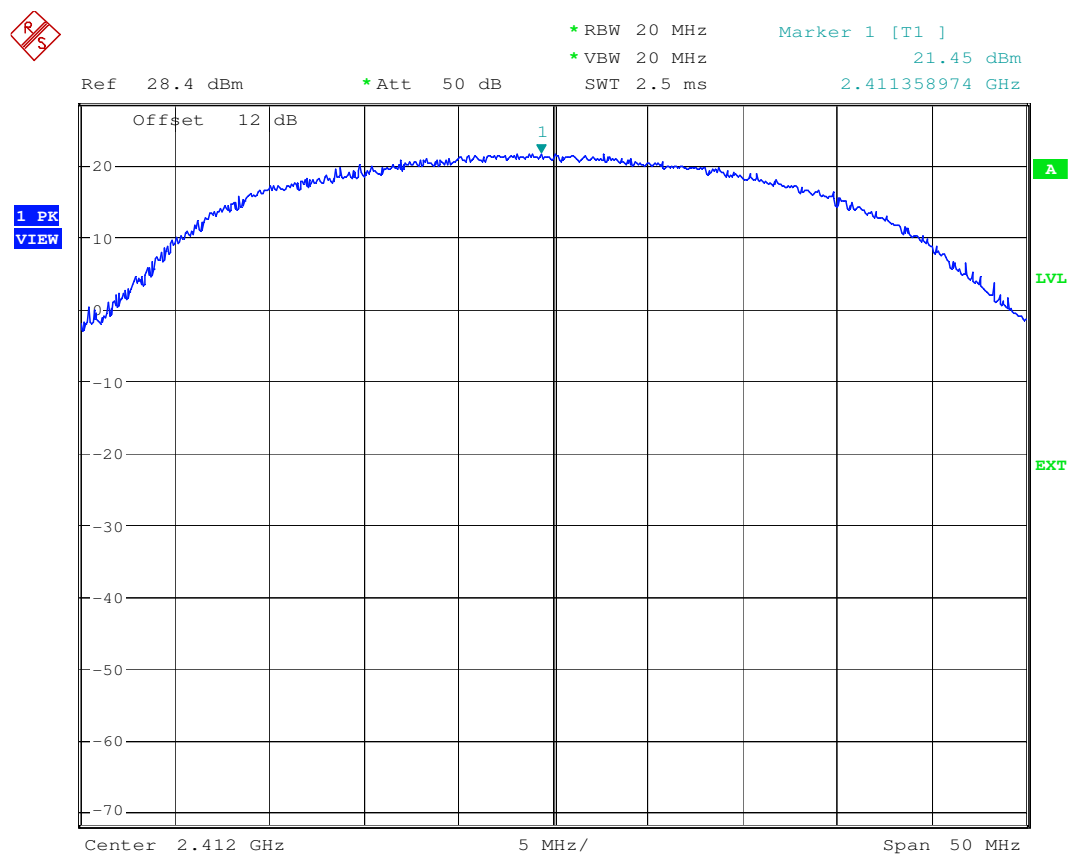
Plot 2:



Plot 3:

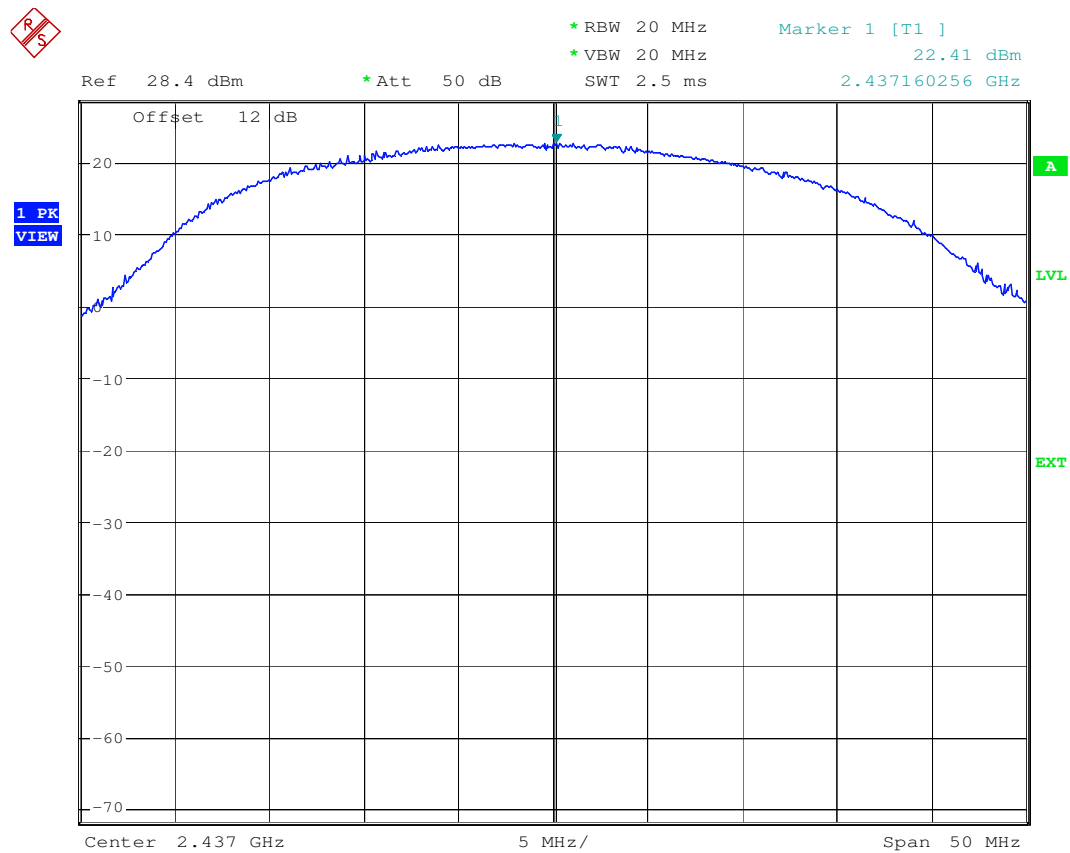


Plot 4:



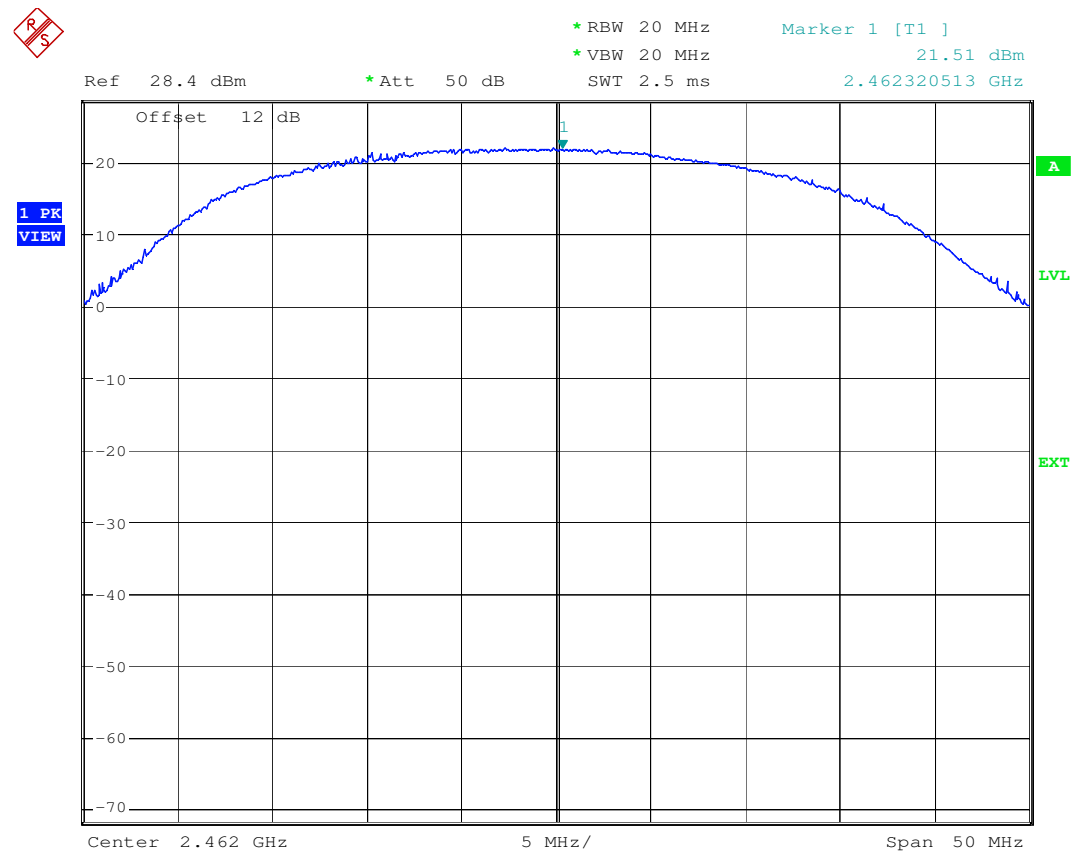
Date: 12.NOV.2007 17:00:51

Plot 5:



Date: 12.NOV.2007 17:00:05

Plot 6:



Date: 12.NOV.2007 16:58:53

Results:

Test conditions		Max. peak output power [dBm](Peak)		
Frequency [MHz]		2412	2437	2462
T _{nom} (DSSS)	V _{nom}	16.82	17.76	16.43
T _{nom} (OFDM)	V _{nom}	21.45	22.41	21.51
Measurement uncertainty		±3dB		

RBW / VBW: 20 MHz

Test conditions		Max. peak output power [dBm](RMS)		
Frequency [MHz]		2412	2437	2462
T _{nom} (DSSS)	V _{nom}	15.7	16.0	15.9
T _{nom} (OFDM)	V _{nom}	13.5	13.9	13.8
Measurement uncertainty		±3dB		

RBW / VBW: 20 MHz

Limits:

Under normal test conditions only, for frequency range 2400-2483.5 MHz	Max. 1.0 Watt / 30 dBm
--	------------------------

MPE calculation

These equations are generally accurate in the far field of an antenna but will over predict power density in the near field, where they could be used for making a “worst case” prediction.

$$S = PG/4\pi R^2$$

where S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units e.g. mW)

G = power gain of the antenna in the direction of interest relative to the isotropic radiator

R = distance to the centre of radiation of the antenna (appropriate units e.g. cm)

Or

$$S = \text{EIRP}/4\pi R^2$$

where EIRP = equivalent isotropically radiated power

Calculation:

(Calculated for max. EIRP)

EIRP: 12.1 dBm (16.2 mW)

calculated at distance of 20 cm:

$$\text{power density} = 16.2 / 4\pi 20^2 = 0.9932 \text{ mW/ cm}^2$$

Limit:

1mW/ cm² is the reference level for general public exposure according to the OET Bulletin 65,
Edition 97-01 Table 1.

5.8 Max. peak output power (radiated) §15.247 (b)(3)

Results: (b – Mode)

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2412	2437	2462
T _{nom}	V _{nom}	9.36	9.09	10.10
Measurement uncertainty		±3dB		

RBW / VBW: 10 MHz

Measured at a distance of 3m

Results: (g – Mode)

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2412	2437	2462
T _{nom}	V _{nom}	10.83	11.05	12.10
Measurement uncertainty		±3dB		

RBW / VBW: 10 MHz

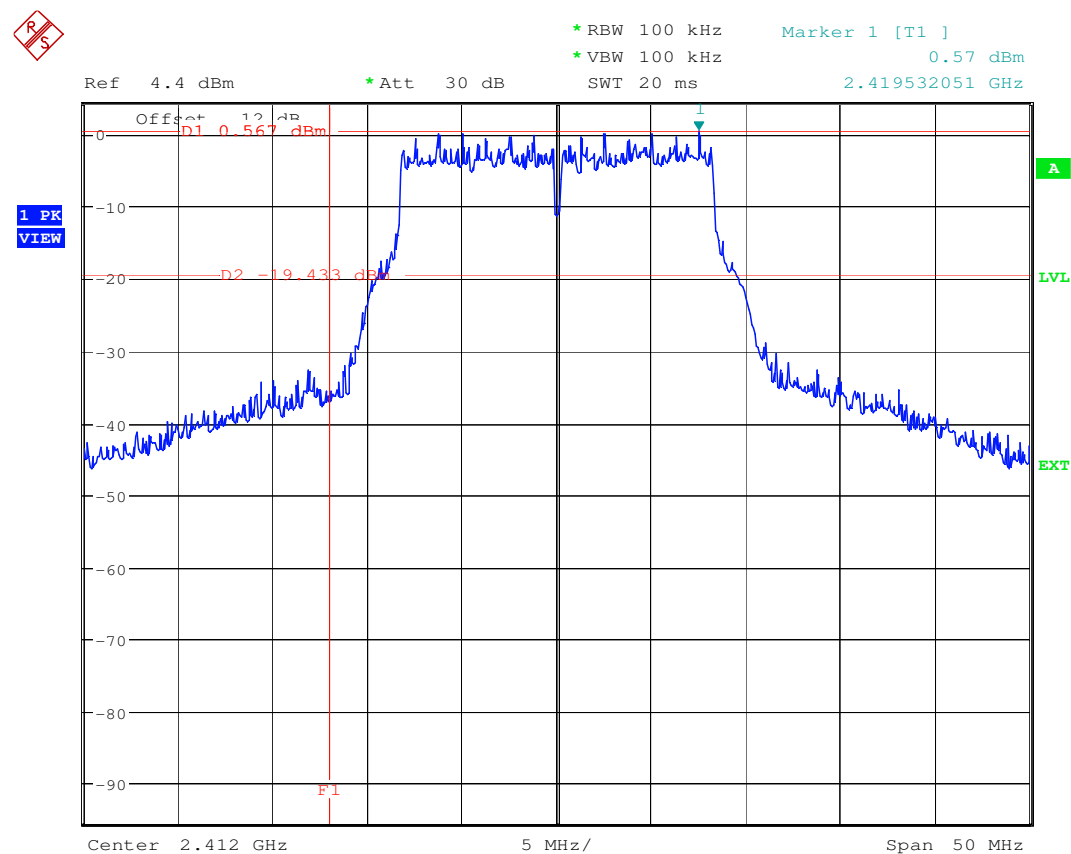
Measured at a distance of 3m

Limits:

Under normal test conditions only, for frequency range 2400-2483.5 MHz	Max. 1.0 Watt
--	---------------

