



## 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.: 3462C-1 (IC)**

**Certification ID: DE 0001**

**Accreditation ID: DE 0002**

**Accredited Bluetooth® Test Facility (BQTF)**

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**Test report no. : 1-0725-01-05/08-A**  
**Type identification : TU-WHR1**  
**Applicant : Panasonic Corporation**  
**FCC ID : ACJ-TUWHR1U**  
**IC Certification No : 216A-TUWHR1U**  
**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 3.1.1. 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.

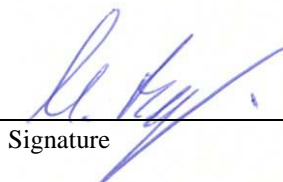
#### Test laboratory manager:

2009-02-13      Jakob Reschke  
Date                      Name

Signature 

#### Technical responsibility for area of testing:

2009-02-13      Michael Berg  
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

<b>Name:</b>	<b>Panasonic Corporation Visual Products and Display Devices Business Group</b>
<b>Street:</b>	<b>1-15 Matsuo-cho, Kadoma City</b>
<b>Town:</b>	<b>Osaka 571-8504</b>
<b>Country:</b>	<b>JAPAN</b>
<b>Telephone:</b>	<b>+81-6-6908-1551</b>
<b>Fax:</b>	<b>+81-6-6905-5983</b>
<b>Contact:</b>	<b>Mr. Masaya Koshimuta</b>
<b>E-mail:</b>	<b>-/-</b>
<b>Telephone:</b>	<b>+81-6-6905-5714</b>

## 1.4 Application details

<b>Date of receipt of order:</b>	<b>2008-10-24</b>
<b>Date of receipt of test item:</b>	<b>2009-02-02</b>
<b>Date of start test:</b>	<b>2009-02-02</b>
<b>Date of end test:</b>	<b>2009-02-13</b>
<b>Persons(s) who have been present during the test:</b>	<b>-/-</b>

## 2 Test standard/s

47 CFR Part 15	2008-07	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:	<b>Panasonic Corporation Visual Products and Display Devices Business Group</b>
Street:	<b>1-15 Matsuo-cho, Kadoma City</b>
Town:	<b>Osaka 571-8504</b>
Country:	<b>JAPAN</b>

##### 3.1.1 Test item

Kind of test item	:	<b>Wireless HDMI Transmission System</b>
Type identification	:	<b>TU-WHR1</b>
S/N serial number	:	<b>058</b>
HW hardware status	:	<b>F1</b>
SW software status	:	<b>081223</b>
Frequency Band [MHz]	:	<b>2425 – 2475 MHz (center frequencies)</b>
Type of Modulation	:	<b>DSSS</b>
Number of channels	:	<b>10</b>
Antenna	:	<b>Integrated antenna</b>
Power Supply	:	<b>12.00 V DC by Power Supply</b>
Temperature Range	:	<b>21 °C</b>

Max. power radiated: **-2.98 dBm**

Max. power conducted: **-2.19 dBm**

FCC ID: **ACJ-TUWHR1U**

IC: **216A-TUWHR1U**

**3.1.2 Additional EUT information For IC Canada (appendix 2)**

IC Registration Number:	<b>216A-TUWHR1U</b>
Model Name:	<b>TU-WHR1</b>
Manufacturer (complete Address):	<b>Panasonic Corporation 1-15 Matsuo-cho, Kadoma City Osaka 571-8504 JAPAN</b>
Tested to Radio Standards Specification (RSS) No.:	<b>RSS-210 Issue 7</b>
Open Area Test Site Industry Canada Number:	<b>IC 3462C-1</b>
Frequency Range (or fixed frequency) [MHz]:	<b>2425 – 2475 MHz (center frequencies)</b>
RF: Power [W] (max):	<b>Rad. EIRP: 0.50 mW Conducted : 0.61 mW</b>
Antenna Type:	<b>Integrated antenna</b>
Occupied Bandwidth (99% BW) [kHz]:	<b>2645</b>
Type of Modulation:	<b>DSSS</b>
Emission Designator (TRC-43):	<b>2M65G1D (DSSS)</b>
Transmitter Spurious (worst case) [ $\mu$ V/m in 3m]:	<b>161</b>
Receiver Spurious (worst case) [ $\mu$ V/m in 3m]:	<b>141 (noise floor)</b>

**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: Jakob Reschke

Date: 2009-02-13

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

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:           **216A**
- 2. MODEL NUMBER:           **TU-WHR1**
- 3. MANUFACTURER:           **Panasonic Corporation**
- 4. TYPE OF EVALUATION:     **(c) RF Evaluation**

- Evaluated against exposure limits: General Public Use  Controlled Use
  - Duty cycle used in evaluation: 34 %
  - Standard used for evaluation: RSS-102 Issue 2 (2005-11)
  - Measurement distance: 0.20 m
  - RF value: 0.00099 V/m  A/m  W/m<sup>2</sup>
- Measured  Computed  Calculated

**Declaration of RF Exposure Compliance**

**ATTESTATION:**

I attest that the information provided in this test report is 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:           Jakob Reschke  
Title:           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 <sub>nom</sub>	°C	21
Nominal Humidity	H <sub>nom</sub>	%	51
Nominal Power Source	V <sub>nom</sub>	V	12.00

Type of power source: **DC by Power Supply**

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 - CANADA RSS-210	PASS	2009-02-13	-/-

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(a)(2)	Spectrum Bandwidth of a DSSS System / 20dB 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

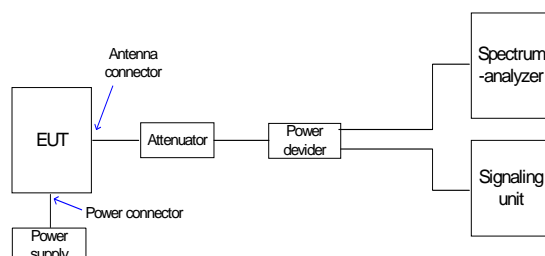
200MHz - 1GHz: Quasi Peak measurement, 120 kHz Bandwidth, log periodic antenna

>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 manufacturer provided a Control Unit. Over a button the lowest, middle and highest channel could be selected.

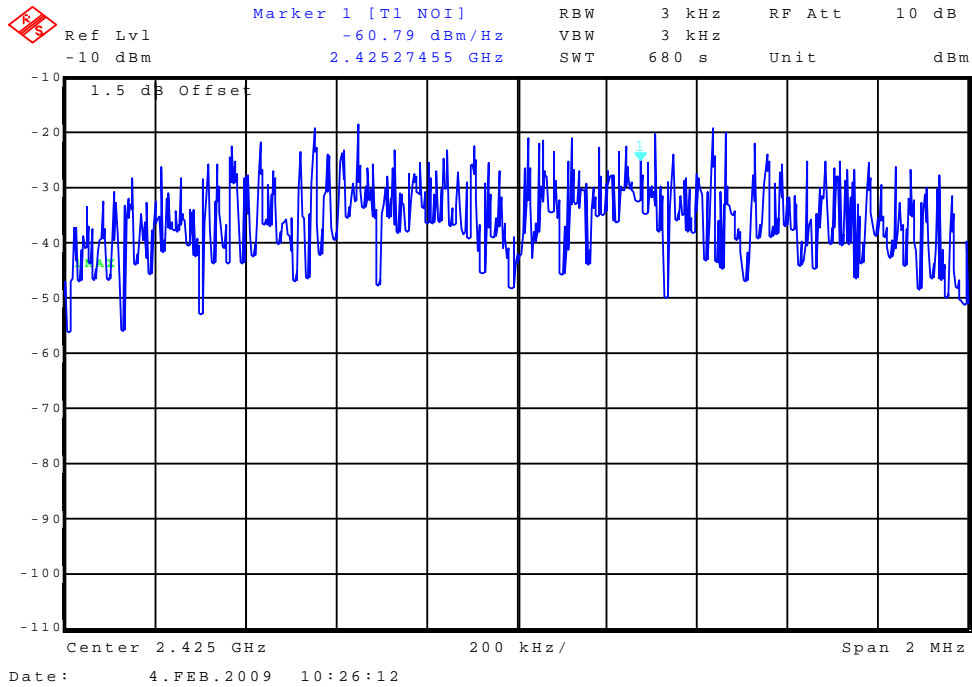
## 5.4 Antenna gain

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

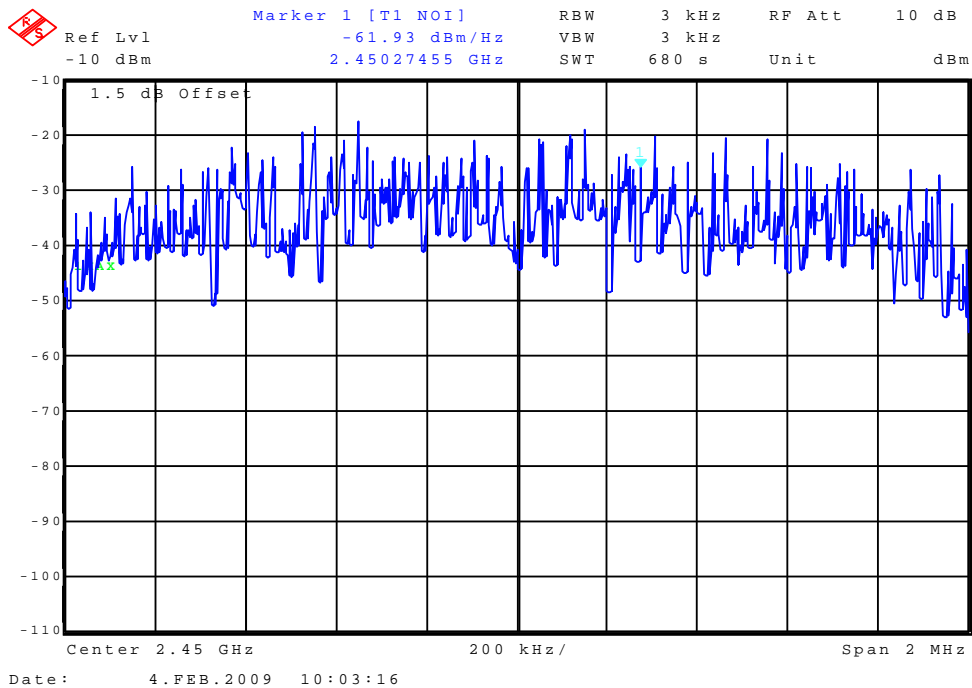
	low channel	mid channel	high channel
Conducted power [dBm] <i>(measured)</i>	-2.50	-2.16	-2.50
Radiated power [dBm] <i>(measured)</i>	-3.58	-3.04	-2.98
Gain [dBi] <i>(calculated)</i>	-1.08	-0.88	-0.48

