



## 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. : 4-3103-01-11/08**  
**Type identification : MCW-D 531 / MCW-D 533**  
**Applicant : beyerdynamic GmbH & Co. KG**  
**FCC ID : OSDMCWD53X**  
**IC Certification No : 3628A-MCWD53X**  
**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.

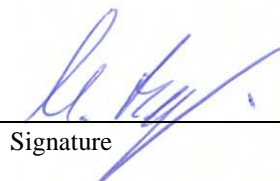
#### Test laboratory manager:

2009-02-12      Jakob Reschke  
Date                      Name

  
Signature

#### Technical responsibility for area of testing:

2009-02-12      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>	beyerdynamic GmbH & Co. KG
<b>Street:</b>	Theresienstraße 8
<b>Town:</b>	74072 Heilbronn
<b>Country:</b>	Germany
<b>Telephone:</b>	+49 (0) 7131 61 71-0
<b>Fax:</b>	+49 (0) 7131 617 215
<b>Contact:</b>	Herrn Ulrich Roth
<b>E-mail:</b>	roth@beyerdynamic.de
<b>Telephone:</b>	+49 (0) 7131 617 155

## 1.4 Application details

<b>Date of receipt of order:</b>	2008-09-10
<b>Date of receipt of test item:</b>	2008-09-10
<b>Date of start test:</b>	2008-09-10
<b>Date of end test:</b>	2009-02-12
<b>Persons(s) who have been present during the test:</b>	-/-

## 2 Test standard/s:

47 CFR Part 15	2007-09	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>beyerdynamic GmbH &amp; Co. KG</b>
Street:	<b>Theresienstraße 8</b>
Town:	<b>74072 Heilbronn</b>
Country:	<b>Germany</b>

##### 3.1.1 Test item

Kind of test item :	<b>Konferenzsystem</b>
Type identification :	<b>MCW-D 531 / MCW-D 533</b>
S/N serial number :	<b>Prototype</b>
HW hardware status :	<b>-/-</b>
SW software status :	<b>-/-</b>
Frequency Band [MHz] :	<b>ISM 2.400 - 2.483,5</b>
Type of Modulation :	<b>DSSS</b>
Number of channels :	<b>3</b>
Antenna :	<b>Integrated antenna</b>
Power Supply :	<b>9.6 V DC by Battery or 230 V by Charger</b>
Temperature Range :	<b>22 °C</b>

Max. power radiated: **20.60 dBm**

Max. power conducted: **18.73 dBm**

FCC ID: **OSDMCWD53X**

IC: **3628A-MCWD53X**

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

IC Registration Number:	<b>3628A-MCWD53X</b>
Model Name:	<b>MCW-D 531 / MCW-D 533</b>
Manufacturer (complete Address):	<b>beyerdynamic GmbH &amp; Co. KG Theresienstraße 8 74072 Heilbronn Germany</b>
Tested to Radio Standards Specification (RSS) No.:	<b>RSS-210 Issue 7</b>
Open Area Test Site Industry Canada Number:	<b>IC 3463A-1</b>
Frequency Range (or fixed frequency) [MHz]:	<b>2400 – 2483.5 MHz</b>
RF: Power [W] (max):	<b>Rad. EIRP: 114.82 mW Cond.: 76.64 mW</b>
Antenna Type:	<b>Integrated antenna</b>
Field Strength [dBµV/m in 3m]:	<b>115.10</b>
Occupied Bandwidth (99% BW) [kHz]:	<b>13301</b>
Type of Modulation:	<b>DSSS</b>
Emission Designator (TRC-43):	<b>13M3G1D (DSSS)</b>
Transmitter Spurious (worst case) [µV/m in 3m]:	<b>384</b>
Receiver Spurious (worst case) [µV/m in 3m]:	<b>125</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: 2009-02-12

**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: **3628A**
2. MODEL NUMBER: **MCW-D 531 / MCW-D 533**
3. MANUFACTURER: **beyerdynamic GmbH & Co. KG**
4. TYPE OF EVALUATION: **(c) RF Evaluation**

- Evaluated against exposure limits: General Public Use  Controlled Use
  - Duty cycle used in evaluation: 40 %
  - Standard used for evaluation: RSS-102 Issue 2 (2005-11)
  - Measurement distance: 0.20 m
  - RF value: 0.23 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	22
Nominal Humidity	H <sub>nom</sub>	%	58
Nominal Power Source	V <sub>nom</sub>	V	9.6

Type of power source: **DC by Battery or 230 V by Charger**

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	2009-02-12	-/-

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, bi-conical antenna

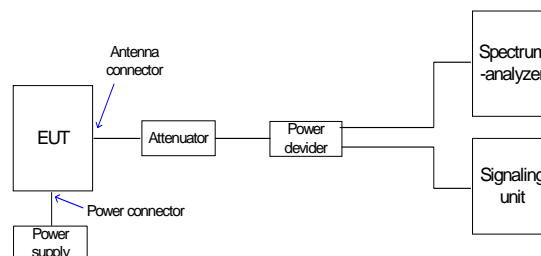
200MHz - 1GHz: Quasi Peak measurement, 120 kHz Bandwidth, log periodic antenna