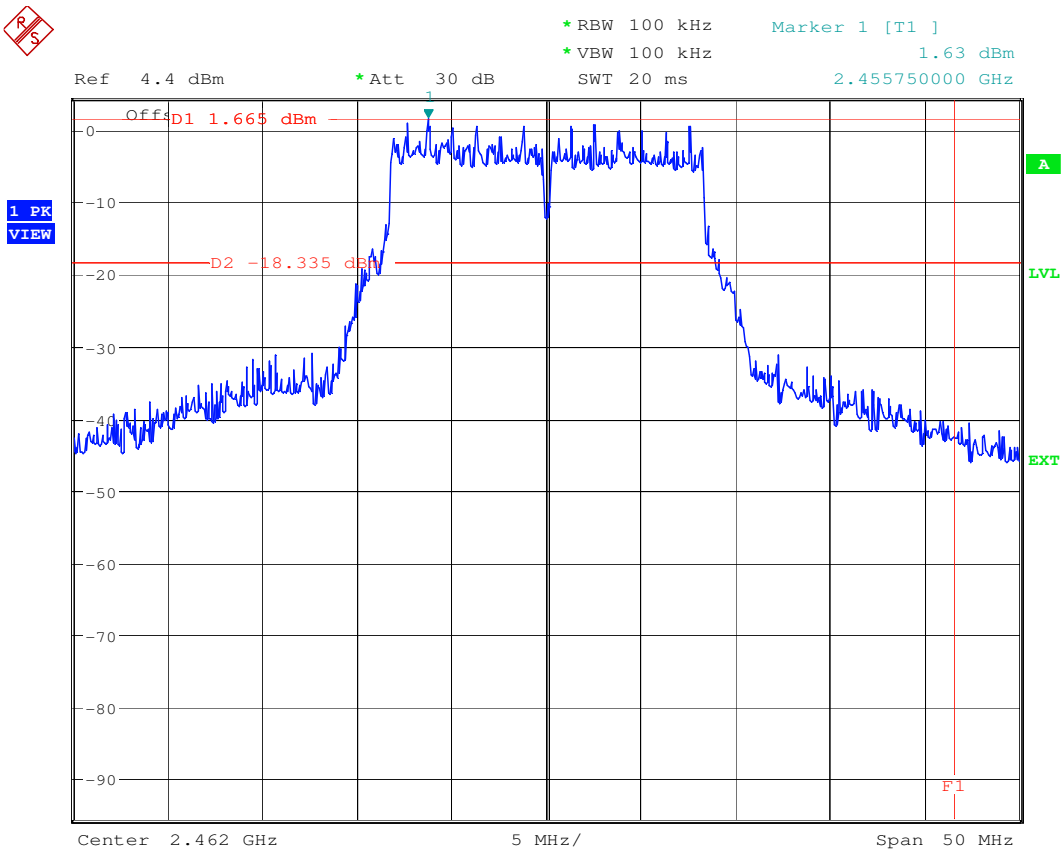
5.9 Band-edge compliance of conducted emissions §15.247 (d)

Plot 1, lowest channel – OFDM Mode



Date: 12.NOV.2007 17:02:55

Plot 2, highest channel – OFDM Mode



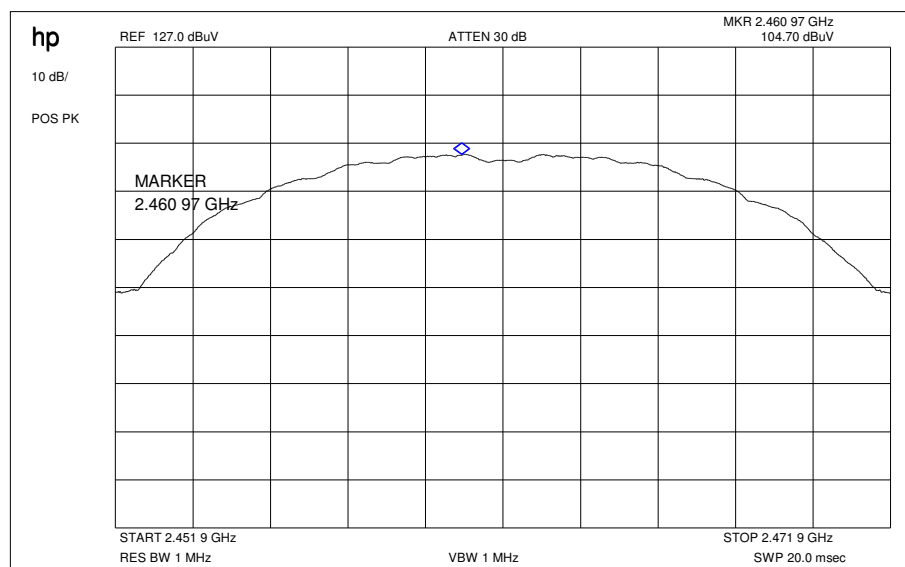
Date: 12.NOV.2007 17:03:56

Limits:

Under normal test conditions only	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)).
-----------------------------------	--

5.10 Band-edge compliance of radiated emissions §15.205

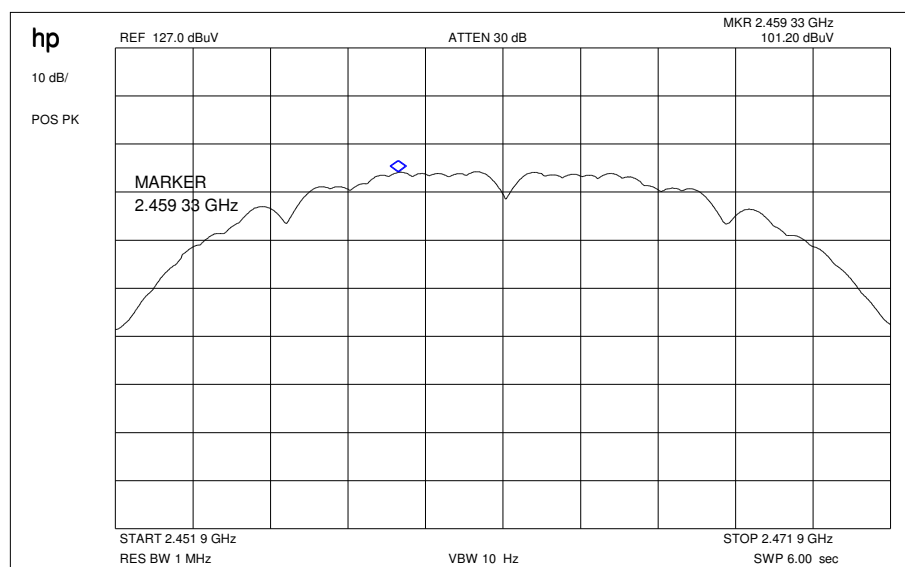
Plot 1: Max field strength in 3m distance (single frequency) peak (b Mode – 1Mbps)



Result:

Frequency	Meter reading	Correction factor	Results
2462 MHz	104.70 dBμV	-1.77 dB	102.93 dBμV

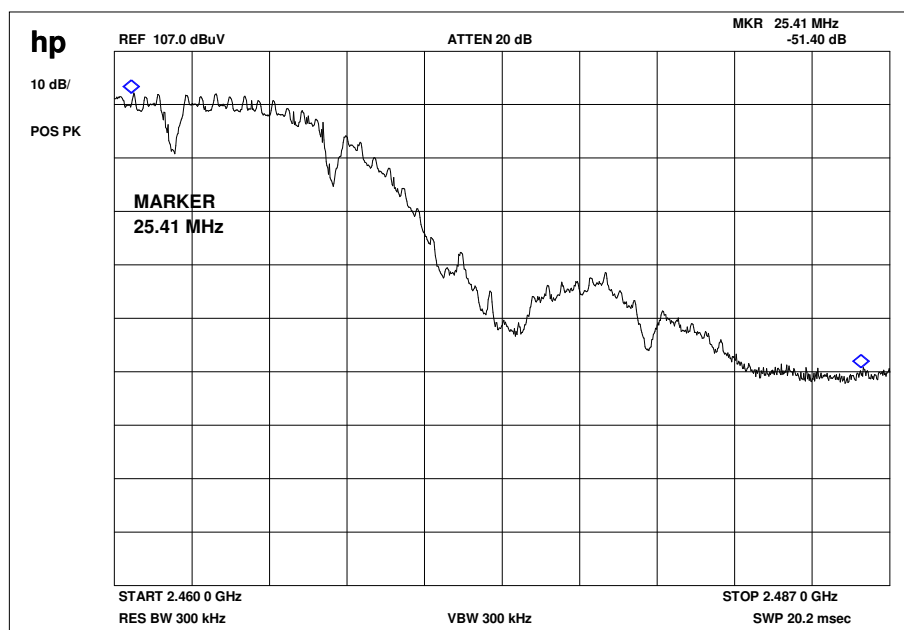
Plot 2 : Max field strength in 3m distance (single frequency) average (b Mode – 1Mbps)



Result:

Frequency	Meter reading	Correction factor	Results
2462 MHz	101.2 dBμV	-1.77 dB	99.43 dBμV

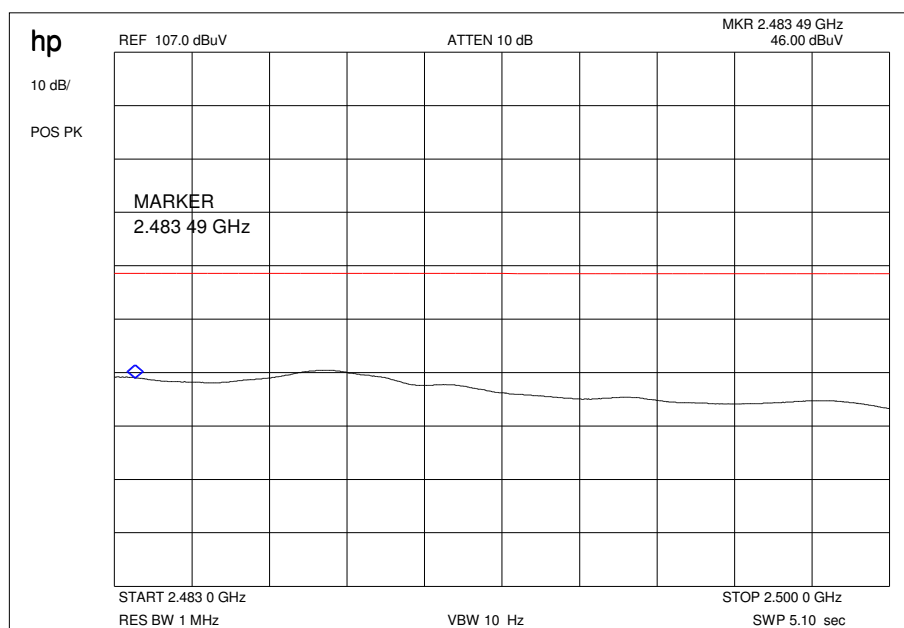
Plot 3: Marker-Delta Method RBW/VBW = 1% of span (b Mode – 1Mbps)



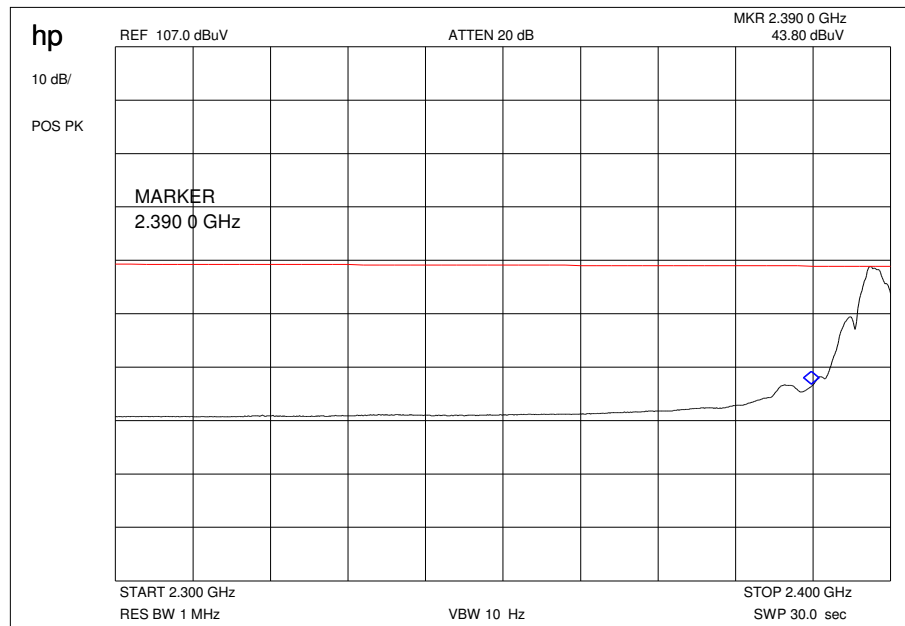
Marker-Delta-Value: 51.40 dB

This measurement was made to show that the behaviour of the system is conform to FCC 15.205 (restricted bands)

Plot 4: Restricted Band low (b Mode – 1Mbps)



Plot 5: Restricted Band high (b Mode – 1Mbps)

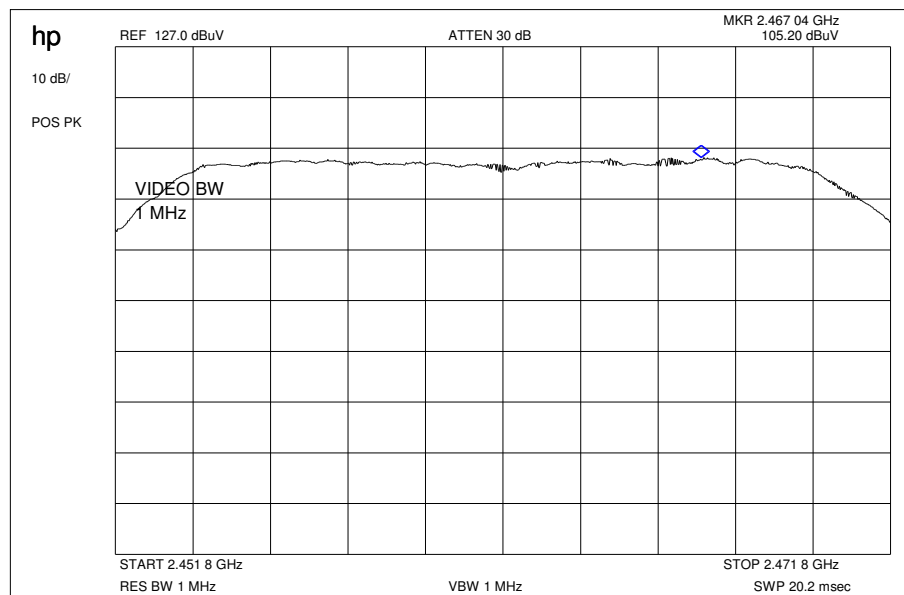
Results & Limits: (b Mode – 1Mbps)

Radiated field strength

The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

high channel	setup	measured value (3m)	correction factor (3m)	calculated value (3m)
Max. peak value	1 MHz RBW 1 MHz VBW	104.70 dB μ V/m	-1.77 dB	102.93 dB μ V/m
Max. average value	1 MHz RBW 10 Hz VBW	101.20 dB μ V/m	-1.77 dB	99.43 dB μ V/m
Delta value	Peak 300 kHz RBW/VBW	51.40 dB		
Value at band edge	limit 54 dB μ V/m			48.03 dB μ V/m
Statement:				Complies

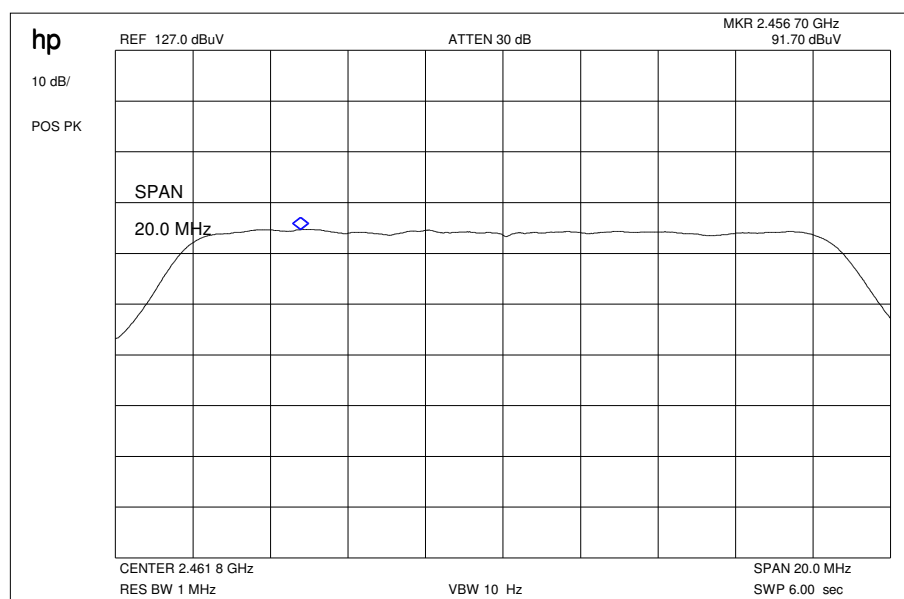
Plot 6: Max field strength in 3m distance (single frequency) peak (g Mode – 54 Mbps)