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

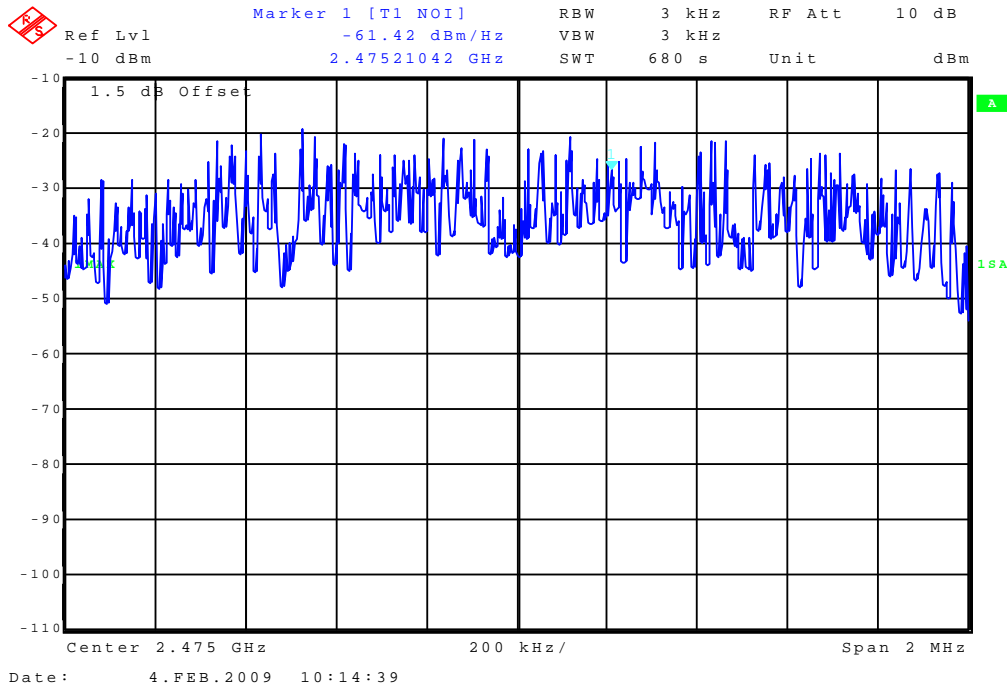
Plot 1: (result calculated by the Signal analyzer FSIQ 26 from Rohde & Schwarz)



Plot 2: (result calculated by the Signal analyzer FSIQ 26 from Rohde & Schwarz)



Plot 3: (result calculated by the Signal analyzer FSIQ 26 from Rohde & Schwarz)



Results: Plot 1: Power density: -60.79 dBm/Hz = -25.99 dBm / 3 kHz  
 Plot 2: Power density: -61.93 dBm/Hz = -27.13 dBm / 3 kHz  
 Plot 3: Power density: -61.42 dBm/Hz = -26.62 dBm / 3 kHz

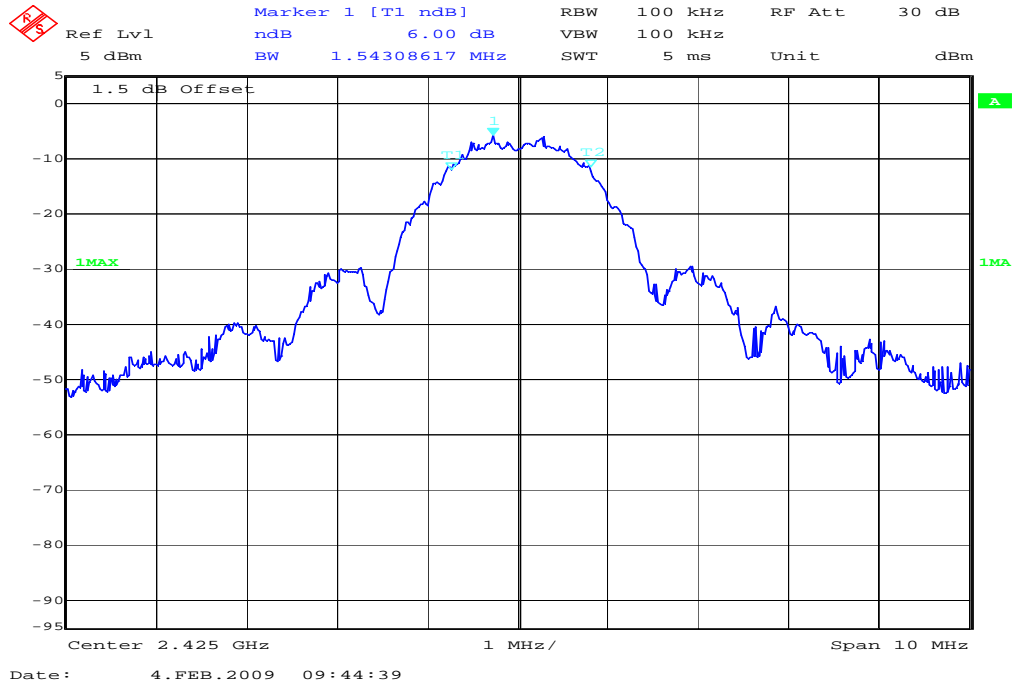
Correction factor from dBm/Hz to dBm/3 kHz is +34,8 dB

Limits:

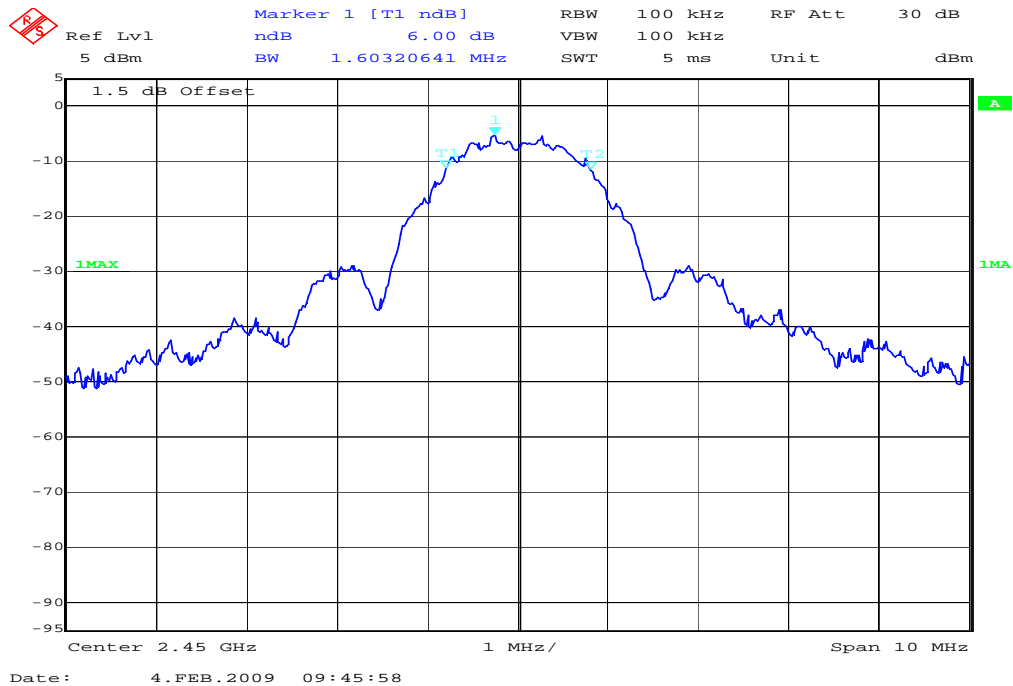
Under normal test conditions only	For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission
-----------------------------------	---

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

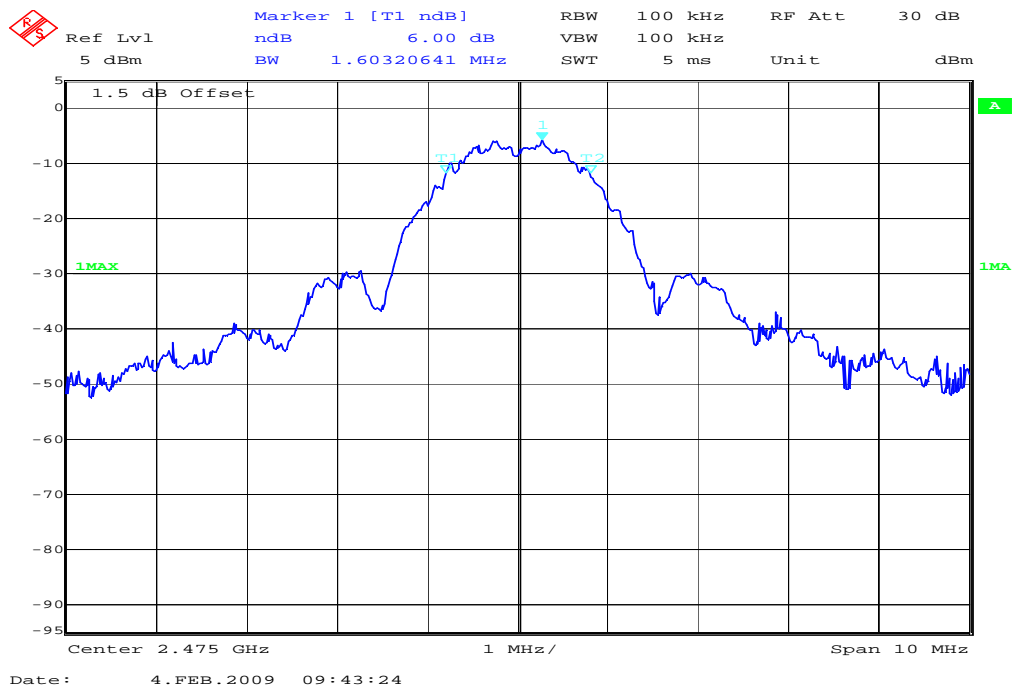
Plot 1:



Plot 2:



Plot 3:



Results:

Test conditions		6 dB BANDWIDTH [kHz]		
Frequency [MHz]		2412	2437	2462
T <sub>nom</sub>	V <sub>nom</sub>	1543	1603	1603
Measurement uncertainty		±1kHz		

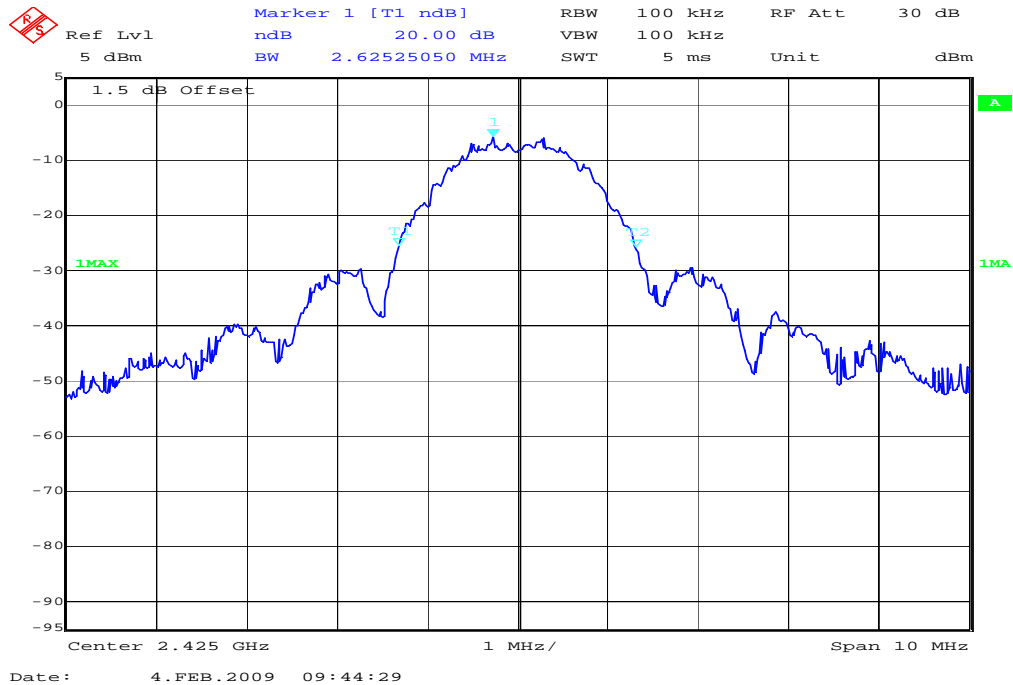
RBW: 100 kHz / VBW 100 kHz

Limits:

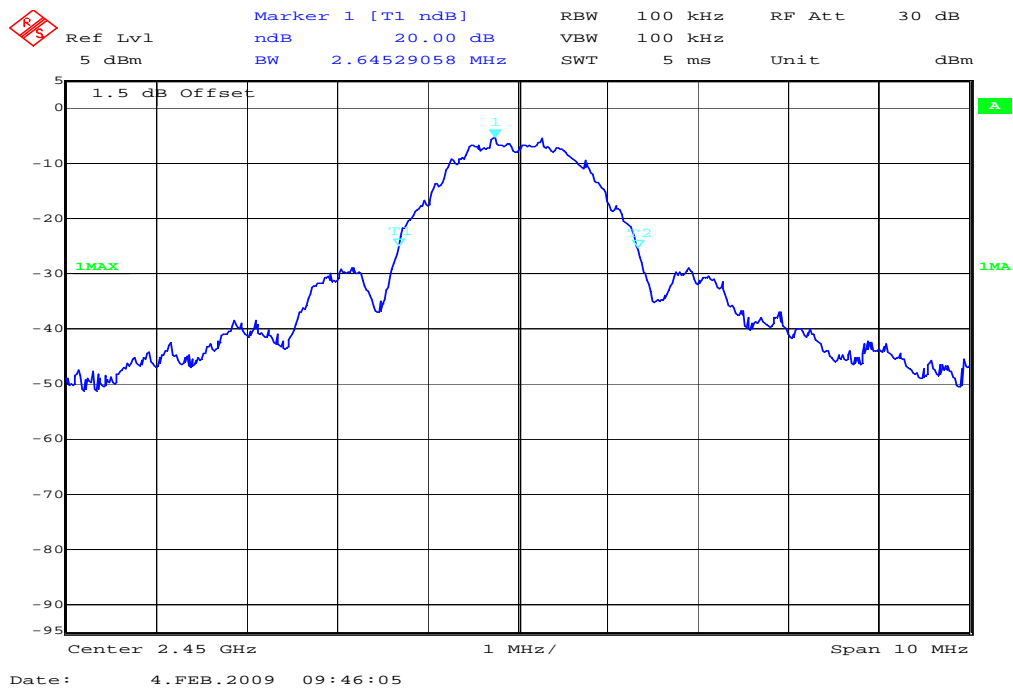
Under normal test conditions only	> 500 kHz
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### 5.7 Spectrum Bandwidth of a DSSS System / 20 dB Bandwidth

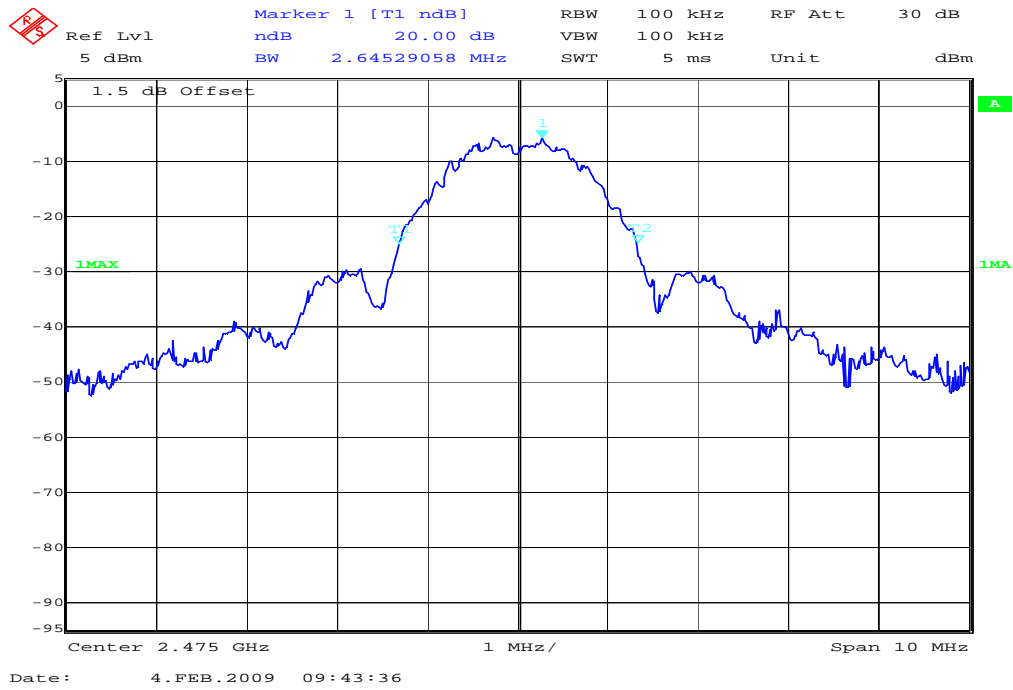
Plot 1:



Plot 2:



Plot 3:



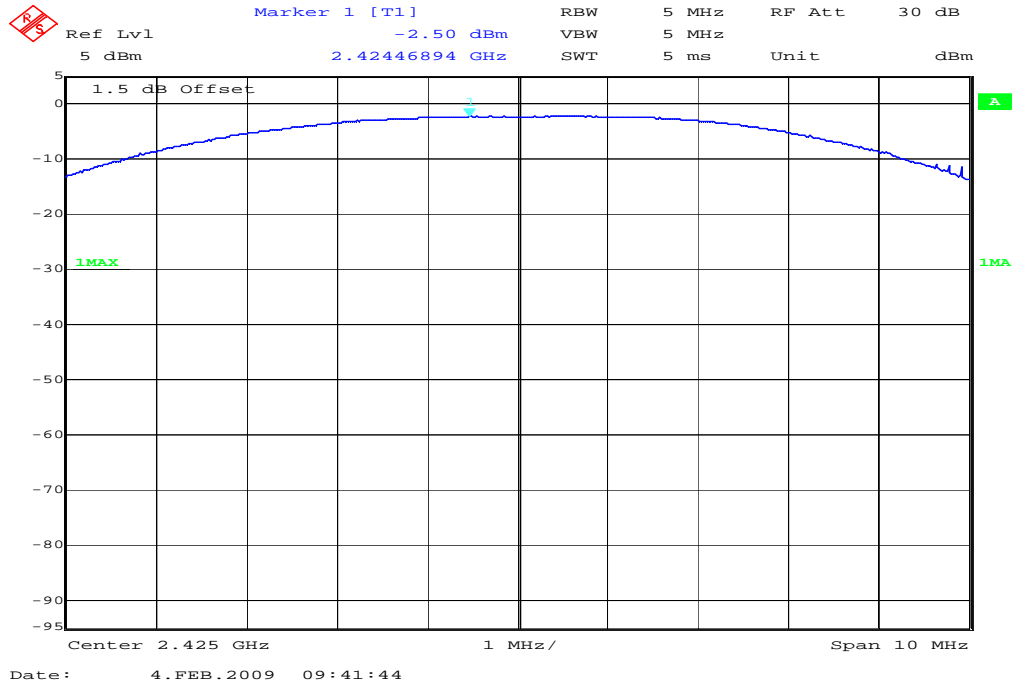
Results:

Test conditions		20 dB BANDWIDTH [kHz]		
Frequency [MHz]		2412	2437	2462
T <sub>nom</sub>	V <sub>nom</sub>	2625	2645	2645
Measurement uncertainty		±1kHz		

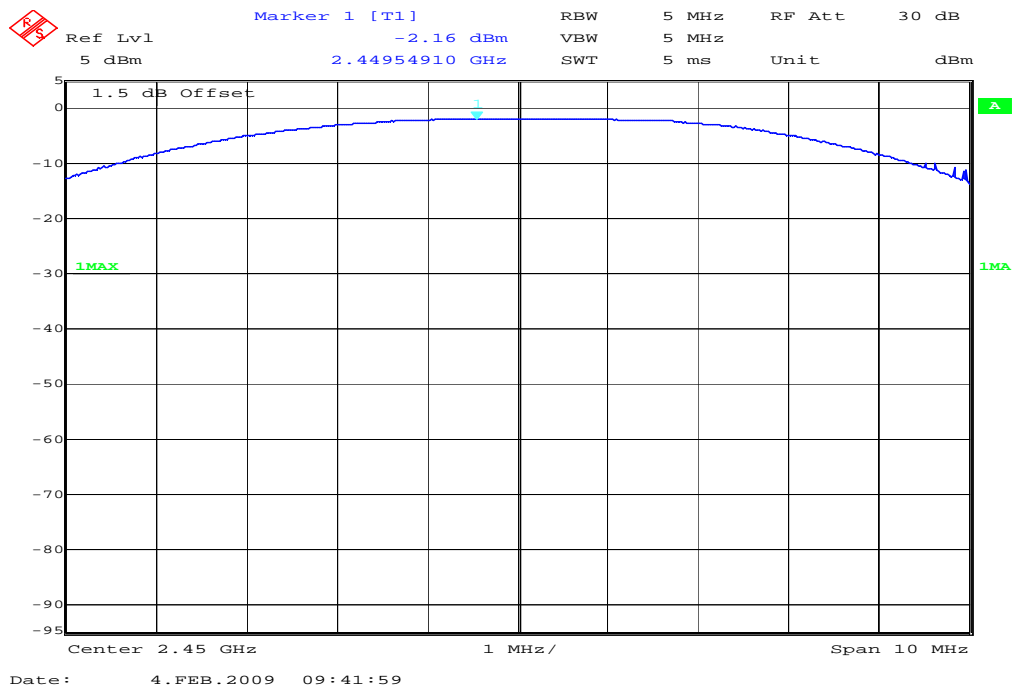
RBW: 100 kHz / VBW 100 kHz

5.8 Maximum output power (conducted) §15.247 (b)(3)

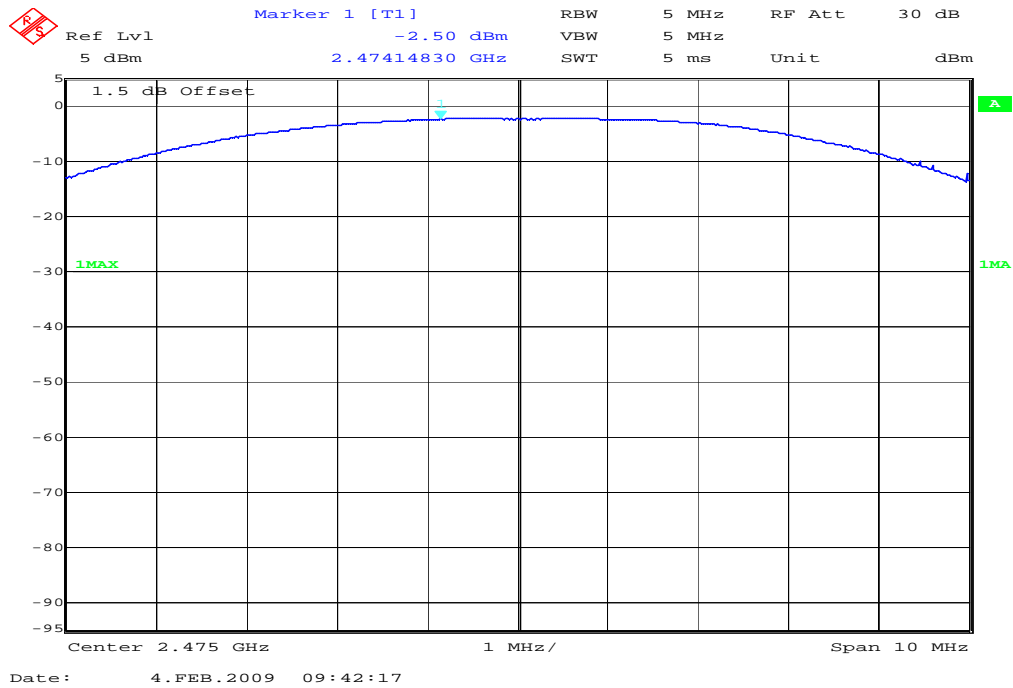
Plot 1:



Plot 2:



Plot 3:



Results:

Test conditions		Max. peak output power [dBm]		
		2412	2437	2462
Frequency [MHz]				
T <sub>nom</sub>	V <sub>nom</sub>	-2.50	-2.16	-2.50
Measurement uncertainty		±3dB		

RBW / VBW: 5 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/cm<sup>2</sup>)  
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

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

where EIRP = equivalent isotropical radiated power

#### Calculation:

(Calculated for max. EIRP)

EIRP: -2.98 dBm (0.50 mW)

calculated at distance of 20 cm:

$$\text{power density} = 0.50 / 4\pi 20^2 = 0.000099 \text{ mW/ cm}^2$$

Limit:

1mW/ cm<sup>2</sup> is the reference level for general public exposure according to the OET Bulletin 65,  
Edition 97-01 Table 1.