>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

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## 5.3 Additional comments

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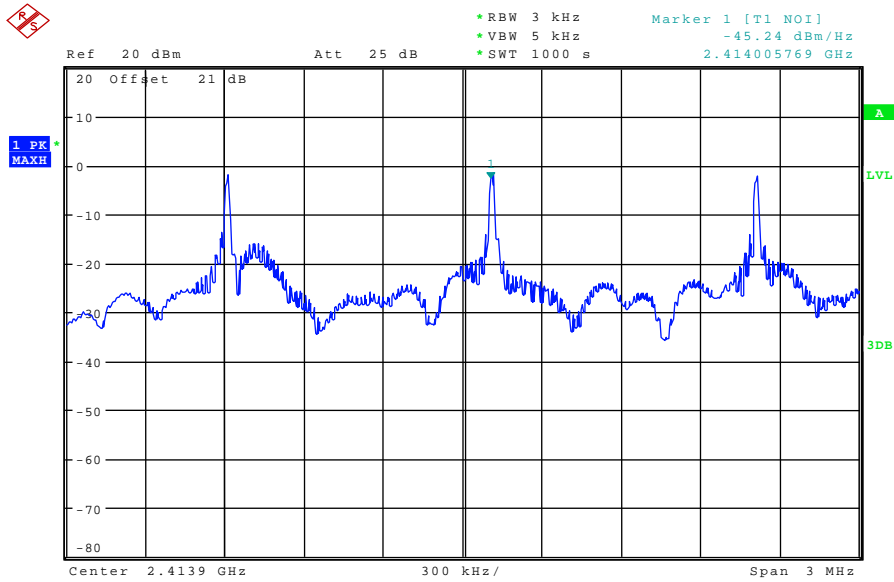
## 5.4 Antenna gain

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

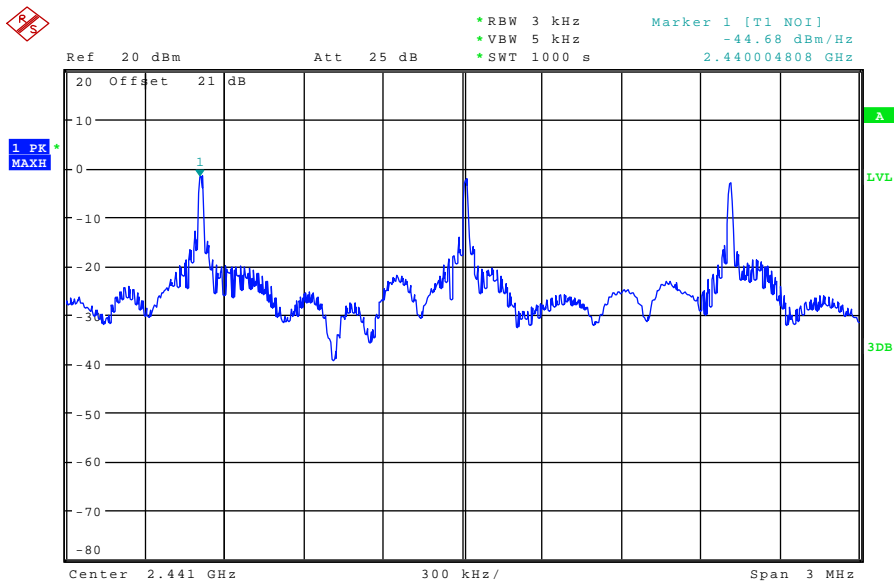
	low channel	mid channel	high channel
Conducted power [dBm] <i>(measured)</i>	18.64	18.73	18.41
Radiated power [dBm] <i>(measured)</i>	20.60	20.22	20.35
Gain [dBi] <i>(calculated)</i>	+1.96	+1.49	+1.94