Result:

Frequency	Meter reading	Correction factor	Results
2462 MHz	105.2 dB μ V	-1.77 dB	103.43 dB μ V

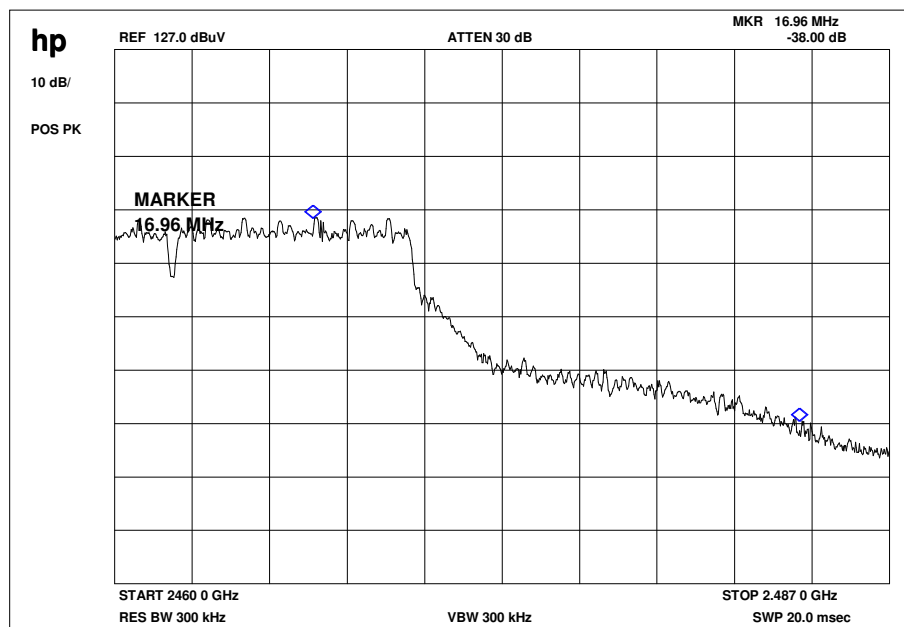
Plot 7: Max field strength in 3m distance (single frequency) average (g Mode – 54 Mbps)



Result:

Frequency	Meter reading	Correction factor	Results
2462 MHz	91.70 dB μ V	-1.77 dB	89.93 dB μ V

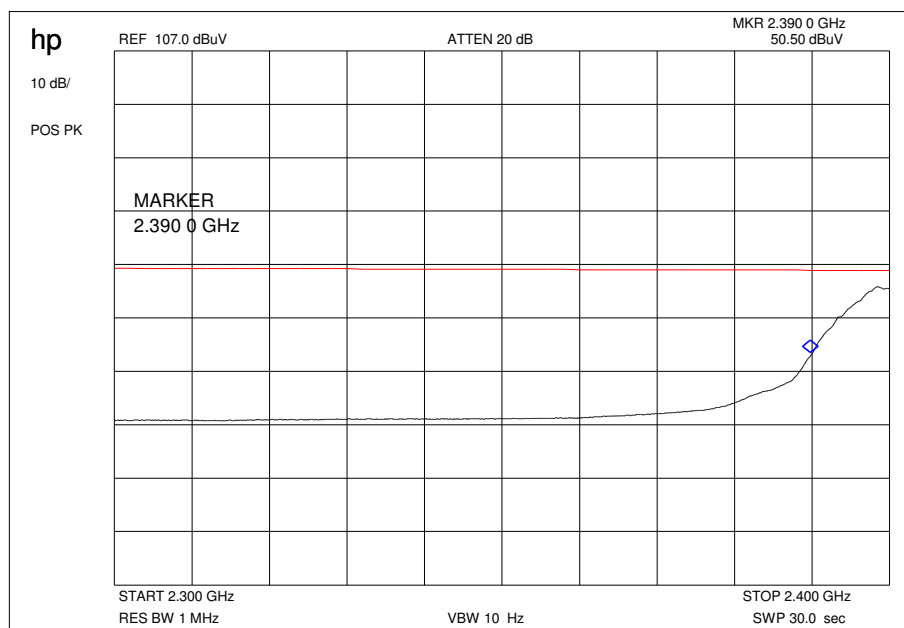
Plot 8: Marker-Delta Method RBW/VBW = 1% of span (g Mode – 54 Mbps)



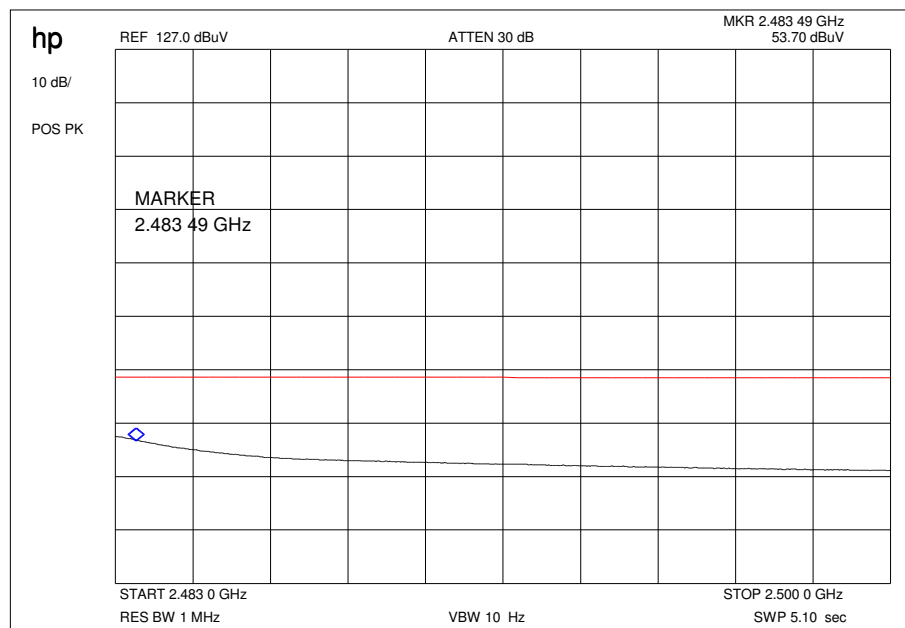
Marker-Delta-Value: 38.00 dB

This measurement was made to show that the behaviour of the system is conform to FCC 15.205 (restricted bands).

Plot 9: Restricted Band low (g Mode – 54 Mbps)



Plot 10: Restricted Band high (g Mode – 54 Mbps)

Results & Limits:

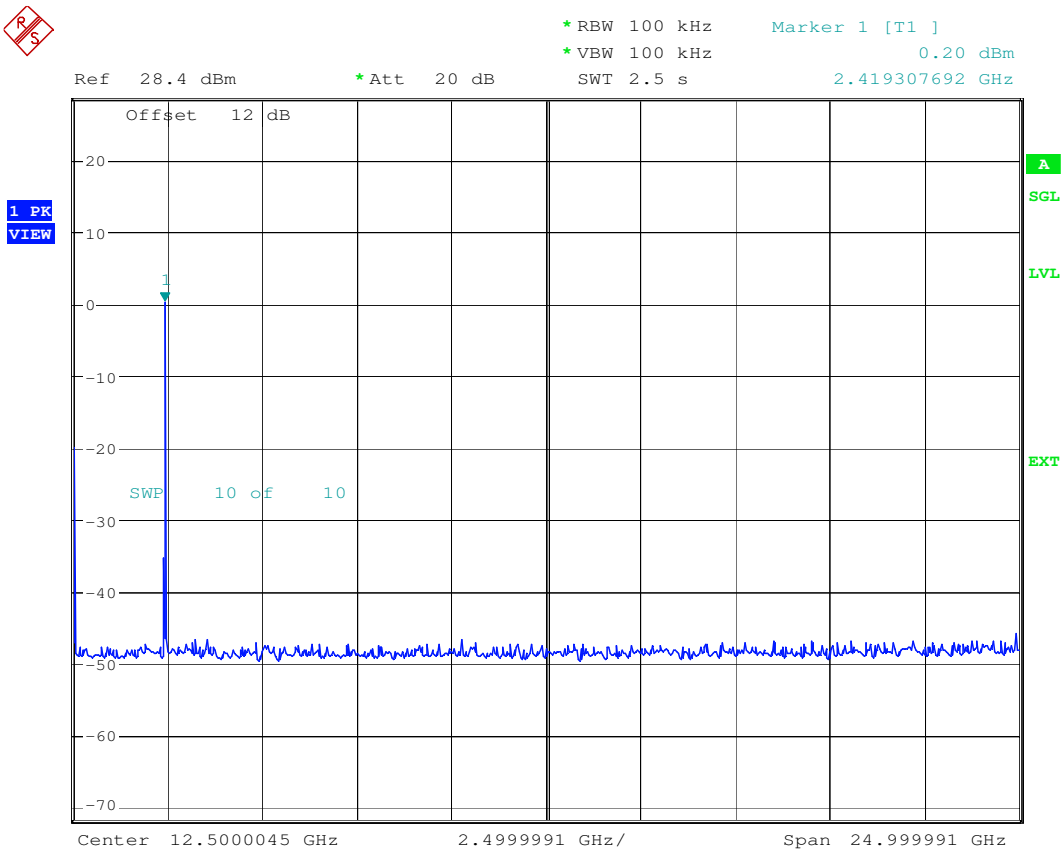
Radiated field strength

The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

high channel	setup	measured value (3m)	correction factor (3m)	calculated value (3m)
Max. peak value	1 MHz RBW 1 MHz VBW	105.2 dB μ V/m	-1.77 dB	103.43 dB μ V/m
Max. average value	1 MHz RBW 10 Hz VBW	91.70 dB μ V/m	-1.77 dB	89.93 dB μ V/m
Delta value	Peak 300 kHz RBW/VBW	38.00 dB		
Value at band edge	limit 54 dB μ V/m			51.93 dB μ V/m
Statement:				Complies

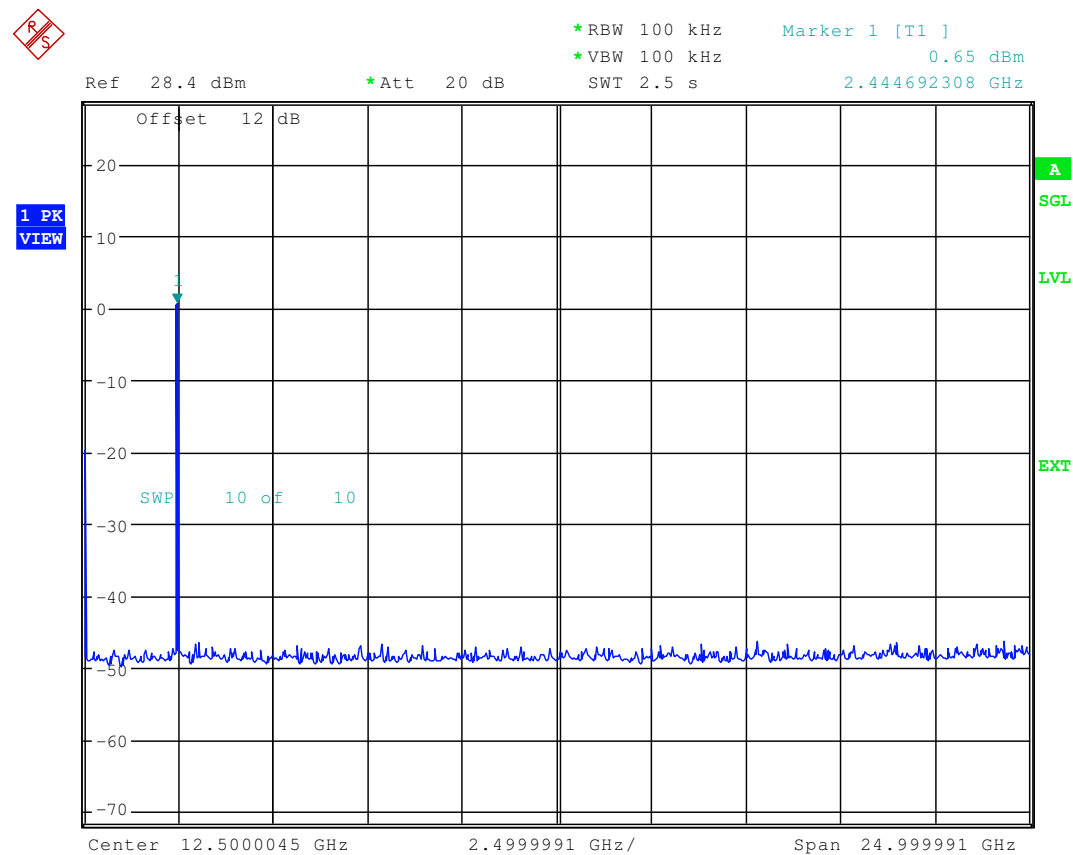
5.11 Spurious Emissions - conducted (Transmitter) §15.247 (c)

Plot 1: (DSSS)

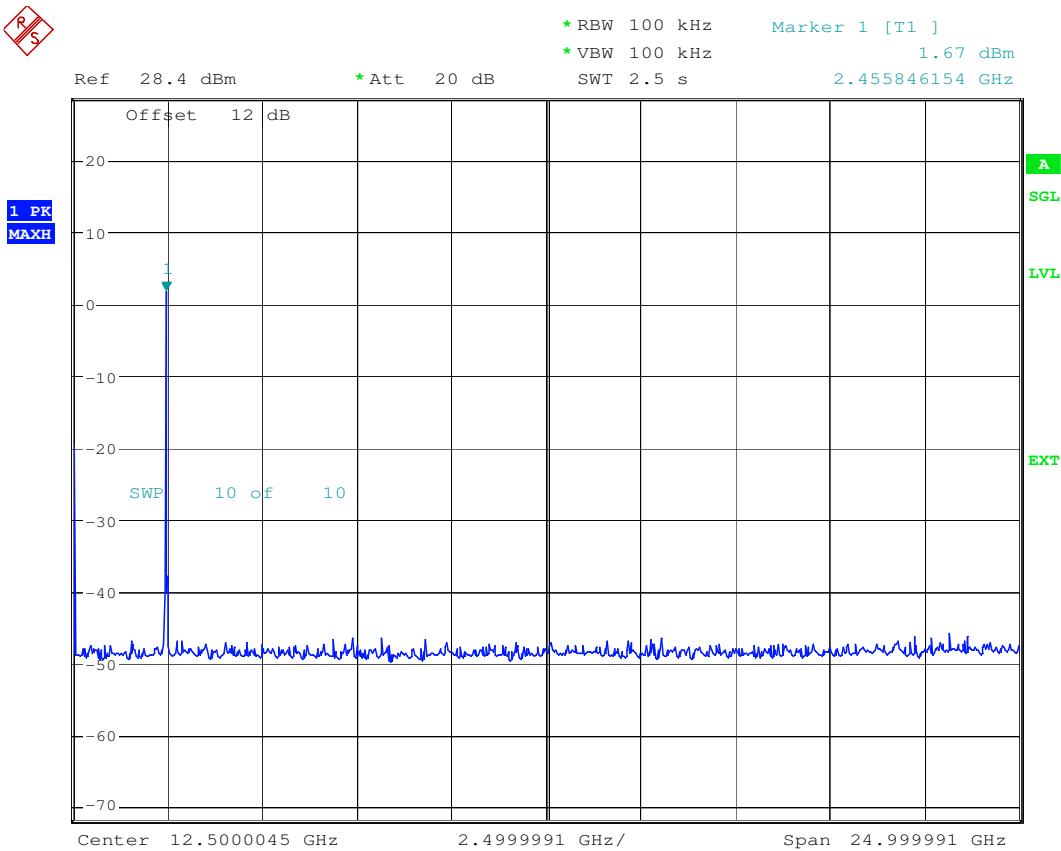


Date: 12.NOV.2007 17:25:45

Plot 2: (DSSS)