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

Results:

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2412	2437	2462
T <sub>nom</sub>	V <sub>nom</sub>	-3.58	-3.04	-2.98
Measurement uncertainty		±3dB		

RBW / VBW: 10 MHz

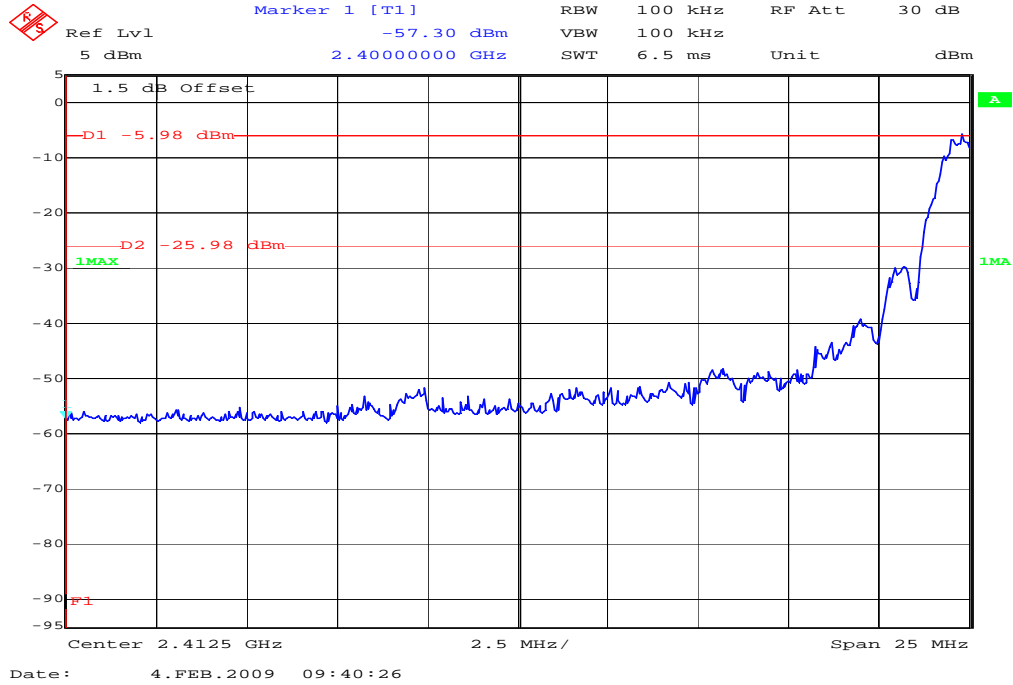
Measured at a distance of 3m

Limits:

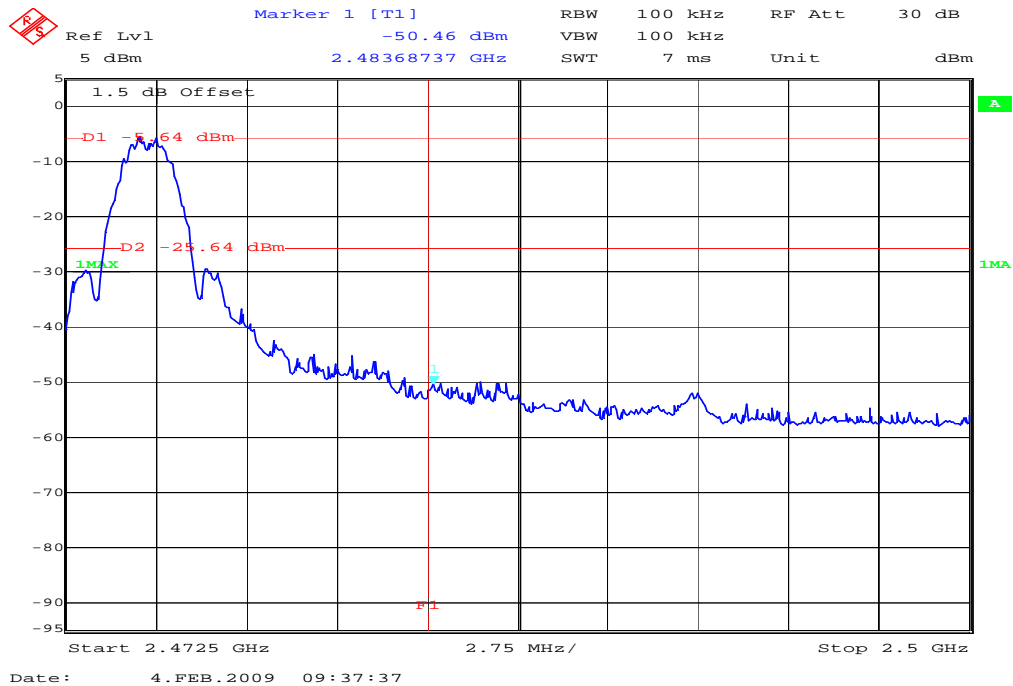
Under normal test conditions only, for frequency range 2400-2483.5 MHz	Max. 1.0 Watt
--	---------------

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

Plot 1: lowest channel



Plot 2: highest channel

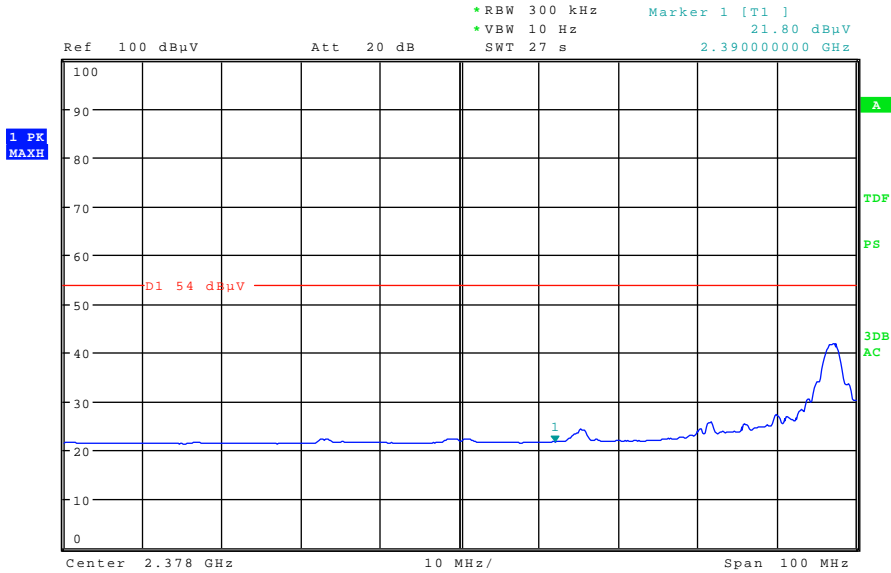


Limits:

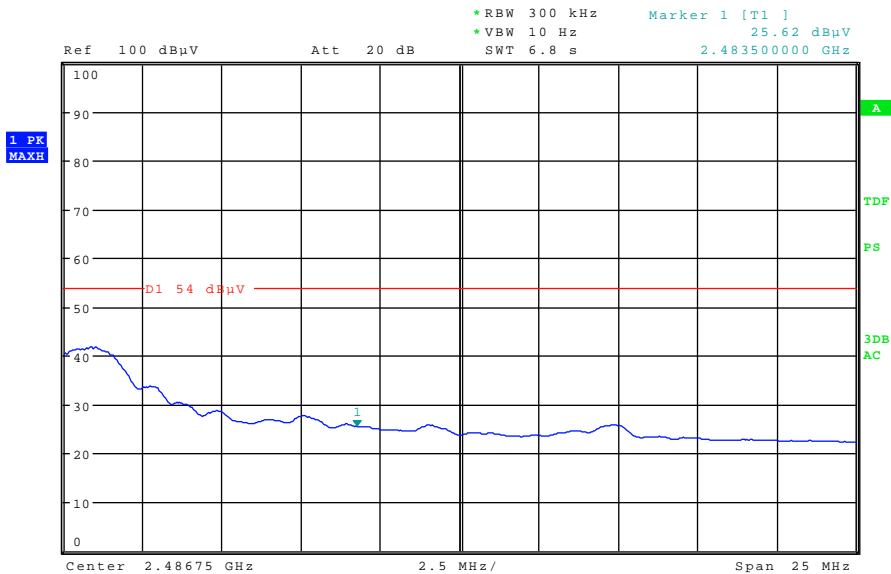
Under normal test conditions only	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth 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)).
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### 5.11 Band-edge compliance of radiated emissions §15.205

Plot 1: Band edge compliance including far away emissions (lowest channel)



Plot 2: Band edge compliance including far away emissions (highest channel)

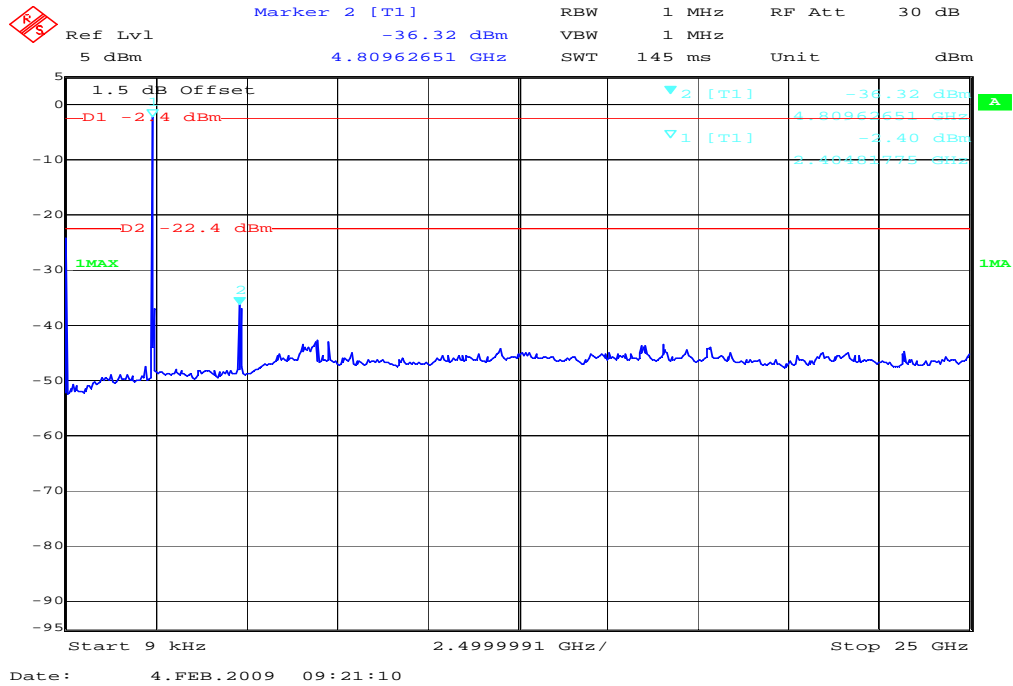


Limit: 54 dBµV/m

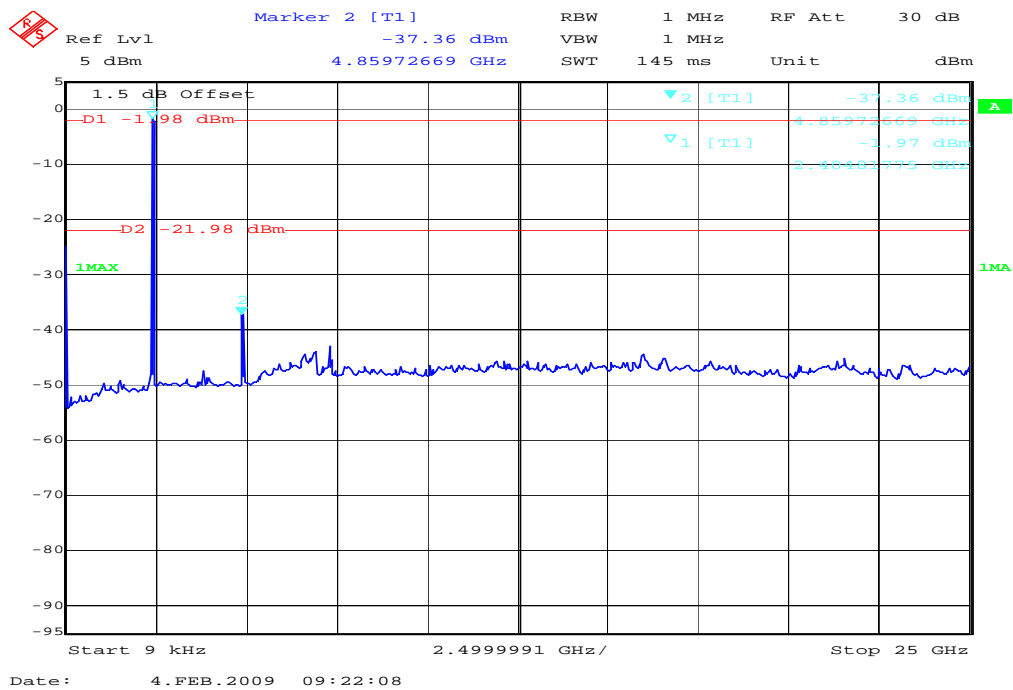
Result: Pass

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

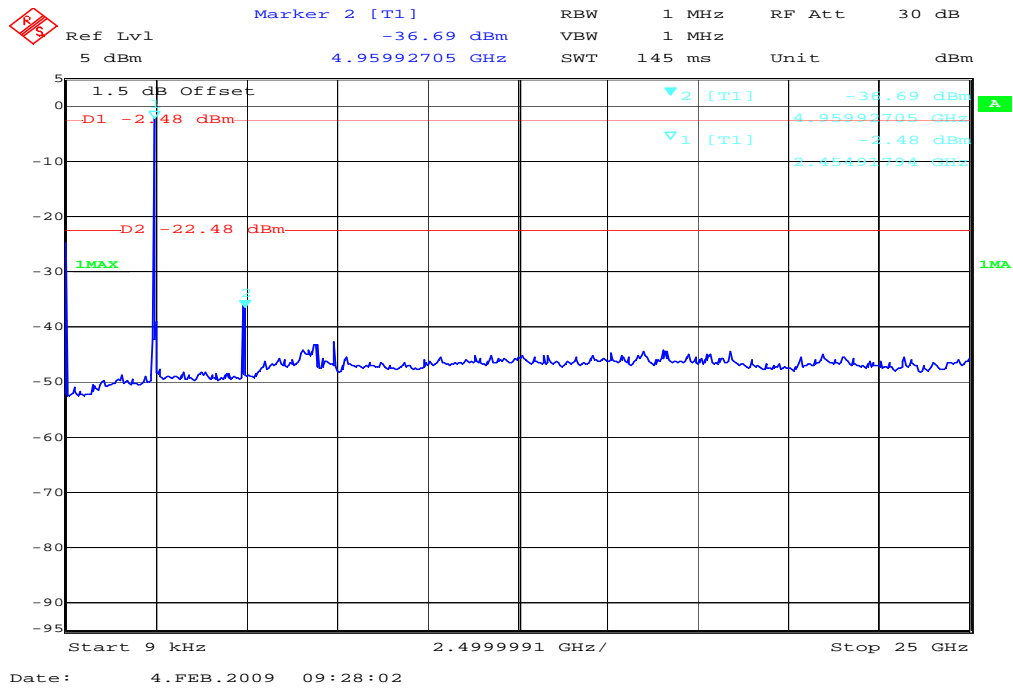
Plot 1: Lowest Channel



Plot 2: Middle Channel



Plot 3: Highest Channel



Result & Limits:

Emission Limitations					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2425		-2.40	30 dBm		Operating frequency
4850		-36.32	-20 dBc	33.92	Pass
2450		-1.97	30 dBm		Operating frequency
4900		-37.36	-20 dBc	35.39	Pass
2475		-2.48	30 dBm		Operating frequency
4950		-36.69	-20 dBc	34.21	Pass
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)).
-----------------------------------	--

Note: For emissions that fall into restricted bands you find the radiated emissions later in the report.

**5.13 Spurious Emissions - radiated (Transmitter) §15.209**

Plot 1: 0.03 - 1 GHz (lowest channel)

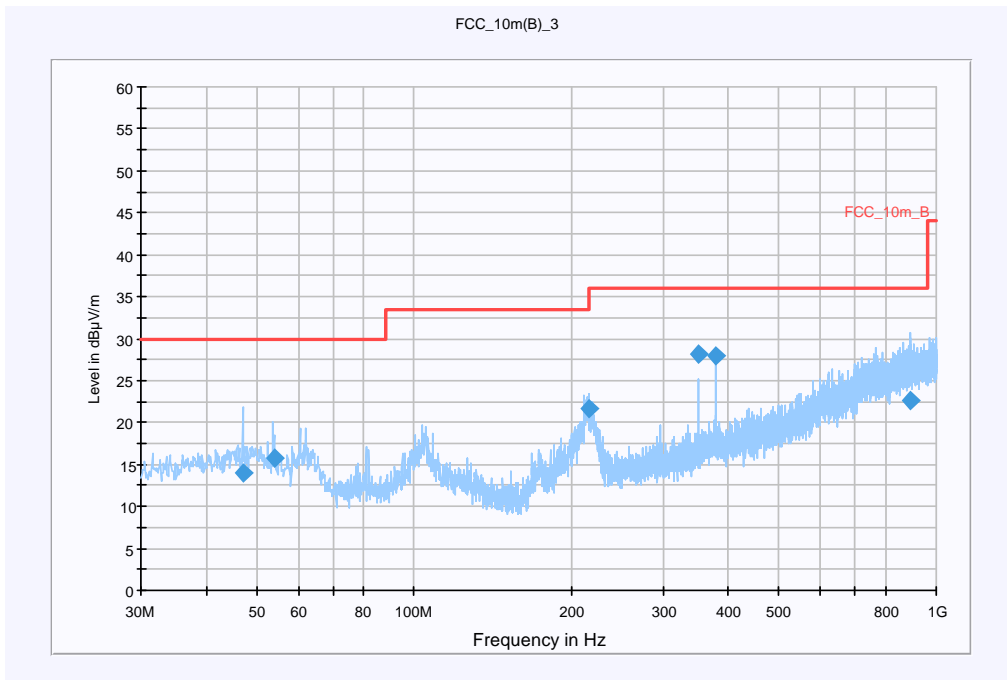
**Common Information**

EUT: Panasonic TU-WHR1  
 Serial Number: sample  
 Test Description: FCC part 15B  
 Operating Conditions: TX / Modulation / Burst / channel 20  
 Operator Name: COA  
 Comment: 115 V / 60 Hz AC to AC / DC adaptor

**Scan Setup: STAN\_Fin [EMI radiated]**

Hardware Setup: Electric Field (NOS)  
 Level Unit: dBµV/m

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



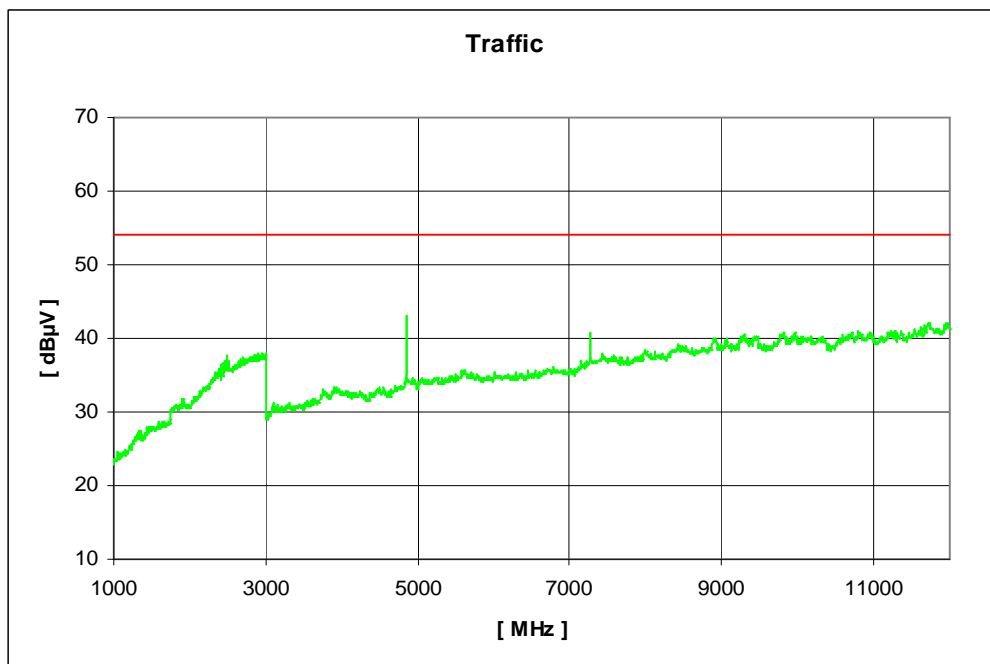
**Final Result 1**

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
46.992550	13.9	15000.000	120.000	161.0	V	233.0	13.5	16.1	30.0	
53.966100	15.7	15000.000	120.000	202.0	V	44.0	13.2	14.3	30.0	
216.007350	21.6	15000.000	120.000	105.0	V	58.0	12.6	14.4	36.0	
350.974400	28.1	15000.000	120.000	212.0	H	289.0	16.4	7.9	36.0	
377.969800	27.9	15000.000	120.000	220.0	H	96.0	16.9	8.1	36.0	
890.440200	22.6	15000.000	120.000	220.0	V	156.0	25.6	13.4	36.0	

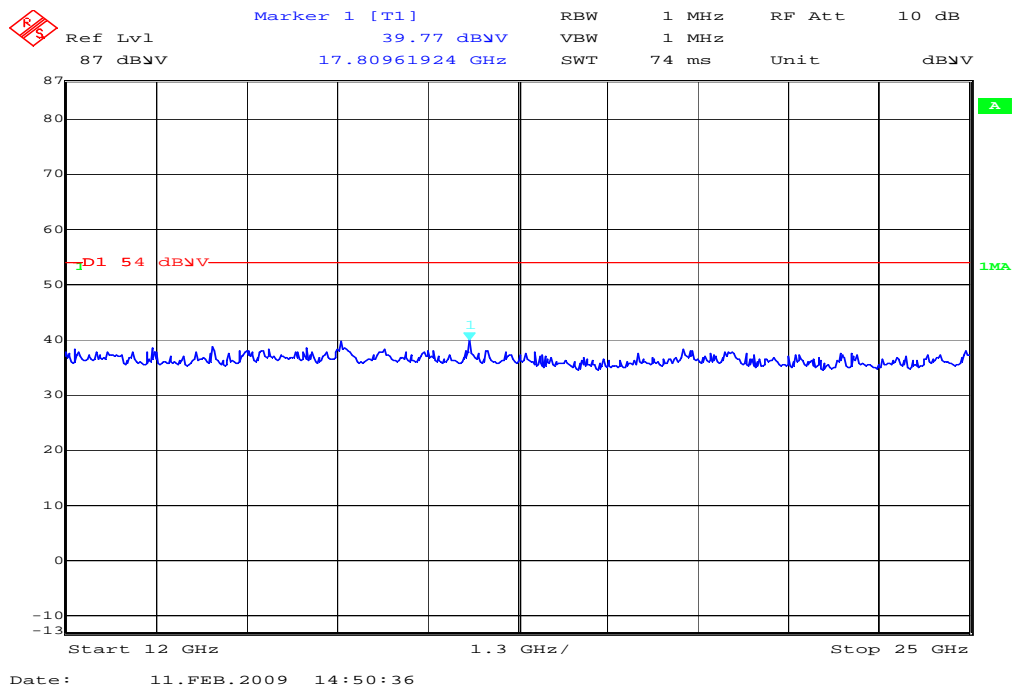
**Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]**