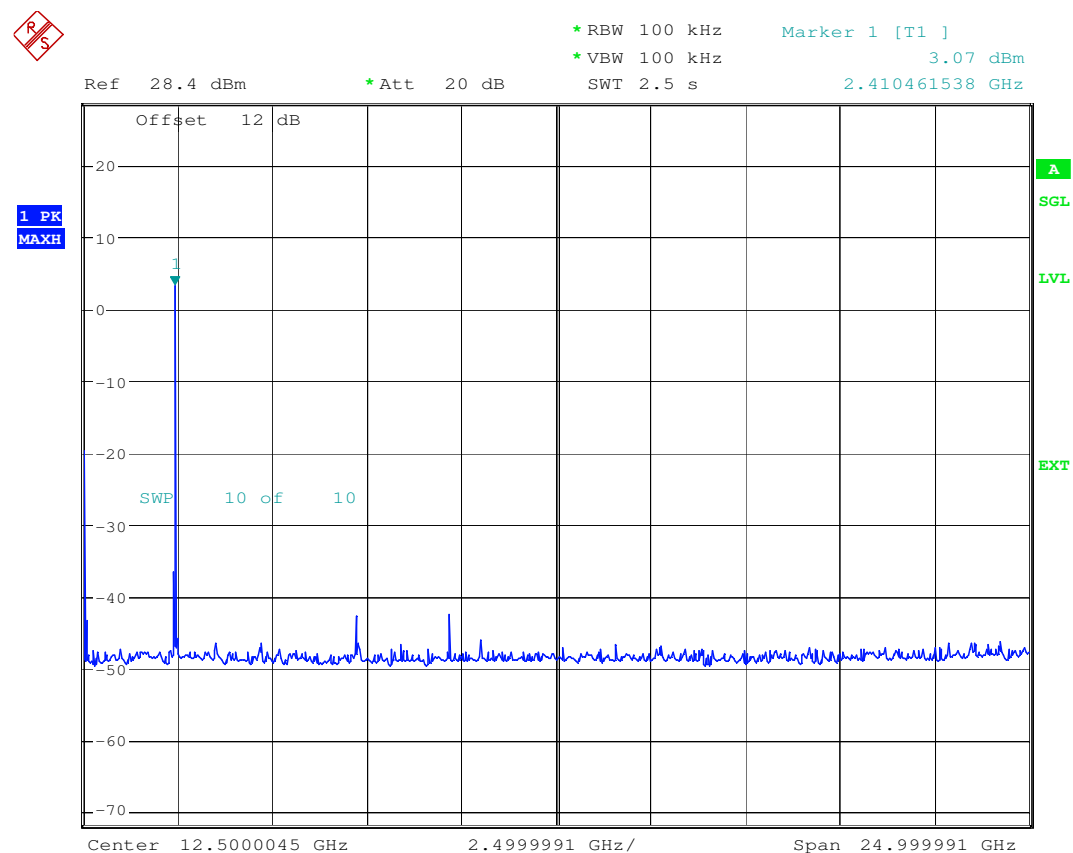


Plot 3: (DSSS)



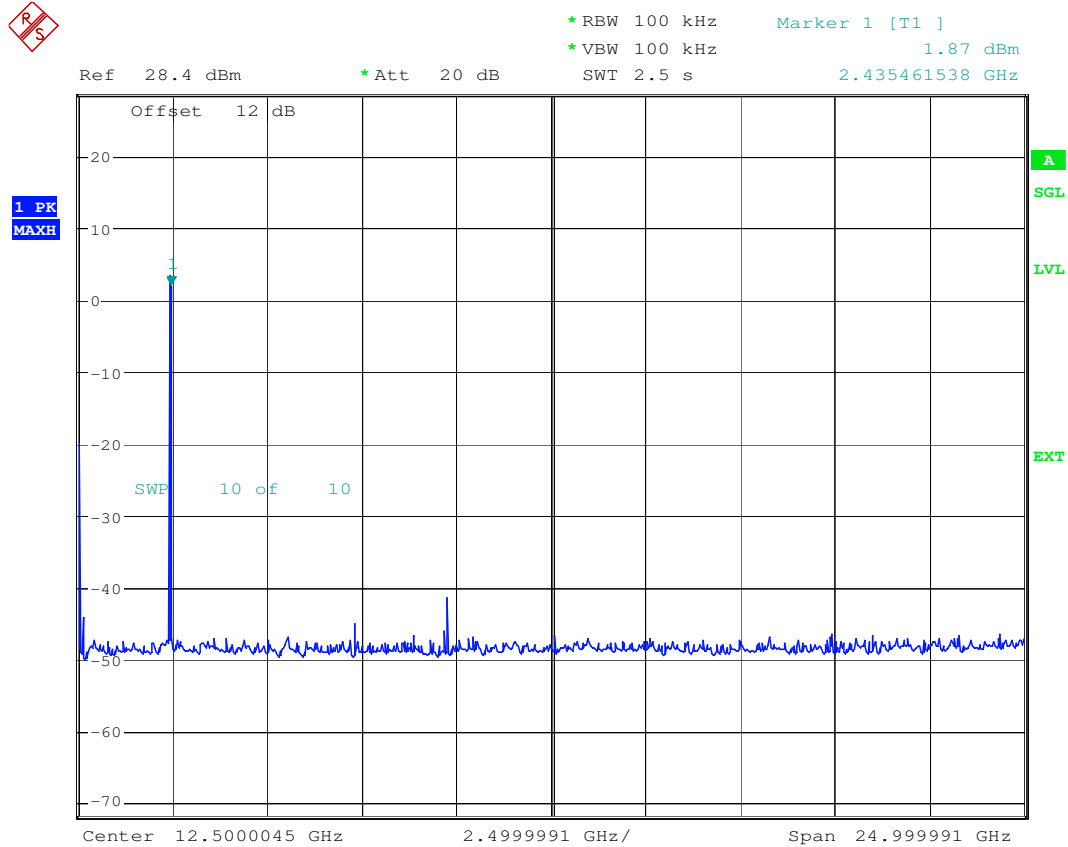
Date: 12.NOV.2007 17:07:37

Plot 4: (OFDM)



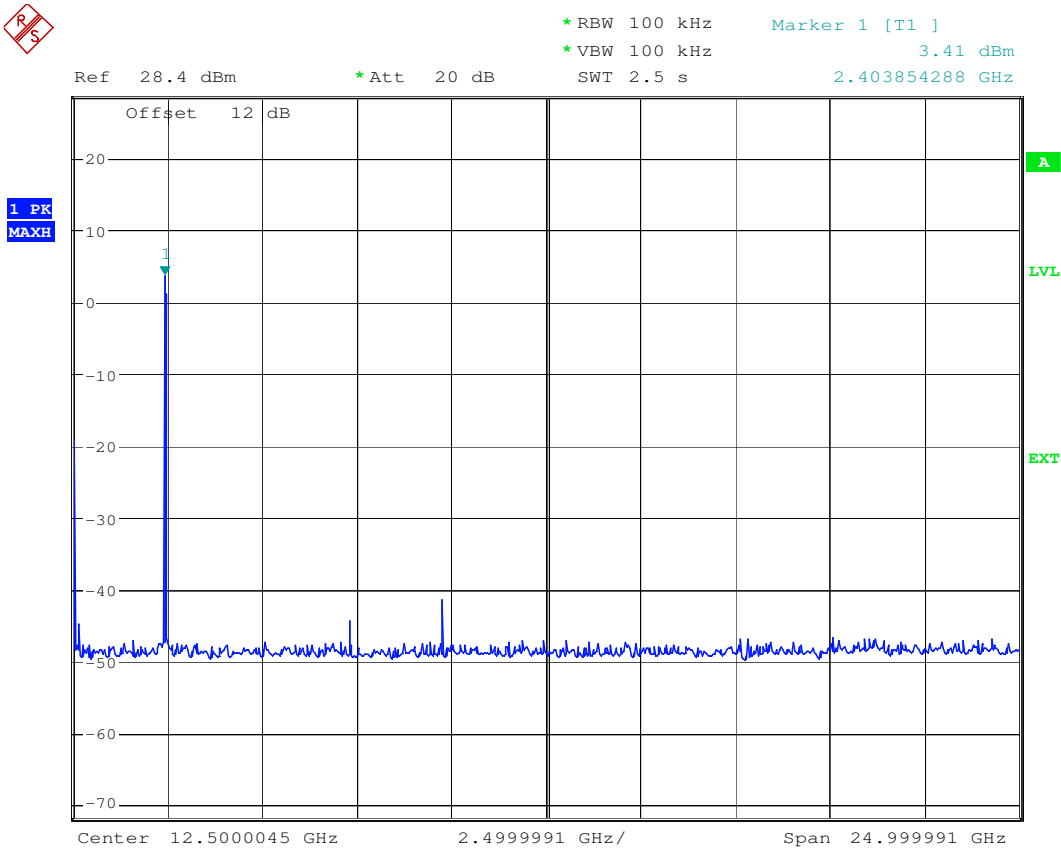
Date: 12.NOV.2007 17:29:00

Plot 5: (OFDM)



Date: 12.NOV.2007 17:30:25

Plot 6: (OFDM)



Date: 12.NOV.2007 17:32:40

Result & Limits:

Emission Limitations					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412			30 dBm	-	Operating frequency
	all peaks > 20	dB below limit	-20 dBc		
2437			30 dBm		Operating frequency
			-20 dBc		
2462			30 dBm		Operating frequency
			-20 dBc		
Measurement uncertainty		± 3dB			

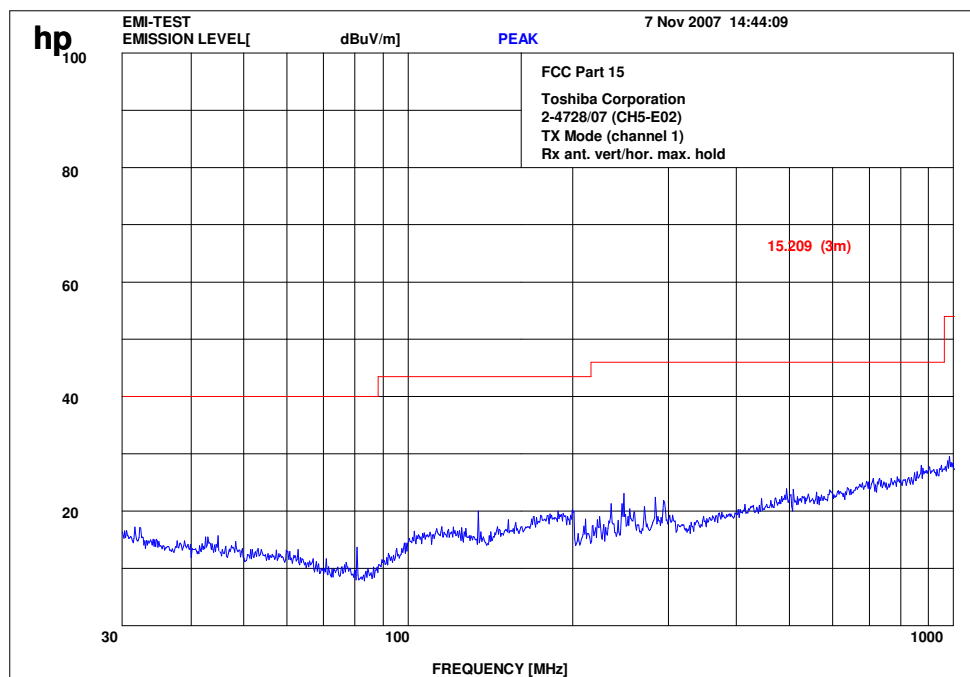
F < 1 GHz: RBW: 100 kHz VBW: 100 kHz
 F > 1 GHz: RBW: 1 MHz VBW: 1 MHz

Under normal test conditions only	In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. 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)).
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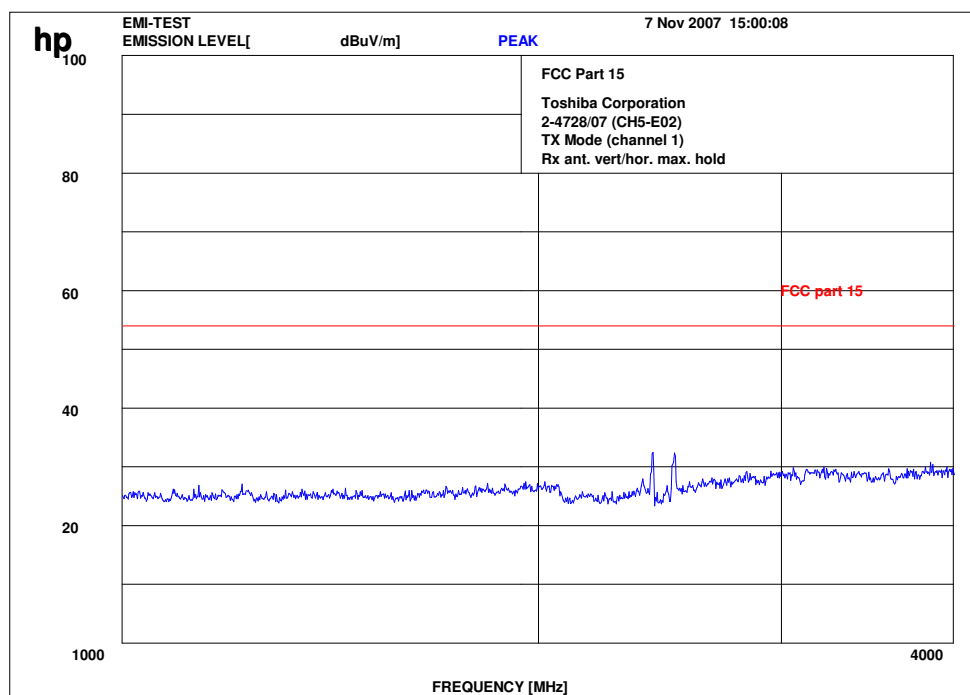
Note: For emissions that fall into restricted bands you find the radiated emissions later in the report.