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 (0109)
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

Plot 2: 1 - 12 GHz (lowest channel)



Plot 3: 12- 25 GHz (valid for all channels)



Plot 4: 0.03 - 1 GHz (middle channel)

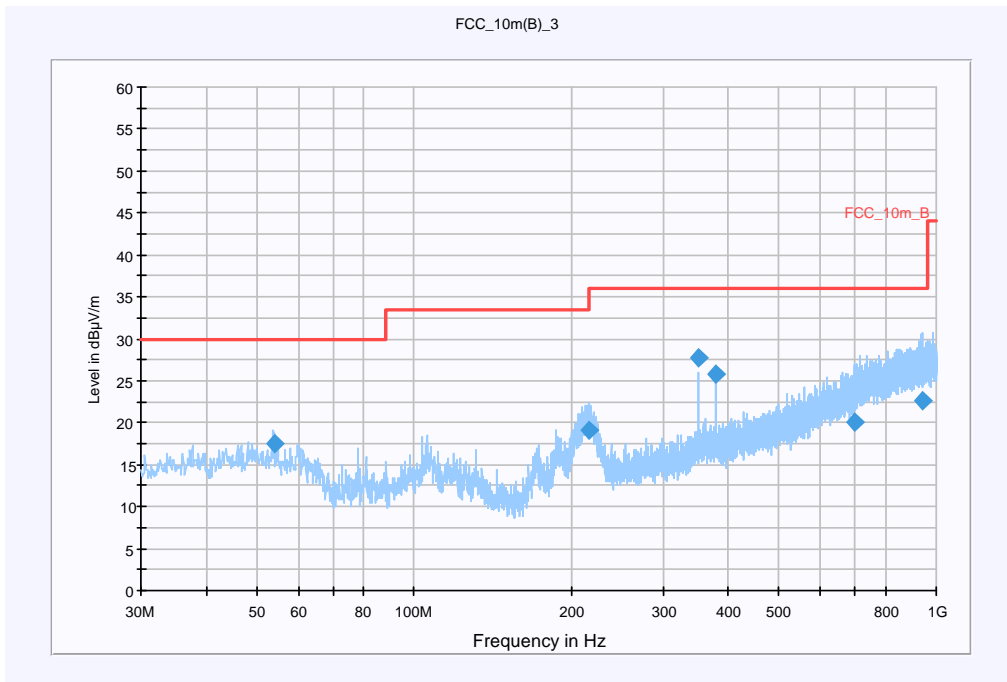
**Common Information**

EUT:	Panasonic TU-WHR1
Serial Number:	sample
Test Description:	FCC part 15B
Operating Conditions:	TX / Modulation / channel 15
Operator Name:	COA
Comment:	115 V / 60 Hz AC to AC / DC adaptor

**Scan Setup: STAN\_Fin [EMI radiated]**

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

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



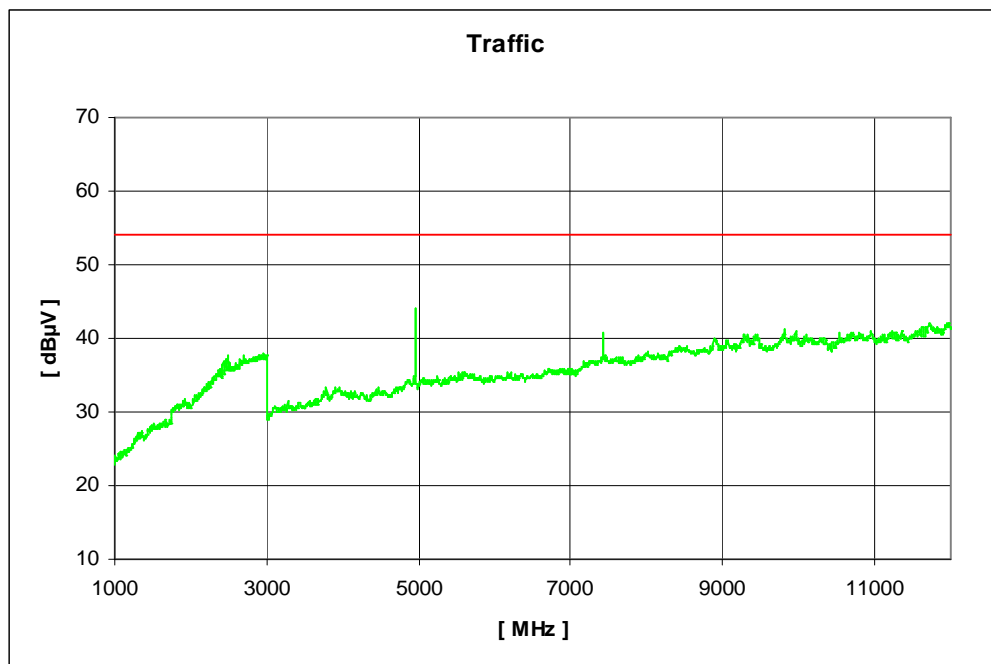
**Final Result 1**

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
53.984200	17.5	15000.000	120.000	220.0	V	156.0	13.2	12.5	30.0	
215.930250	19.1	15000.000	120.000	98.0	V	41.0	12.6	14.4	33.5	
350.982650	27.8	15000.000	120.000	209.0	H	109.0	16.4	8.2	36.0	
377.963350	25.8	15000.000	120.000	220.0	H	260.0	16.9	10.2	36.0	
699.656750	20.0	15000.000	120.000	220.0	V	159.0	23.0	16.0	36.0	
942.380250	22.7	15000.000	120.000	200.0	H	49.0	25.8	13.3	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 (0109)
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

Plot 5: 1 - 12 GHz (middle channel)



Plot 6: 0.03 - 1 GHz (highest channel)

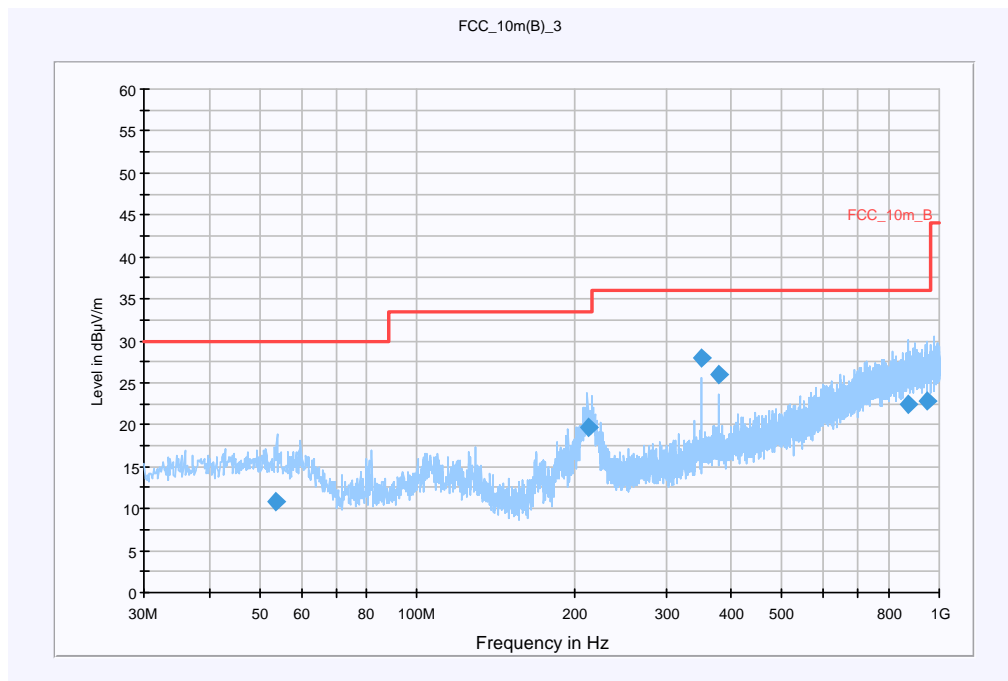
**Common Information**

EUT:	Panasonic TU-WHR1
Serial Number:	sample
Test Description:	FCC part 15B
Operating Conditions:	TX / Modulation / channel 25
Operator Name:	COA
Comment:	115 V / 60 Hz AC to AC / DC adaptor

**Scan Setup: STAN\_Fin [EMI radiated]**

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

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



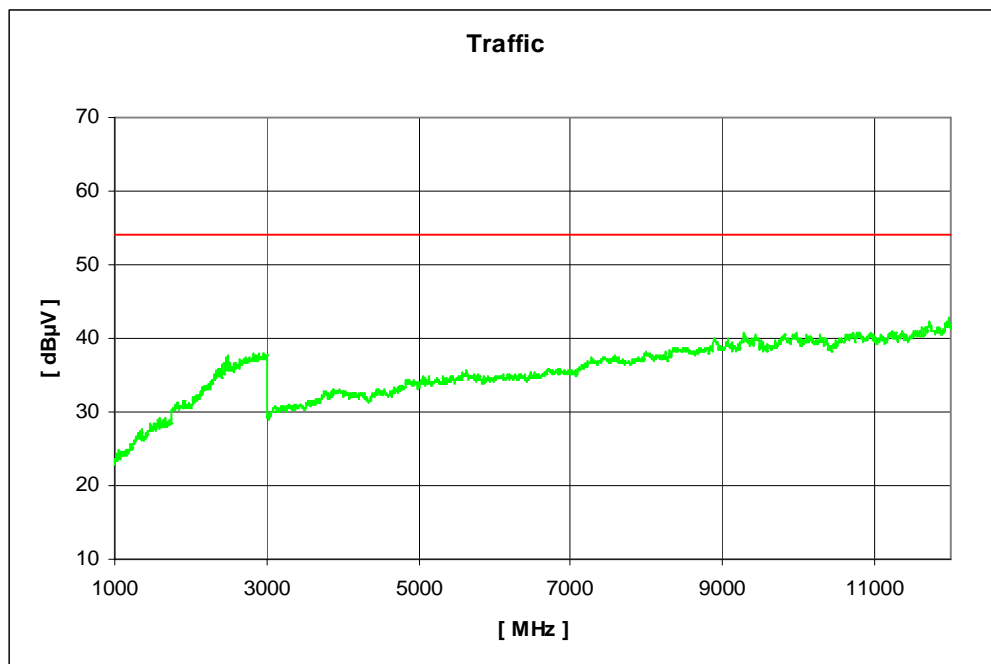
**Final Result 1**

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
53.834250	10.9	15000.000	120.000	220.0	V	8.0	13.2	19.1	30.0	
212.239750	19.8	15000.000	120.000	120.0	V	51.0	12.4	13.7	33.5	
350.994800	27.9	15000.000	120.000	220.0	H	261.0	16.4	8.1	36.0	
378.001300	26.0	15000.000	120.000	220.0	H	86.0	16.9	10.0	36.0	
871.174050	22.5	15000.000	120.000	220.0	V	143.0	25.3	13.5	36.0	
947.362400	22.8	15000.000	120.000	220.0	H	77.0	25.8	13.2	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 (0109)
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

Plot 7: 1 - 12 GHz (highest channel)



Results:

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]
4850	PK	43.19	4900	PK	44.14	No critical peaks found		
7275	PK	40.60	7350	PK	40.78			
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: § 15.109

Frequency (MHz)	Field strength (dBµV/m)	Measurement distance (m)
30 - 88	30.0	10
88 - 216	33.5	10
216 - 960	36.0	10
above 960	54.0	3

### 5.14 Spurious Emissions - radiated (Receiver) §15.109 / 209

Plot 1: 0.03 - 1 GHz vertical / horizontal (receiver)

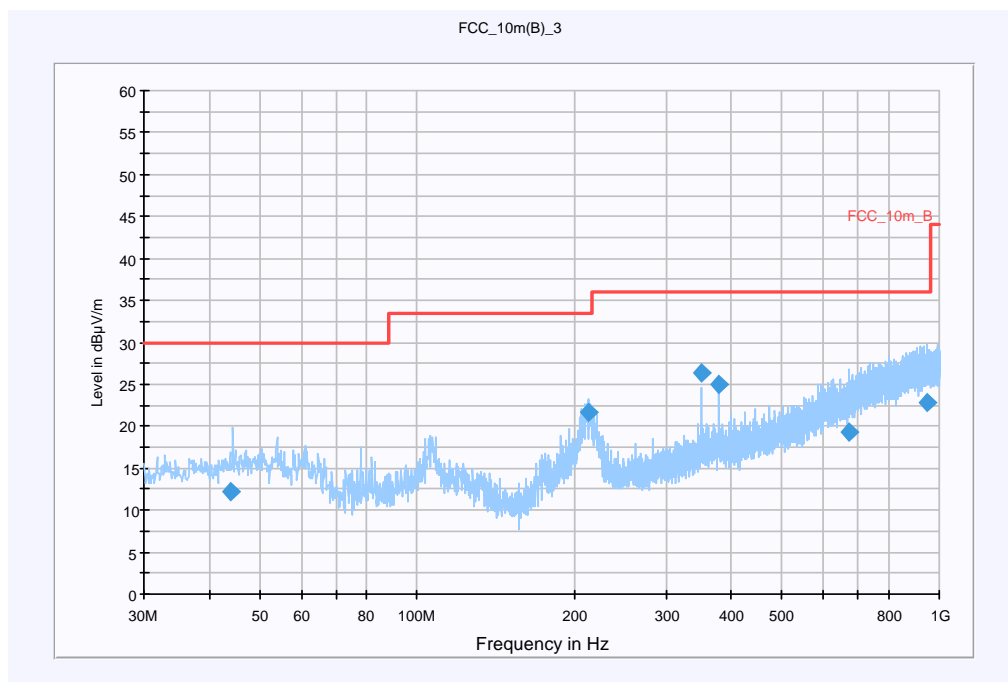
#### Common Information

EUT:	Panasonic TU-WHR1
Serial Number:	sample
Test Description:	FCC part 15B
Operating Conditions:	RX/Cont channel 15
Operator Name:	COA
Comment:	115 V / 60 Hz AC to AC / DC adaptor

#### Scan Setup: STAN\_Fin [EMI radiated]

Hardware Setup:	Electric Field (NOS)
Level Unit:	dBµV/m

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



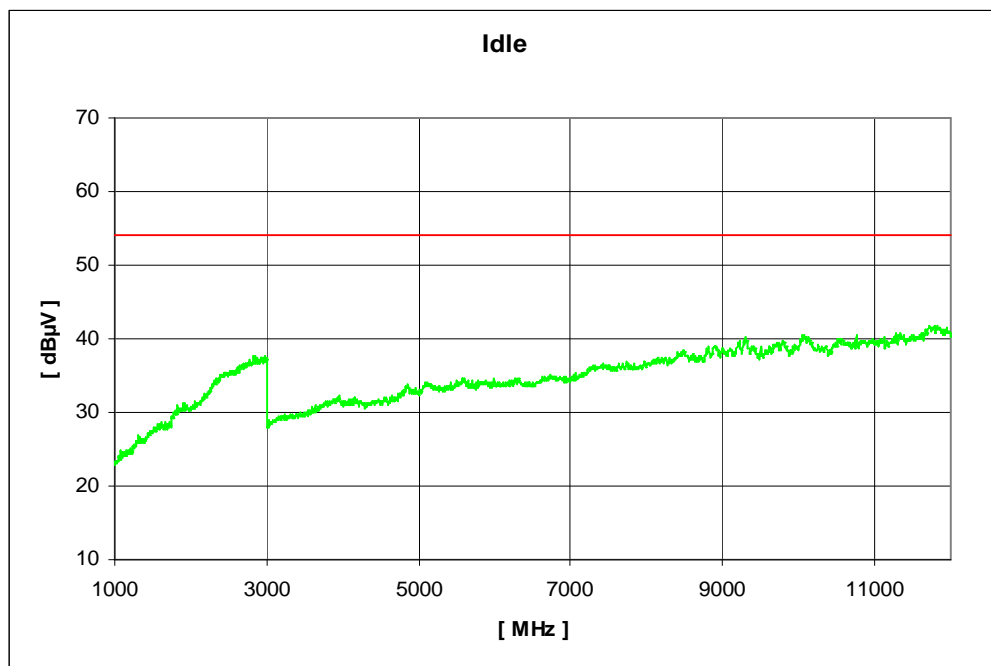
#### Final Result 1

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
44.000350	12.1	15000.000	120.000	186.0	V	293.0	13.4	17.9	30.0	
213.219500	21.5	15000.000	120.000	105.0	V	51.0	12.5	12.0	33.5	
350.967200	26.4	15000.000	120.000	220.0	H	270.0	16.4	9.6	36.0	
377.949550	25.0	15000.000	120.000	220.0	H	289.0	16.9	11.0	36.0	
673.039150	19.3	15000.000	120.000	171.0	H	13.0	22.3	16.7	36.0	
946.260850	22.8	15000.000	120.000	105.0	H	18.0	25.8	13.2	36.0	

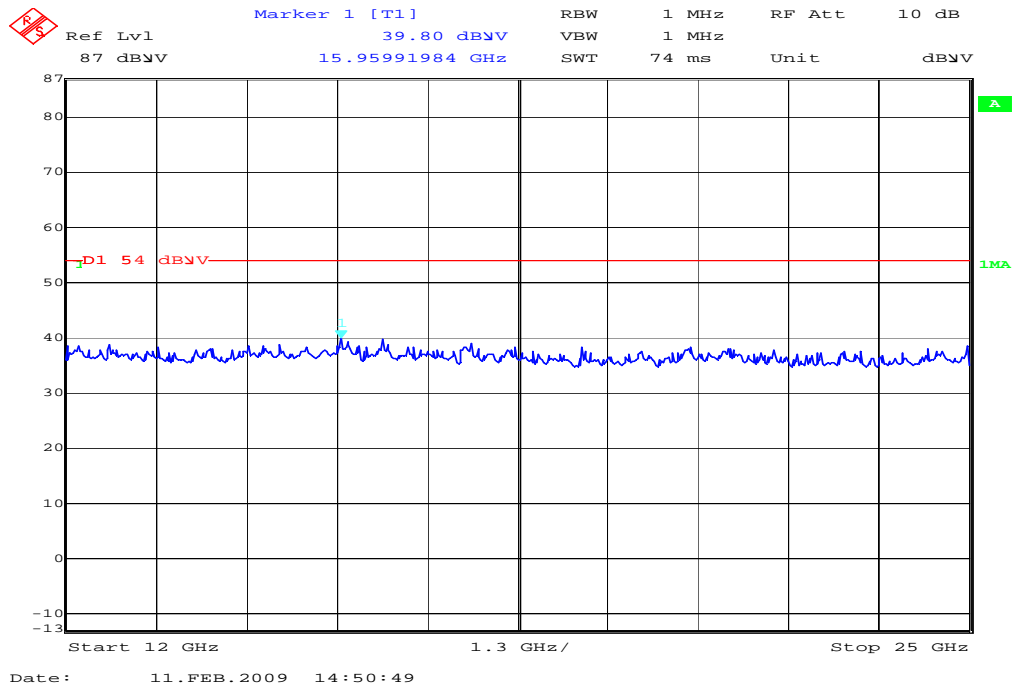
**Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]**

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 (0109)
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

Plot 2: 1 - 12 GHz vertical / horizontal (receiver)



Plot 4: 12- 25 GHz (receiver)



Results:

Spurious Emissions 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

See above plots

Measurement distance see table

Limits: § 15.109

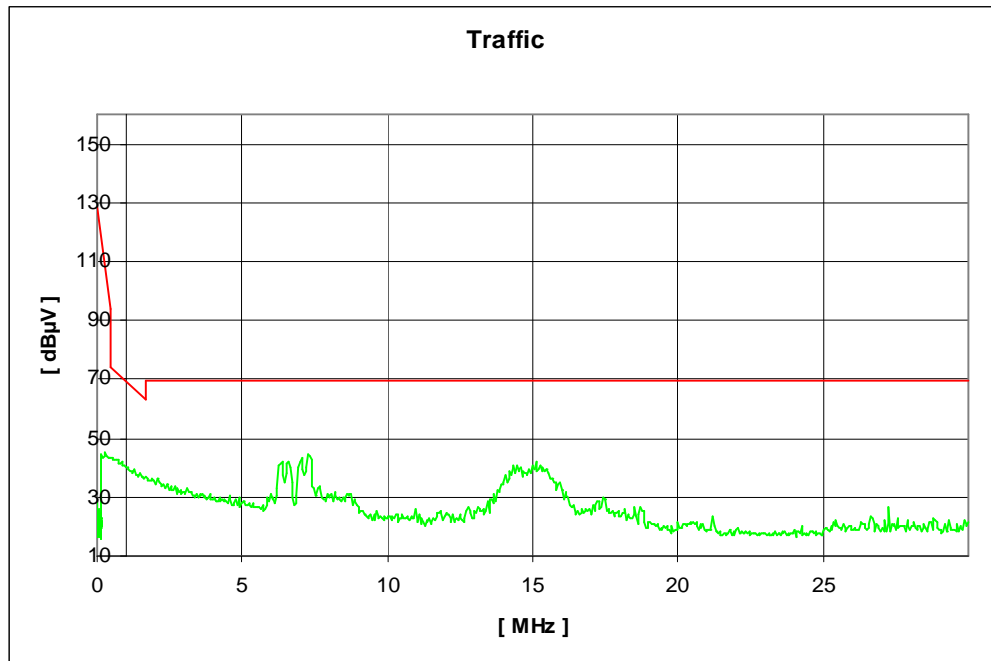
Frequency (MHz)	Field strength (dBµV/m)	Measurement distance (m)
30 - 88	30.0	10
88 - 216	33.5	10
216 - 960	36.0	10
above 960	54.0	3

**5.15 Spurious Emissions - radiated <30 MHz §15.209**

Measured at 3 m distance.