5.12 Spurious Emissions - radiated (Transmitter) §15.209

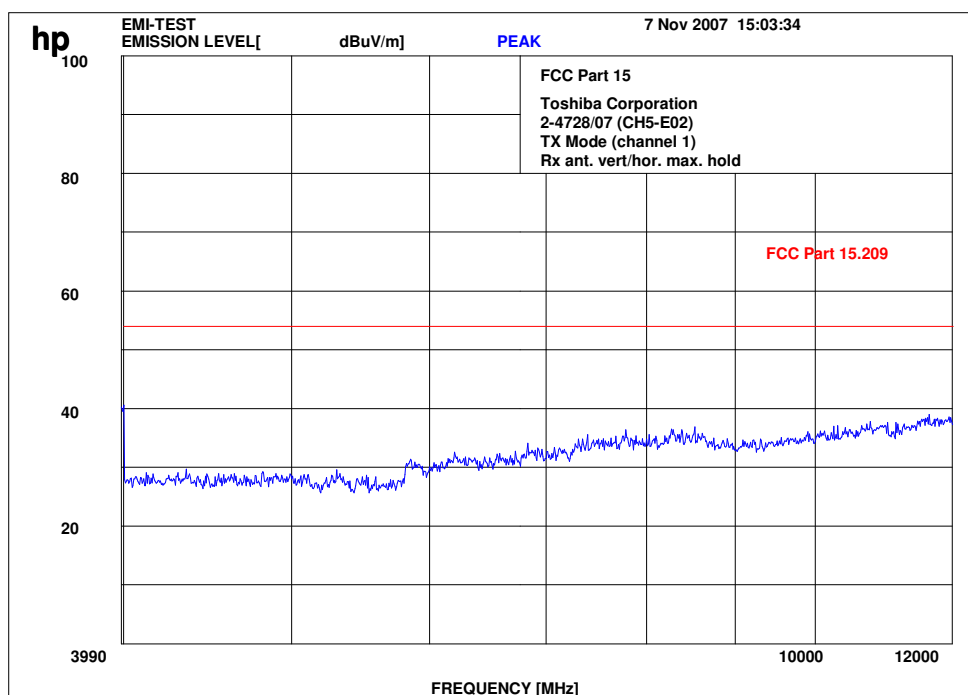
Plot 1: 0.03 - 1 GHz (lowest channel) (b Mode – 1Mbps)



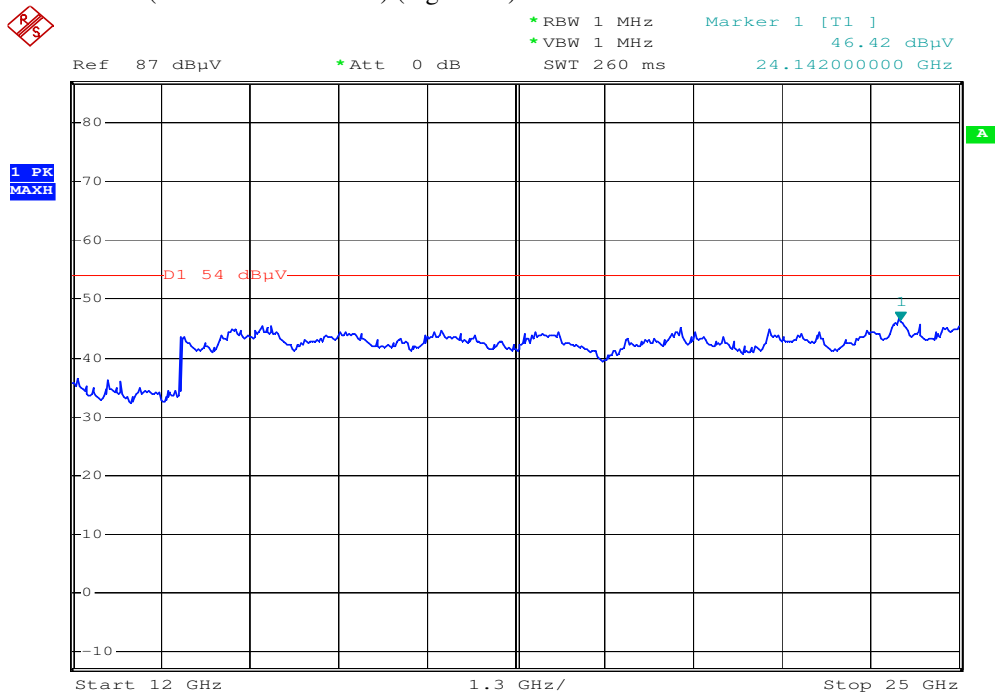
Plot 2: 1 - 4 GHz (lowest channel) (b Mode – 1Mbps) [carrier notched with 2.4 GHz rejection filter]



Plot 3: 4 - 12 GHz (lowest channel) (b Mode – 1Mbps)

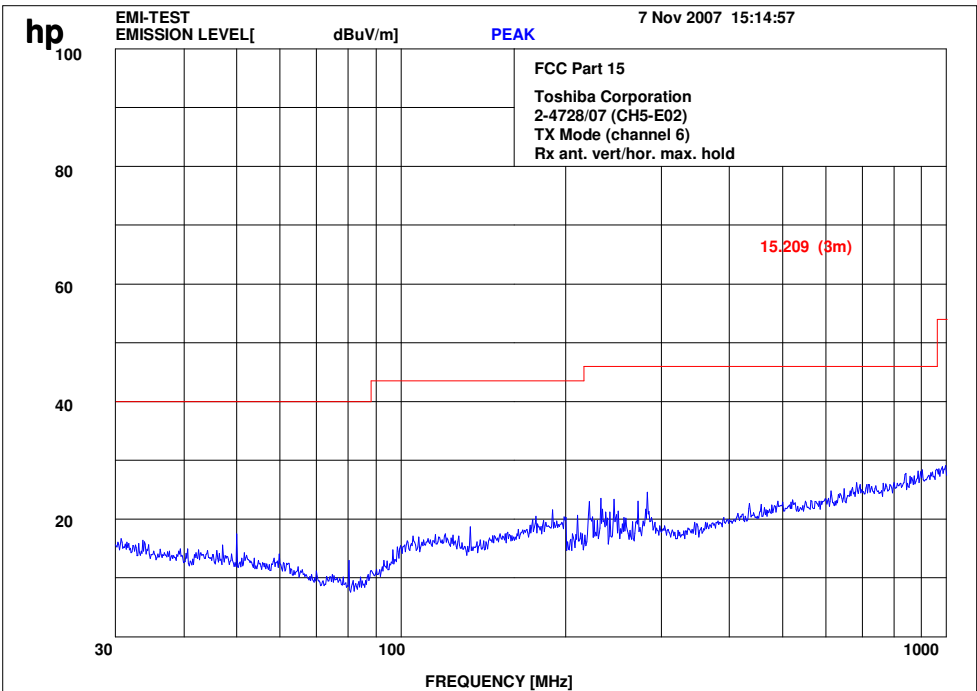


Plot 4: 12 - 25 GHz (valid for all channels) (b/g Mode)

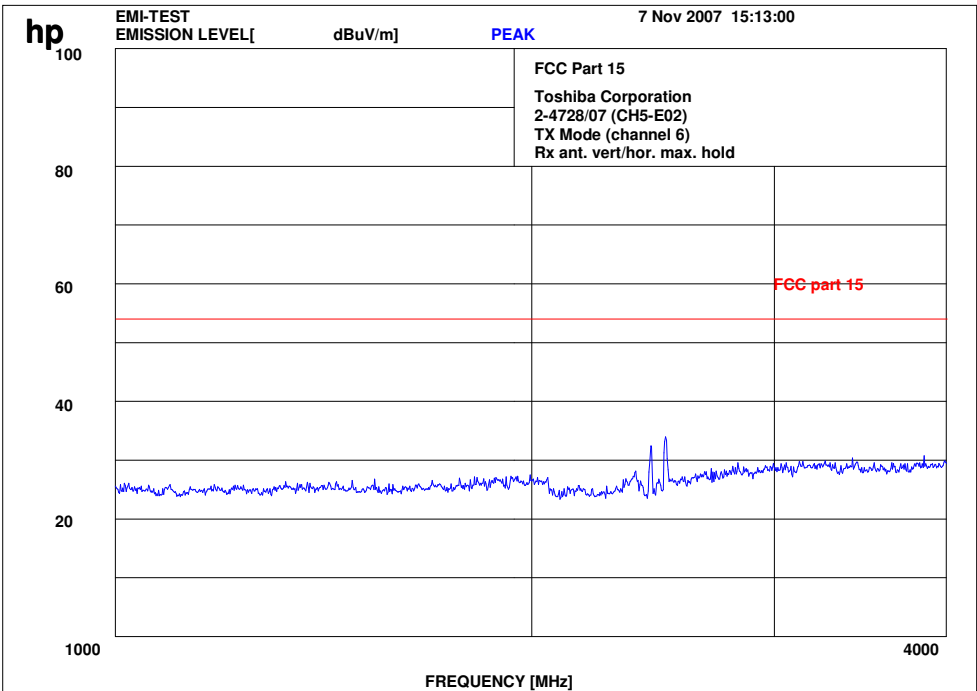


Date: 8.NOV.2007 09:37:10

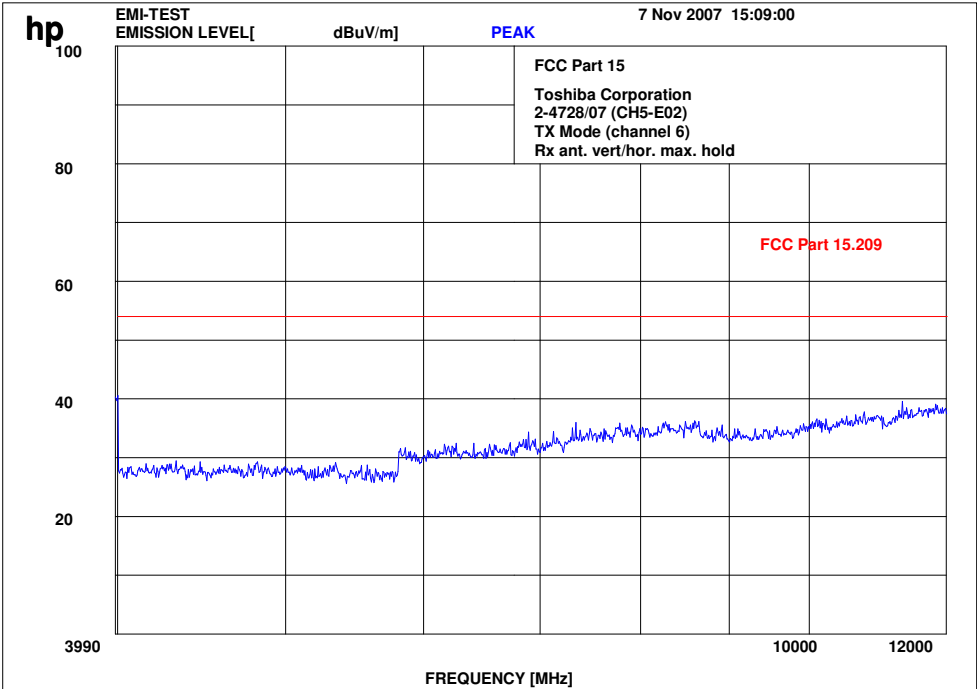
Plot 5: 0.03 - 1 GHz (middle channel) (b Mode – 1Mbps)



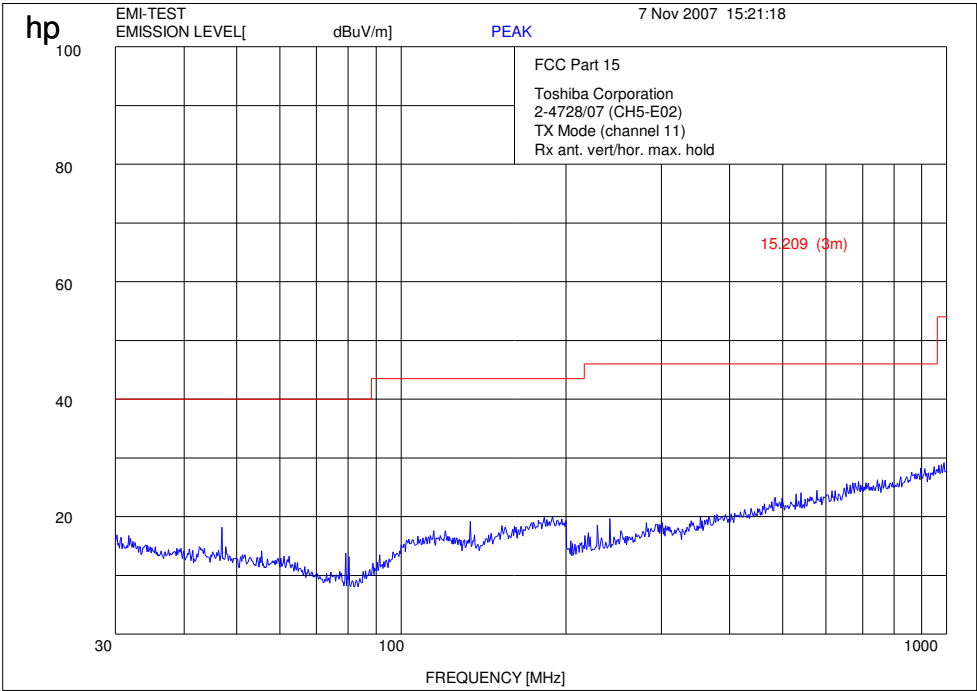
Plot 6: 1 - 4 GHz (middle channel) (b Mode – 1Mbps) [carrier notched with 2.4 GHz rejection filter]



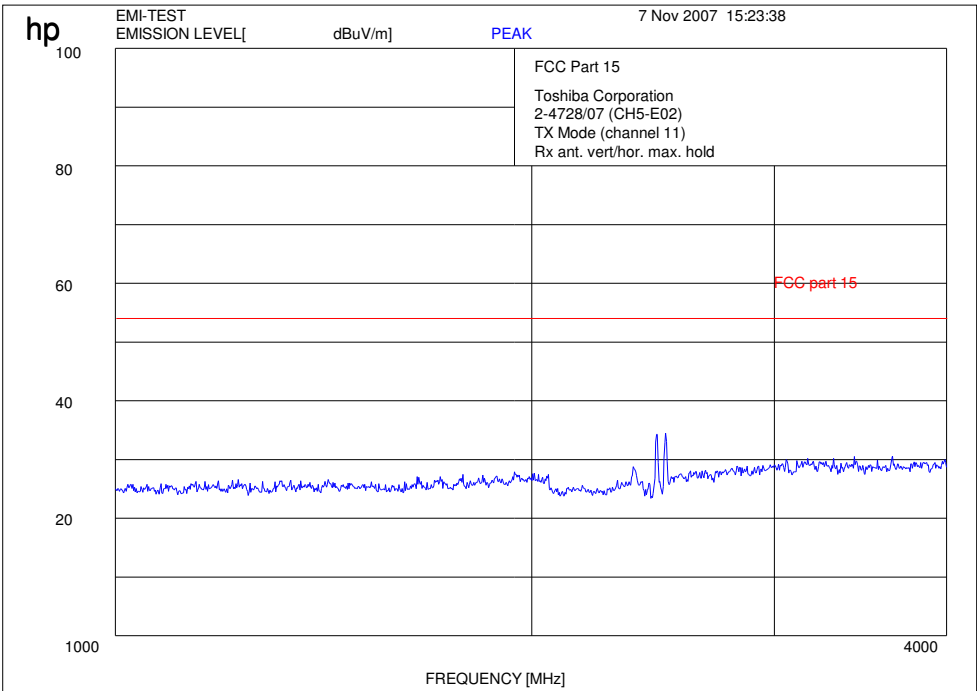
Plot 7: 4 - 12 GHz (middle channel) (b Mode – 1Mbps)