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

Plot 1:

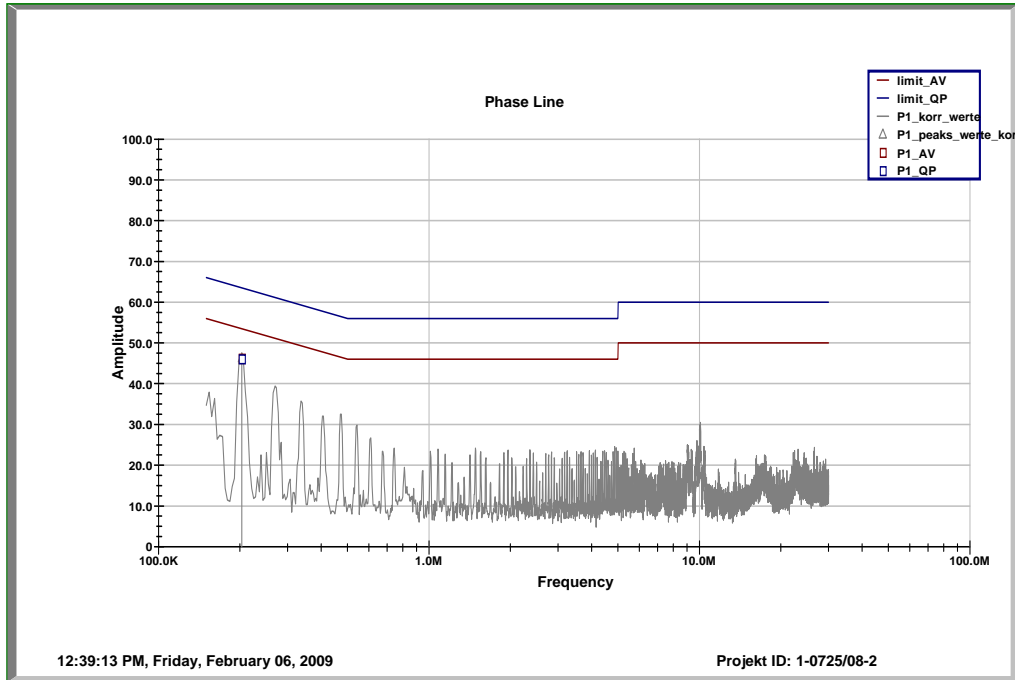


Limits:

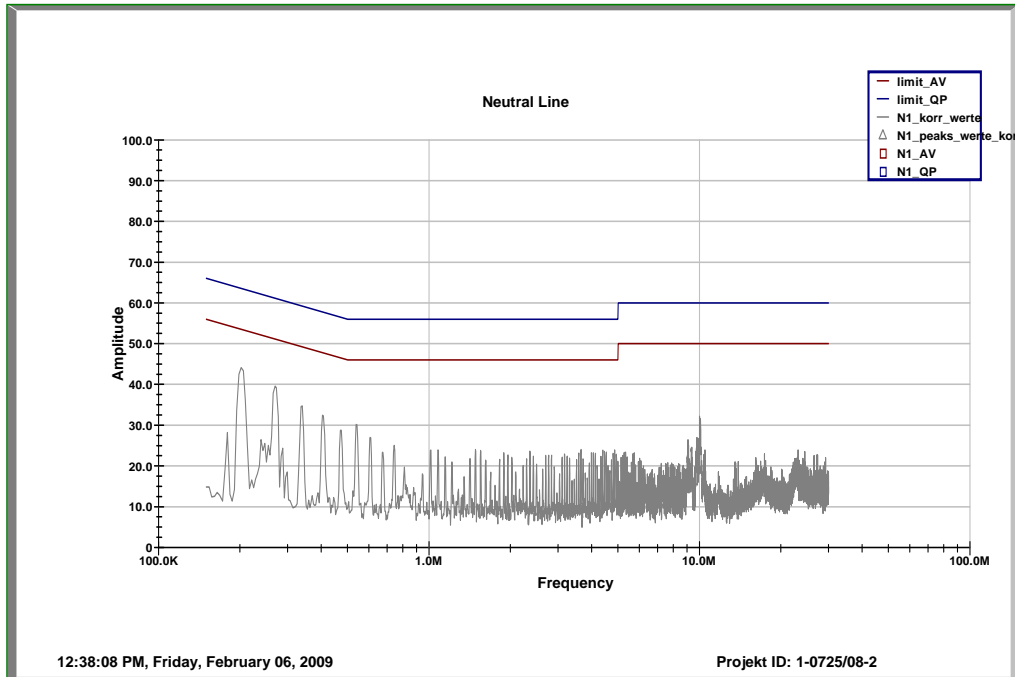
Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30 / 29.5 dBµV/m	30
30 - 88	100 / 40 dBµV/m	3
88 - 216	150 / 43.5 dBµV/m	3
216 - 960	200 / 46 dBµV/m	3
above 960	54 dBµV/m	3

5.16 Conducted Emissions <30 MHz §15.107/207

Plot 1: Phase Line



Plot 2: Neutral Line



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.

All reported calibration intervals are calibrations according to the EN/ISO/IEC 17025 standard. These calibrations were performed from an accredited external calibration laboratory.

Additional to these calibrations the laboratory performed comparison measurements with other calibrated systems and performed a weekly chamber inspection.

All used devices are connected with a 10 MHz external reference.

According to the manufacturers' instruction is it possible to establish a calibration interval for the FSP unit of 24 month, if the device has an external 10 MHz reference.

### *Anechoic chamber A:*

No.	Instrument/Ancillary	Manufacturer	Type	Serial-No.	Internal identification
<b>Radiated emission in chamber A</b>					
A-1	Spectrum Analyzer	Rohde & Schwarz	ESU26	100037	300003555
A-2	Signal Generator	Rohde & Schwarz	SMR20B11	1104.0002.20	300003593
A-3	RF System Panel	Rohde & Schwarz	TS RSP	---	300003556
A-4	Relais Matrix	Rohde & Schwarz	PSN	860673/009	300001385
A-5	Horn Antenna	EMCO	3115	9709-5290	300000212
A-6	Bilog.-Log. Antenna	Schwarzbeck	VULB 9163	02/00	300003696
A-7	Notch Filter GSM 900	Wainwright	WRCD 901.9/903.1EE	9	---
A-8	Notch Filter GSM 1800	Wainwright	WRCD 1747/1748-5EE	1	---
A-9	Notch Filter GSM 1900	Wainwright	WRCD 1879.5/1880.5EE	9	---
A-10	Notch Filter GSM 850	Wainwright	WRCT 837-0.2/50-8EE	1	---
A-11	Notch Filter UMTS	Wainwright	WRCD 1800/2000-0.2/40-5EEK	2	---
A-12	Notch Filter ISM 2400	Wainwright	WRCG 2400/ 2483-2375/ 2505-50/10SS	26	---
A-13	High Pass Filter 1.1 GHz	Wainwright	WHK 1.1/15G-10SS	---	---
A-14	High Pass Filter 2.6 GHz	Wainwright	WHKX 2.6/18G-12SS	---	---
A-15	High Pass Filter 7 GHz	Wainwright	WHKX 7.0/18G-8SS	---	---
A-14	Amplifier	Miteq	AFS4-00201800-15-10P-6	US42-0050 2650-28-5A	300003204
A-16	Controller	Inn co	CO 2000	2020507	---
A-17	DC Power Supply	Hewlet Packard	HP6632A	---	300000924
A-18	Computer	F+W	---	---	300003303

### *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	300002681-00xx	n.a.		
2	Memory Extension PSM-K10	R&S	To 1	300002681	n.a.		
3	Operating Software PSM-B2	R&S	To 1	300002681	n.a.		
4	19" Monitor		22759020-ED	300002681	n.a.		
5	Mouse		LZE 0095/6639	300002681	n.a.		
6	Keyboard		G00013834L461	300002681	n.a.		
7	Spectrum Analyser FSIQ 26	R&S	835540/018	300002681-0005	10.01.2008	24	10.01.2010
8	Tracking Generator FSIQ-B10	R&S	835107/015	300002681	s.No.7		
10	RF-Generator SMIQ03 (B1 Signal)	R&S	835541/056	300002681-0002	26.08.2008	36	26.08.2011
11	Modulation Coder SMIQ-B20	R&S	To 10	300002681	s.No.10		
12	Data Generator SMIQ-B11	R&S	To 10	300002681	s.No.10		
13	RF Rear Connection SMIQ-B19	R&S	To 10	300002681	s.No.10		
14	Broadband horn antenna (1-18 GHz)	EMCO	9107-3696	300001604	16.04.2008	24	16.04.2010

15	Broadband horn antenna (1-18 GHz)	EMCO	9107-3697	300001605	21.08.2008	24	21.08.2010
16	Std gain horn antenna (18-26.5 GHz)	Narda	Model no. 638	3000000486	n.a.		
17	Std gain horn antenna (18-26.5 GHz)	Narda	Model no. 638	3000000487	n.a.		
18	Sleeve dipole antenna Model 3126-880	ETS-Lindgren	00040887	3000000	n.a.		
19	Fast CPU SM-B50	R&S	To 10	3000002681	s.No.10		
20	FM Modulator SM-B5	R&S	835676/033	3000002681	s.No.10		
21	RF-Generator SMIQ03 (B2 Signal)	R&S	835541/055	3000002681-0001	25.08.2008	36	25.08.2011
22	Modulation Coder SMIQ-B20	R&S	To 16	3000002681	s.No.16		
23	Data Generator SMIQ-B11	R&S	To 16	3000002681	s.No.16		
24	RF Rear Connection SMIQ-B19	R&S	To 16	3000002681	s.No.16		
25	Fast CPU SM-B50	R&S	To 16	3000002681	s.No.16		
26	FM Modulator SM-B5	R&S	836061/022	3000002681	s.No.16		
27	RF-Generator SMP03 (B3 Signal)	R&S	835133/011	3000002681-0003	26.08.2008	36	26.08.2011
28	Attenuator SMP-B15	R&S	835136/014	3000002681	S.No.22		
29	RF Rear Connection SMP-B19	R&S	834745/007	3000002681	S.No.22		
30	Power Meter NRVD	R&S	835430/044	3000002681-0004	26.08.2008	24	26.08.2010
31	Power Sensor NRVD-Z1	R&S	833894/012	3000002681-0013	26.08.2008	24	26.08.2010
32	Power Sensor NRVD-Z1	R&S	833894/011	3000002681-0010	26.08.2008	24	26.08.2010
33	Rubidium Standard RUB	R&S		3000002681-0009	27.08.2008	24	27.08.2010
34	Switching and Signal Conditioning Unit SSCU	R&S	338864/003	3000002681-0006	Verified with path compensation		
35	Laser Printer HP Deskjet 2100	HP	N/A	3000002681-0011	n.a.		
36	19" Rack	R&S	11138363000004	3000002681	n.a.		
37	RF-cable set	R&S	N/A	3000002681	n.a.		
39	IEEE-cables	R&S	N/A	3000002681	n.a.		
40	Sampling System FSIQ-B70	R&S	835355/009	3000002681	s.No.7		
41	RSP programmable attenuator	R&S	834500/010	3000002681-0007	26.08.2008	24	26.08.2010
42	Signalling Unit	R&S	838312/011	3000002681	n.a.		
43	NGPE programmable Power Supply for EUT	R&S	192.033.41	3000002681			
44	Power Splitter 6005-3	Inmet Corp.	none	300002841	23.12.2006	24	23.12.2008
45	SMA Cables SPS-1151-985-SPS	Insulated Wire	different	different	n.a.		
46	CBT32 with EDR Signaling Unit	R&S					
47	Coupling unit	Narda	N/A	--	n.a.		
48	2xSwitch Matrix PSU	R&S	872584/021	300001329	n.a.		
49	RF-cable set	R&S	N/A	different	n.a.		
50	IEEE-cables	R&S	N/A	--	n.a.		

Note: 3000002681-00xx inventoried as a system

*Anechoic chamber F:*

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Control Computer	F+W	FW0502032	300003303	-/-	-/-	-/-
2	Trilog Antenna VULB 9163	Schwarzbeck	295	300003787	01.04.2008	24	01.04.2010
3	Amplifier - 0518C-138	Veritech Microwave Inc.	-/-	-/-	-/-	-/-	-/-
4	Switch - 3488A	HP		300000368	-/-	-/-	-/-
5	EMI Test receiver - ESCI	R&S	100083	300003312	31.01.2007	24	31.01.2009
6	Turntable Controller - 1061 3M	EMCO	1218	300000661	-/-	-/-	-/-
7	Tower Controller 1051 Controller	EMCO	1262	300000625	-/-	-/-	-/-
8	Tower - 1051	EMCO	1262	300000625	-/-	-/-	-/-
10	Ultra Notch-Filter Rejected band Ch. 62	WRCD	9	-/-	-/-	-/-	-/-

## **7 Photographs of the Test Set-up and EUT are in the Annex**