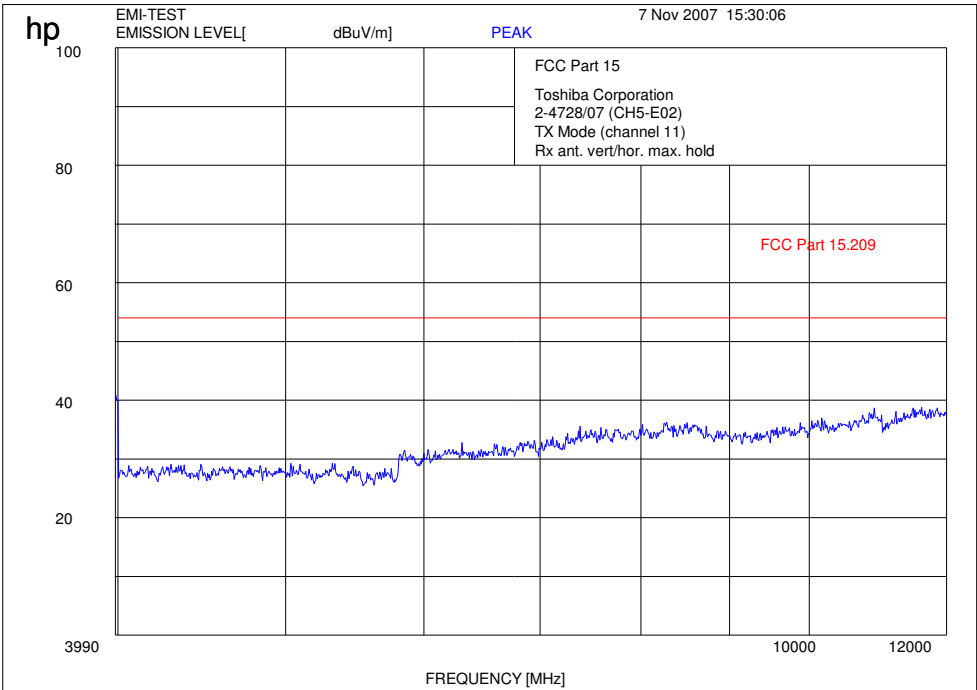
Plot 8: 0.03 - 1 GHz (highest channel) (b Mode – 1Mbps)



Plot 9: 1 - 4 GHz (highest channel) (b Mode – 1Mbps) [carrier notched with 2.4 GHz rejection filter]



Plot 10: 4 - 12 GHz (highest channel) (b Mode – 1Mbps)



Results: (b Mode – 1Mbps)

SPURIOUS EMISSIONS LEVEL §15.209								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBμV/m]	F [MHz]	Detector	Level [dBμV/m]	F [MHz]	Detector	Level [dBμV/m]
No critical peaks found.								
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

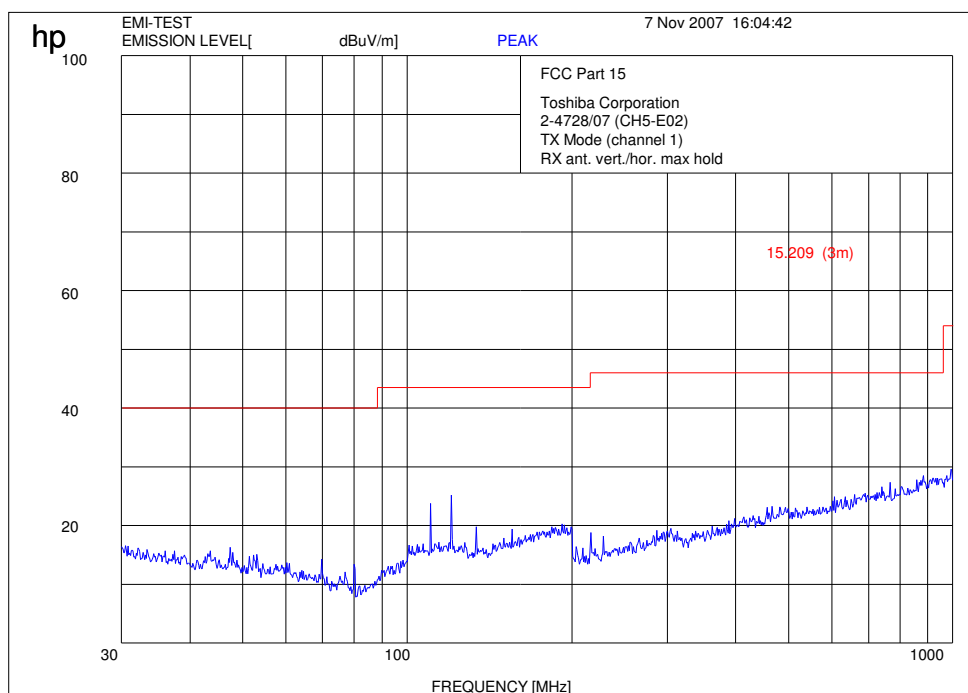
Limits: § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. 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)).

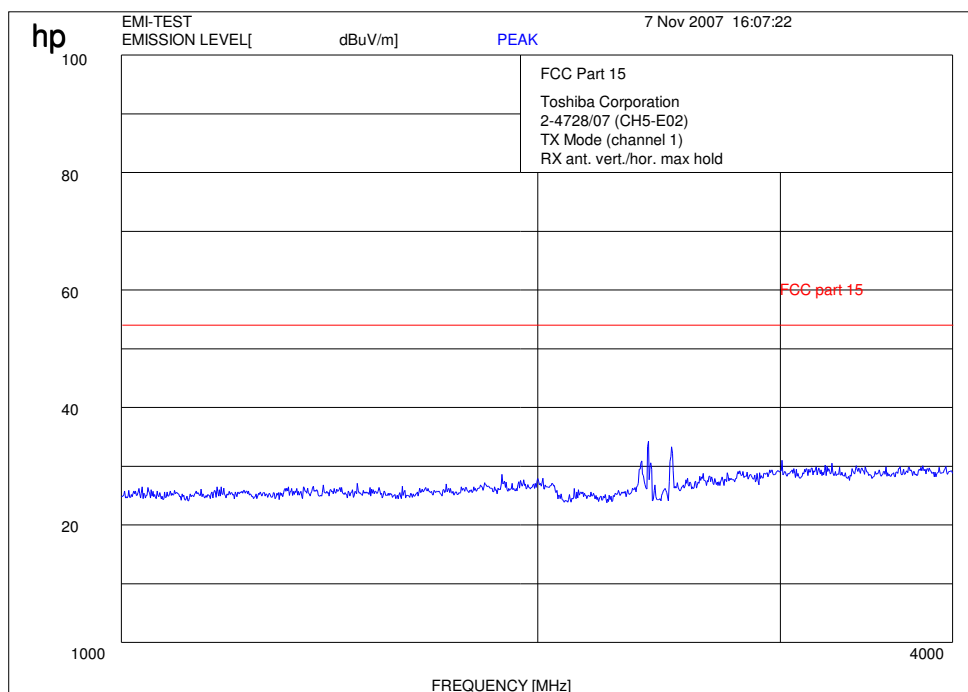
Limits: § 15.209

Frequency [MHz]	Field strength [μV/m]	Measurement distance (m)
30 - 88	100 (40 dBμV/m)	3
88 - 216	150 (43.5 dBμV/m)	3
216 - 960	200 (46 dBμV/m)	3
above 960	500 (54 dBμV/m)	3

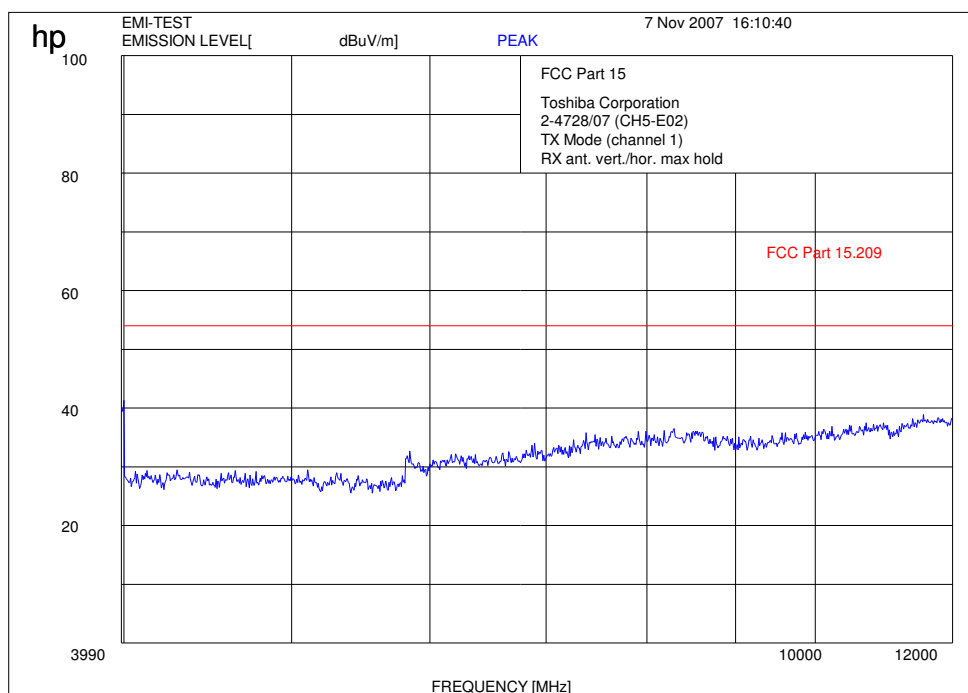
Plot 11: 0.03 - 1 GHz (lowest channel) (g Mode – 54 Mbps)



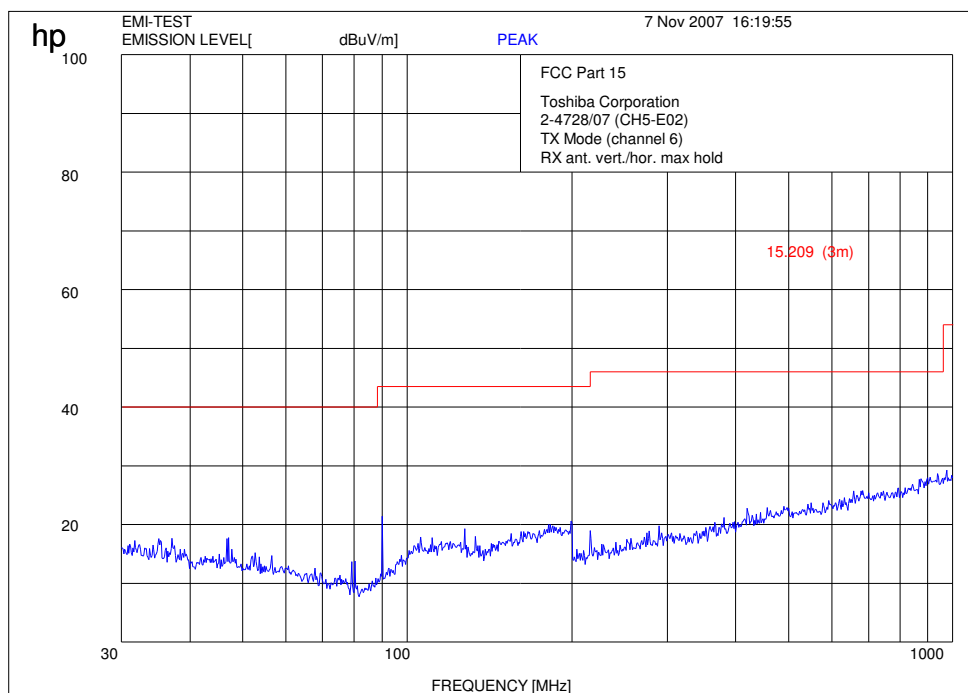
Plot 12: 1 - 4 GHz (lowest channel) (g Mode – 54 Mbps) [carrier notched with 2.4 GHz rejection filter]



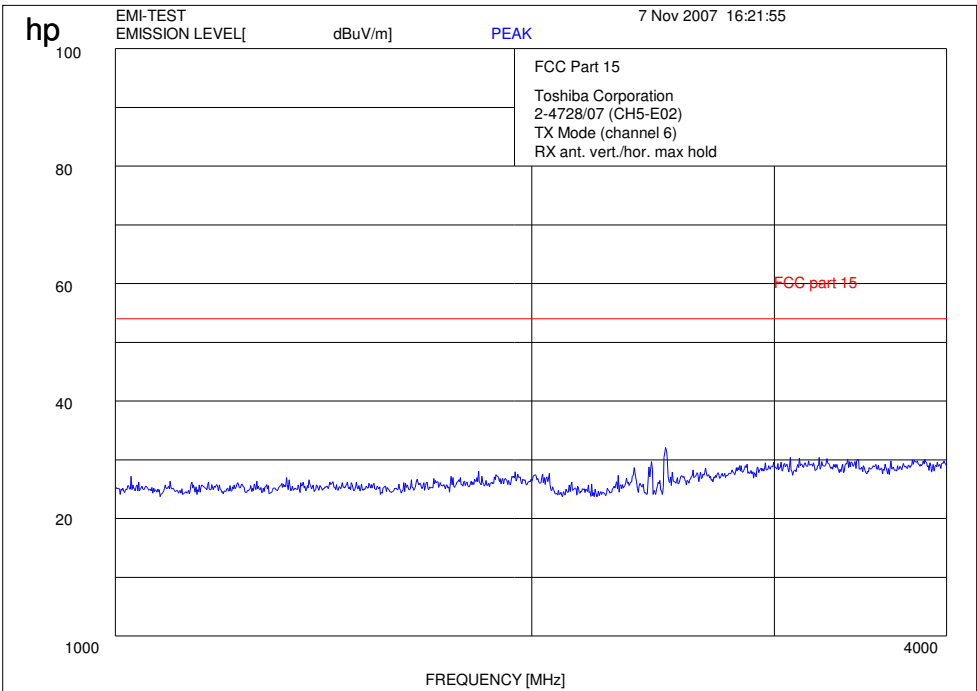
Plot 13: 4 - 12 GHz (lowest channel) (g Mode – 54 Mbps)



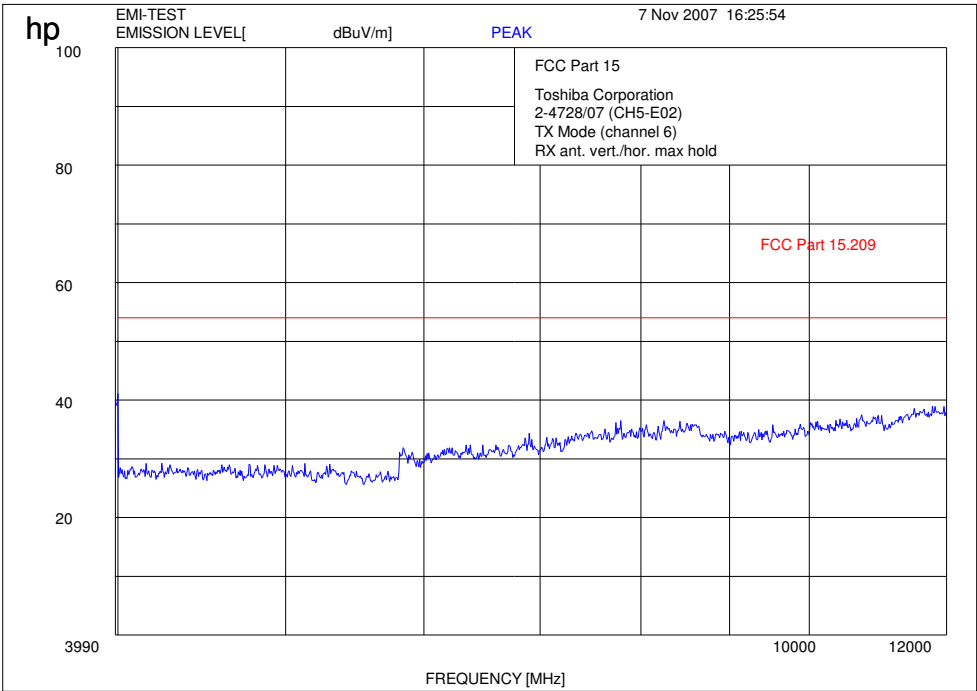
Plot 14: 0.03 - 1 GHz (middle channel) (g Mode – 54 Mbps)



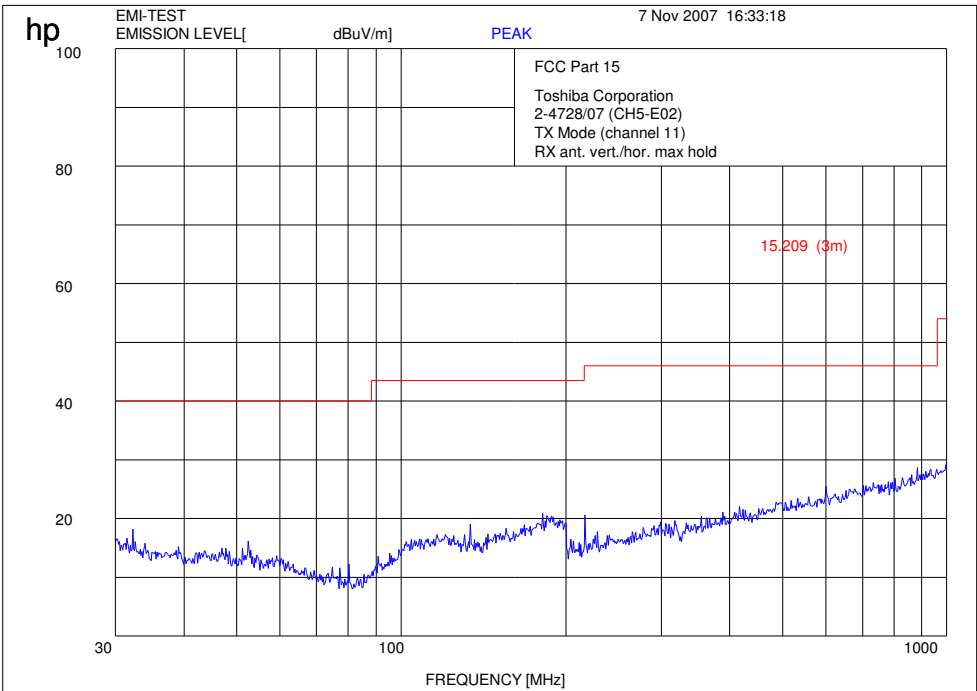
Plot 15: 1 - 4 GHz (middle channel) (g Mode – 54 Mbps) [carrier notched with 2.4 GHz rejection filter]



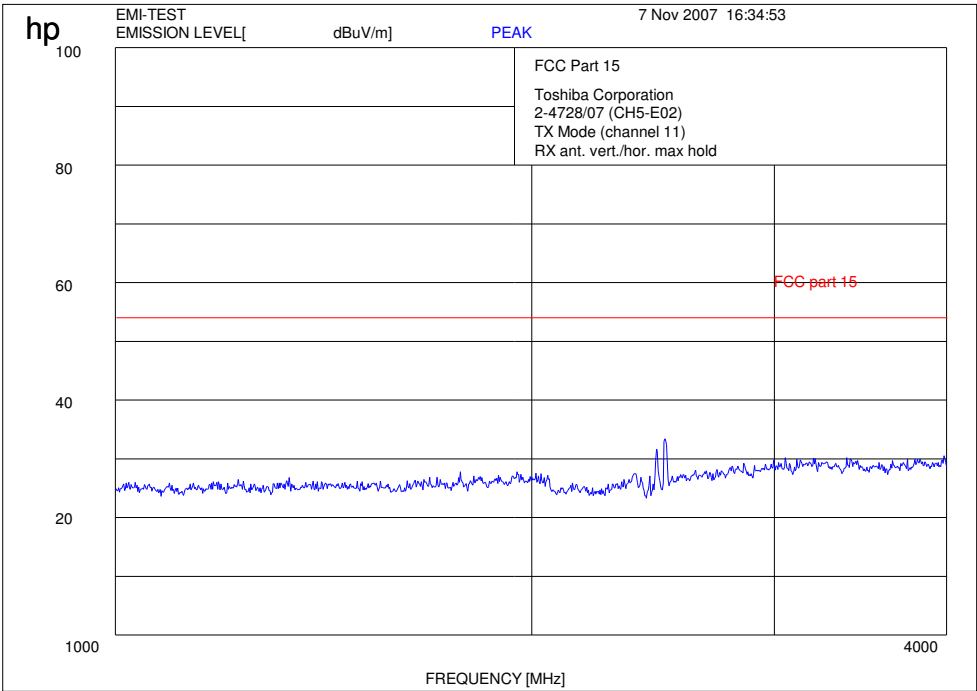
Plot 16: 4 - 12 GHz (middle channel) (g Mode – 54 Mbps)



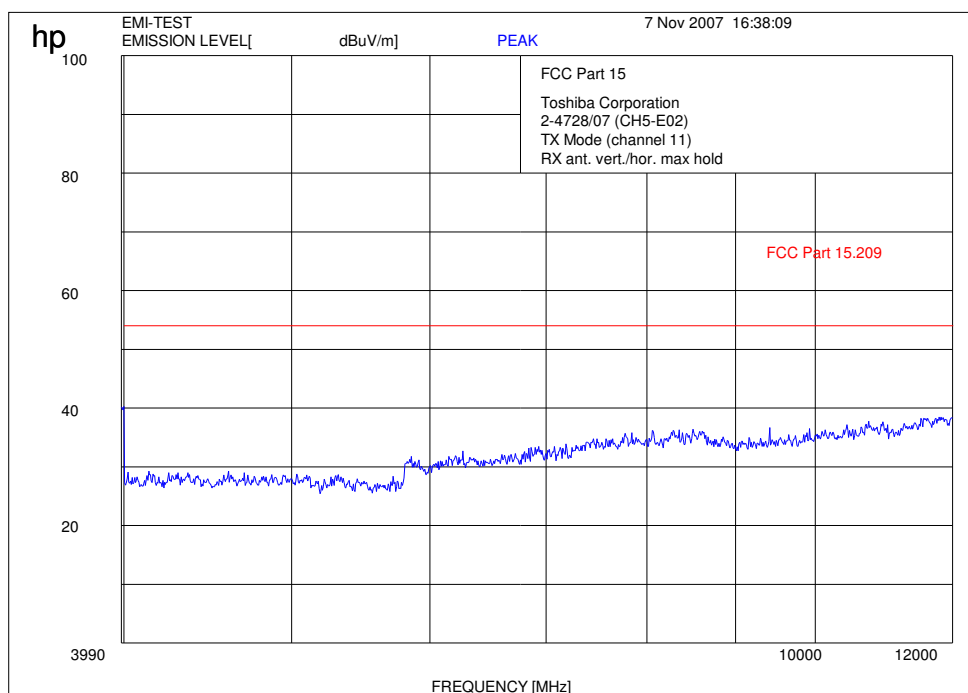
Plot 17: 0.03 - 1 GHz (highest channel) (g Mode – 54 Mbps)



Plot 18: 1 - 4 GHz (highest channel) (g Mode – 54 Mbps) [carrier notched with 2.4 GHz rejection filter]



Plot 19: 4 - 12 GHz (highest channel) (g Mode – 54 Mbps)



Results: (g Mode – 54 Mbps)

SPURIOUS EMISSIONS LEVEL § 15.209								
2412 MHz			2437 MHz			2462 MHz		
F [MHz]	Detector	Level [dBμ V/m]	F [MHz]	Detector	Level [dBμ V/m]	F [MHz]	Detector	Level [dBμ V/m]
No critical peaks found.								
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

Limits: § 15.247 (c)

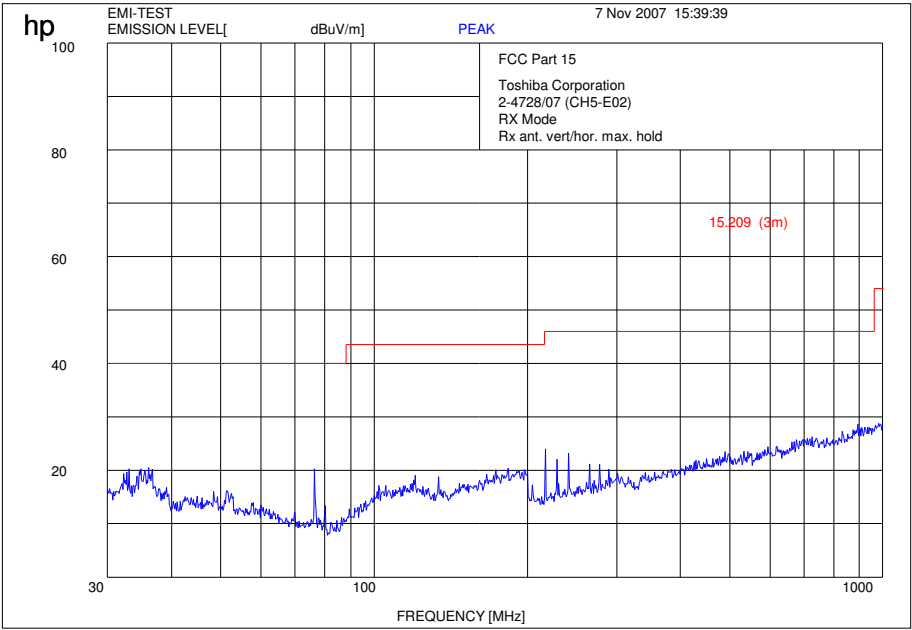
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Limits: § 15.209

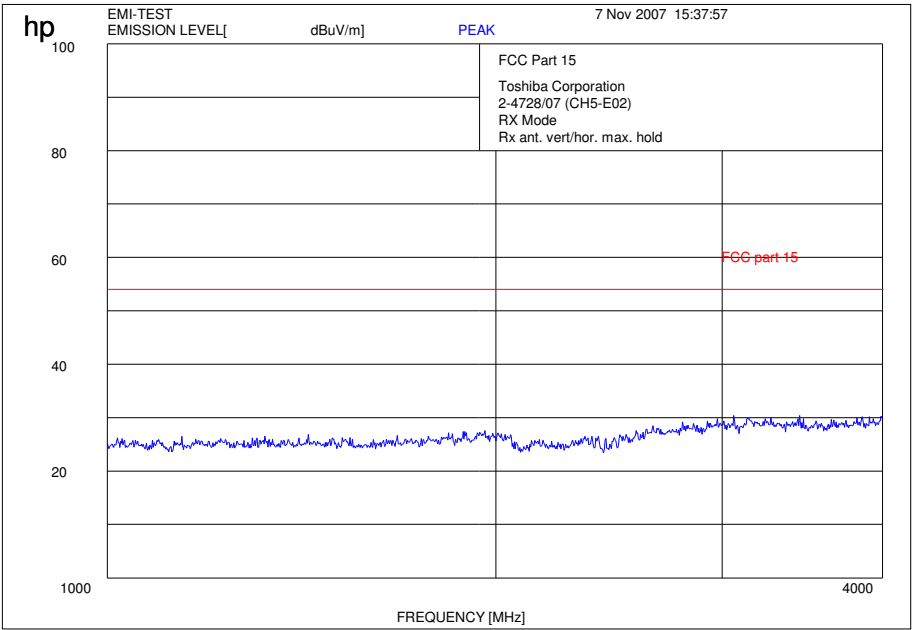
Frequency [MHz]	Field strength [μV/m]	Measurement distance (m)
30 - 88	100 (40 dBμV/m)	3
88 - 216	150 (43.5 dBμV/m)	3
216 - 960	200 (46 dBμV/m)	3
above 960	500 (54 dBμV/m)	3

5.13 Spurious Emissions - radiated (Receiver) §15.109 / 209

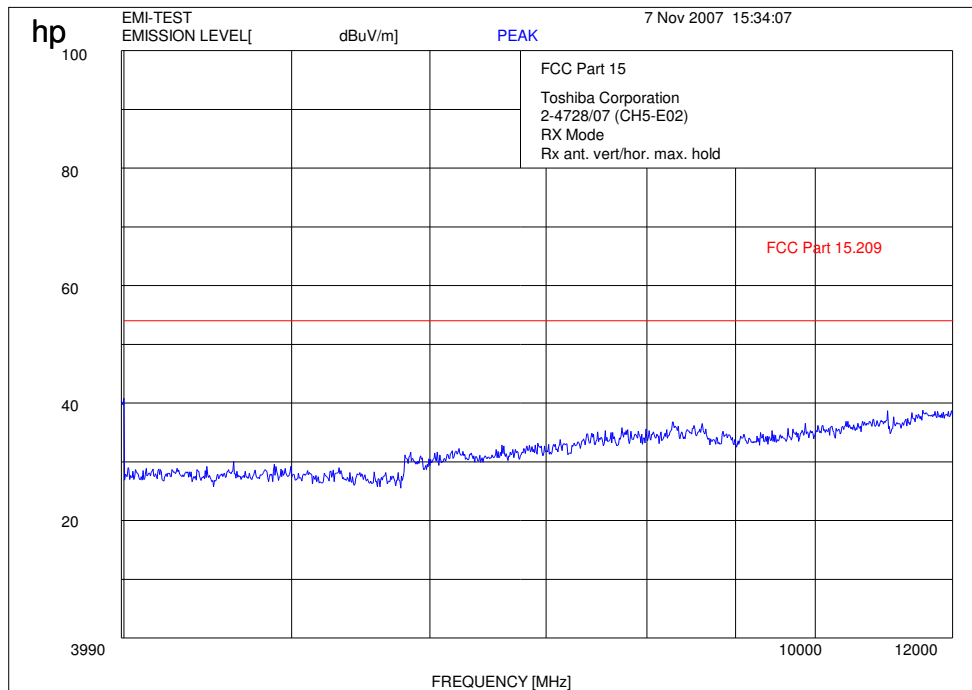
Plot 1: 0.03 - 1 GHz (receiver) (b/g Mode)



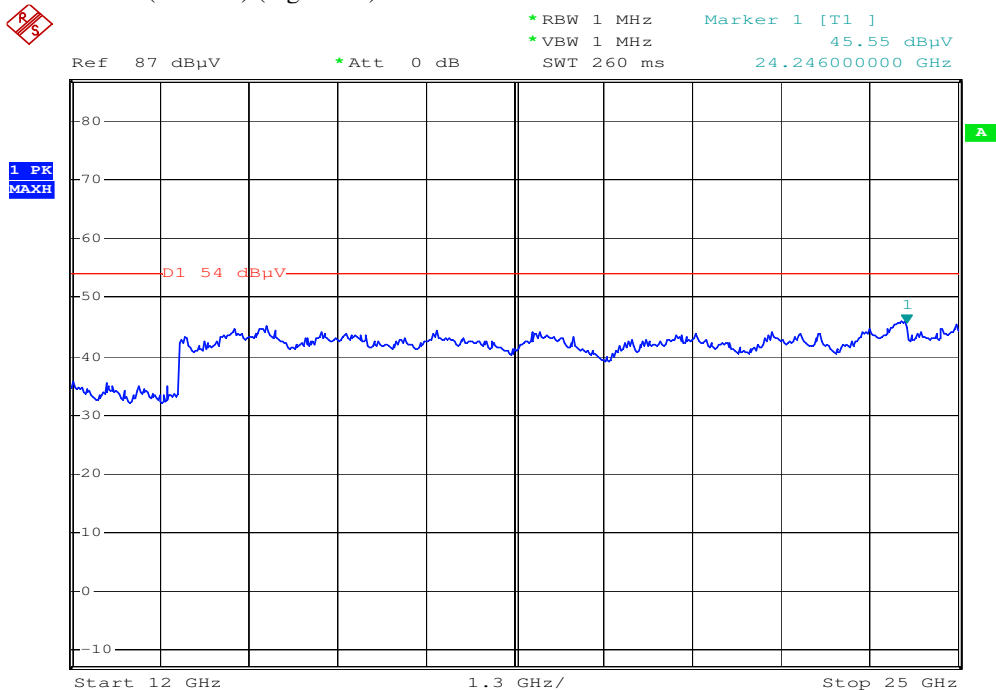
Plot 2: 1 - 4 GHz (receiver) (b/g Mode)



Plot 3: 4 - 12 GHz (receiver) (b/g Mode)



Plot 4: 12 - 25 GHz (receiver) (b/g Mode)



Date: 8.NOV.2007 09:38:32

Results:

Spurious Emissions level [dB μ V/m]		
f[MHz]	Detector	Level [dB μ V/m]
No critical peaks found.		
Measurement uncertainty		± 3 dB

f < 1 GHz : RBW/VBW: 100 kHz

f $\geq$ 1GHz : RBW/VBW: 1 MHz

See above plots

Measurement distance see table

Limits: § 15.109 / 209

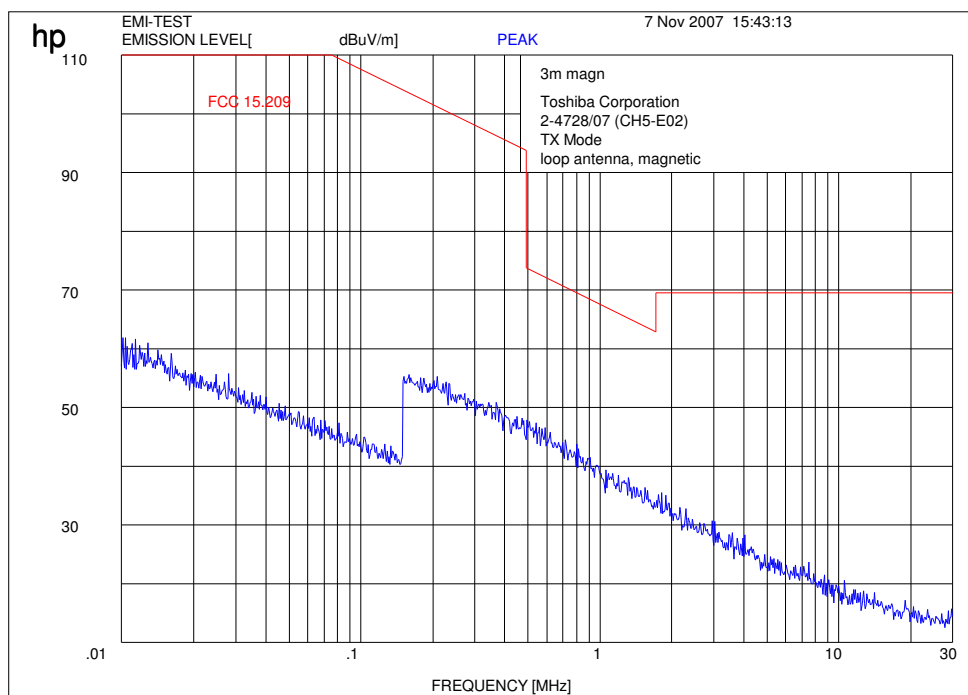
Frequency (MHz)	Field strength (μ V/m)	Measurement distance (m)
30 - 88	100 (40 dB μ V/m)	3
88 - 216	150 (43.5 dB μ V/m)	3
216 - 960	200 (46 dB μ V/m)	3
above 960	500 (54 dB μ V/m)	3

5.14 Spurious Emissions - radiated <30 MHz §15.209

Measured at 10 m distance.

Values recalculated with 40 dB/decade according to FCC rules.

Plot 1: OFDM Mode

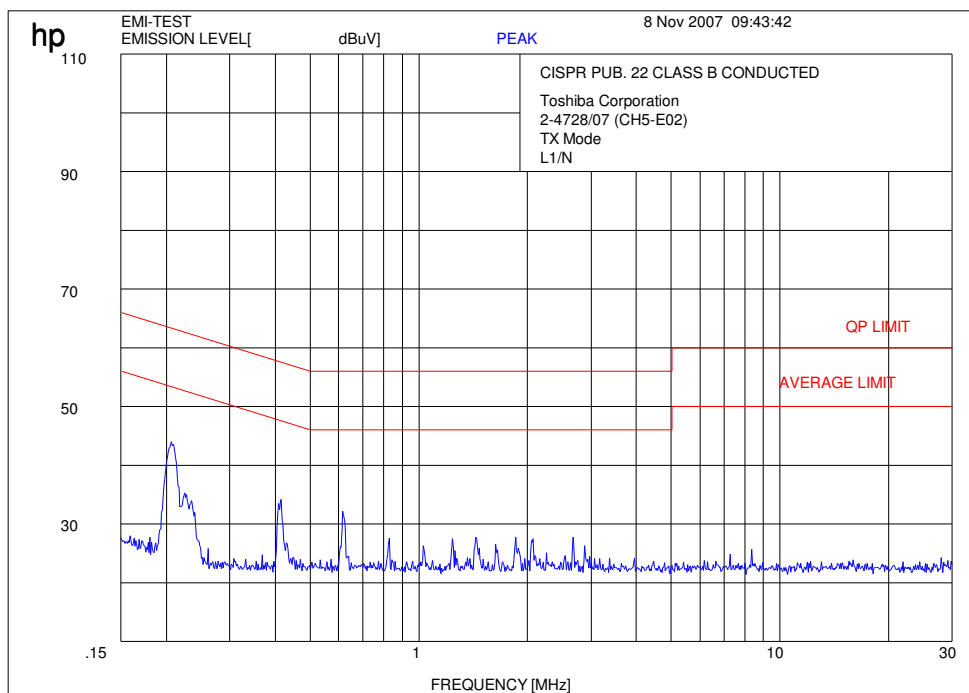


Limits:

Frequency (MHz)	Field strength (μ V/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30 / 29.5 dB μ V/m	30
30 - 88	100 / 40 dB μ V/m	3
88 - 216	150 / 43.5 dB μ V/m	3
216 - 960	200 / 46 dB μ V/m	3
above 960	54 dB μ V/m	3

5.15 Conducted Emissions <30 MHz §15.107/207

Plot 1: CISPR 22 – OFDM Mode



We measured in TX and RX mode, L1 and N floating and grounded, max value was hold.

Limits:

Under normal test conditions only	See plots
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6 Test equipment and ancillaries used for tests

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

Anechoic chamber C:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Anechoic chamber	MWB	87400/02	300000996	Monthly verification		
2	System-Rack 85900	HP I.V.	*	300000222	n.a.		
3	Measurement System 1						
4	Spektrum Analyzer 8566B	HP	2747A05306	300001000	05.10.2006	24	05.10.2008
5	Spektrum Analyzer Display 85662A	HP	2816A16541	300002297	05.10.2006	24	05.10.2008
6	Quasi-Peak-Adapter 85650A	HP	2811A01131	300000999	05.10.2006	24	05.10.2008
7	RF-Preselector 85685A	HP	2837A00779	300000218	08.11.2006	24	08.11.2008
8	PC Vectra VL	HP		300001688	n.a.		
9	Software EMI	HP		300000983	n.a.		
10	Measurement System 2						
11	FSP 30	R&S	100623	ICT 300003464	26.10.2006	12	15.10.2009
12	PC	F+W			n.a.		
13	TILE	TILE			n.a.		
14	Biconical antenna	EMCO	S/N: 860 942/003		Monthly verification (System cal.)		
15	Log. Period. Antenna 3146	EMCO	2130	300001603	Monthly verification (System cal.)		
16	Double Ridged Antenna HP 3115P	EMCO	3088	300001032	Monthly verification (System cal.)		
17	Active Loop Antenna 6502	EMCO	2210	300001015	Monthly verification (System cal.)		
18	Power Supply 6032A	HP	2818A03450	300001040	12.05.2007	36	12.05.2010
19	Busisolator	Kontron		300001056	n.a.		
20	Leitungsteiler 11850C	HP		300000997	Monthly verification (System cal.)		
21	Power attenuator 8325	Byrd	1530	300001595	Monthly verification (System cal.)		
22	Band reject filter WRCG1855/1910	Wainwright	7	300003350	Monthly verification (System cal.)		
23	Band reject filter WRCG2400/2483	Wainwright	11	300003351	Monthly verification (System cal.)		

Bluetooth Rack:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	FSP 30	R&S		300003575	02.04.2007	24	02.04.2009
2	CBT	R&S	100313	300003516	24.10.2006	24	24.10.2008
3	Switch Matrix	HP		300000929	n.a.		
4	Power Supply	HP	3041A00544	300002270	13.05.2007	36	13.05.2010
5	Signal Generator	R&S	836206/0092	300002680	30.05.2007	36	30.05.2010

Signaling Units:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	CBT	R&S	100313	300003516	24.10.2006	24	24.10.2008
2	CBT	R&S	100185	300003416	21.02.2006	24	21.02.2008
3	CMU-200	R&S	103992	300003231	27.04.2007	12	27.04.2008
4	CMU-200	R&S	106240	300003321	02.05.2006	24	02.05.2008

SRD Laboratory Room 002:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	System Controller PSM 12	R&S	835259/007	3000002681-00xx	n.a.		
2	Memory Extension PSM-K10	R&S	To 1	3000002681	n.a.		
3	Operating Software PSM-B2	R&S	To 1	3000002681	n.a.		
4	19" Monitor		22759020-ED	3000002681	n.a.		
5	Mouse		LZE 0095/6639	3000002681	n.a.		
6	Keyboard		G00013834L 461	3000002681	n.a.		
7	Spectrum Analyser FSIQ 26	R&S	835540/018	3000002681-0005	01.08.2006	24	01.08.2008
8	Tracking Generator FSIQ-B10	R&S	835107/015	3000002681	s.No.7		
10	RF-Generator SMIQ03 (B1 Signal)	R&S	835541/056	3000002681-0002	01.08.2006	36	01.08.2009
11	Modulation Coder SMIQ-B20	R&S	To 10	3000002681	s.No.10		
12	Data Generator SMIQ-B11	R&S	To 10	3000002681	s.No.10		
13	RF Rear Connection SMIQ-B19	R&S	To 10	3000002681	s.No.10		
14	Fast CPU SM-B50	R&S	To 10	3000002681	s.No.10		
15	FM Modulator SM-B5	R&S	835676/033	3000002681	s.No.10		
16	RF-Generator SMIQ03 (B2 Signal)	R&S	835541/055	3000002681-0001	01.08.2006	36	01.08.2009
17	Modulation Coder SMIQ-B20	R&S	To 16	3000002681	s.No.16		
18	Data Generator SMIQ-B11	R&S	To 16	3000002681	s.No.16		
19	RF Rear Connection SMIQ-B19	R&S	To 16	3000002681	s.No.16		
20	Fast CPU SM-B50	R&S	To 16	3000002681	s.No.16		
21	FM Modulator SM-B5	R&S	836061/022	3000002681	s.No.16		
22	RF-Generator SMP03 (B3 Signal)	R&S	835133/011	3000002681-0003	01.08.2006	36	01.08.2009
23	Attenuator SMP-B15	R&S	835136/014	3000002681	S.No.22		
24	RF Rear Connection SMP-B19	R&S	834745/007	3000002681	S.No.22		
25	Power Meter NRVD	R&S	835430/044	3000002681-0004	01.08.2006	24	01.08.2008
26	Power Sensor NRVD-Z1	R&S	833894/012	3000002681-0013	01.08.2006	24	01.08.2008
27	Power Sensor NRVD-Z1	R&S	833894/011	3000002681-0010	01.08.2006	24	01.08.2008
28	Rubidium Standard RUB	R&S		3000002681-0009	01.08.2006	24	01.08.2008

29	Switching and Signal Conditioning Unit SSCU	R&S	338864/003	3000002681-0006	01.08.2006	24	01.08.2008
30	Laser Printer HP Deskjet 2100	HP	N/A	3000002681-0011	n.a.		
31	19" Rack	R&S	11138363000004	3000002681	n.a.		
32	RF-cable set	R&S	N/A	3000002681	n.a.		
33	IEEE-cables	R&S	N/A	3000002681	n.a.		
34	Sampling System FSIQ-B70	R&S	835355/009	3000002681	s.No.7		
35	RSP programmable attenuator	R&S	834500/010	3000002681-0007	01.08.2006	24	01.08.2008
36	Signalling Unit	R&S	838312/011	3000002681	n.a.		
37	NGPE programmable Power Supply for EUT	R&S	192.033.41	3000002681			
38	Climatic box VT 4002	Heraeus Vötsch	58566046820010	300003019	11.05.2007	24	11.05.2009
39	Signaling Unit CMU200	R&S	832221/0055	300002862	12.01.2006	24	12.01.2008
40	Power Splitter 6005-3	Inmet Corp.	none	300002841	23.12.2006	24	23.12.2008
41	SMA Cables SPS-1151-985-SPS	Insulated Wire	different	different	n.a.		
42	CBT32 with EDR Signaling Unit	R&S					
43	Coupling unit	Narda	N/A	--	n.a.		
44	2xSwitch Matrix PSU	R&S	872584/021	300001329	n.a.		
45	RF-cable set	R&S	N/A	different	n.a.		
46	IEEE-cables	R&S	N/A	--	n.a.		

Anmerkung: 3000002681-00xx als Systeme inventarisiert

SRD Laboratory Room 005:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Spektrum Analyzer 8566B	HP	2747A05275	300000219	08.11.2006	24	08.11.2008
2	Spektrum Analyzer Display 85662A	HP	2816A16497	300001690	08.11.2006	24	08.11.2008
3	Quasi-Peak-Adapter 85650A	HP	2811A01135	300000216	08.11.2006	24	08.11.2008
4	Power Supply	Heiden	003202	300001187	12.05.2007	36	12.05.2010
5	Power Supply	Heiden	1701	300001392	12.05.2007	36	12.05.2010