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

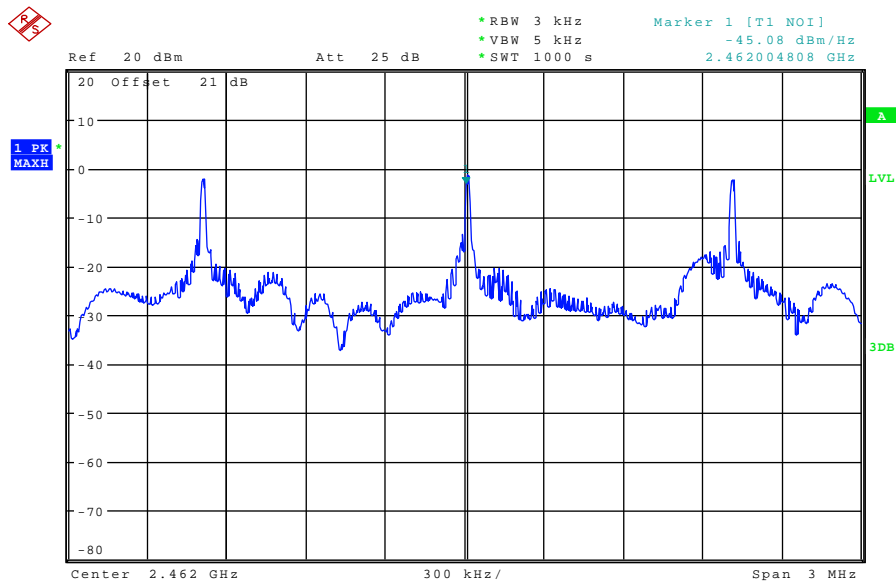
Plot 1: (result calculated by the Signal analyzer FSIQ 26 from Rohde & Schwarz)



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: -45.24 dBm/Hz = -10.41 dBm / 3 kHz  
 Plot 2: Power density: -44.63 dBm/Hz = -9.83 dBm / 3 kHz  
 Plot 3: Power density: -45.08 dBm/Hz = -10.28 dBm / 3 kHz

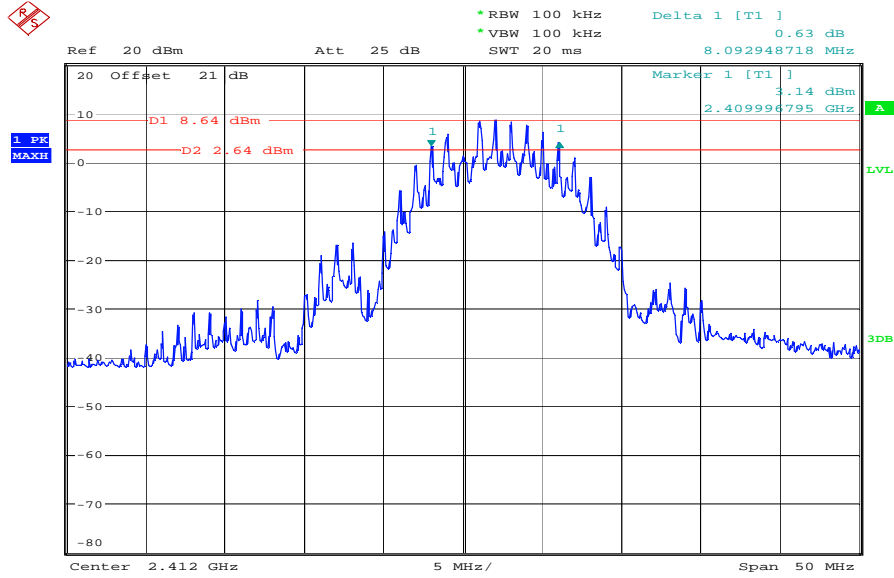
Correction factor from dBm/Hz to dBm/3 kHz is +34,8 dB

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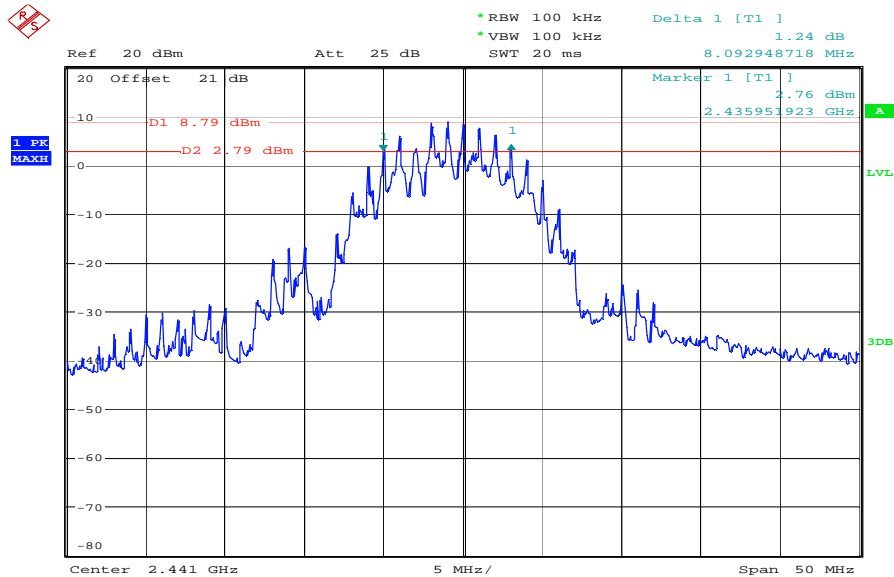
5.6 Spectrum Bandwidth of a DSSS System / 6 dB Bandwidth §15.247(a)(2)

Plot 1:



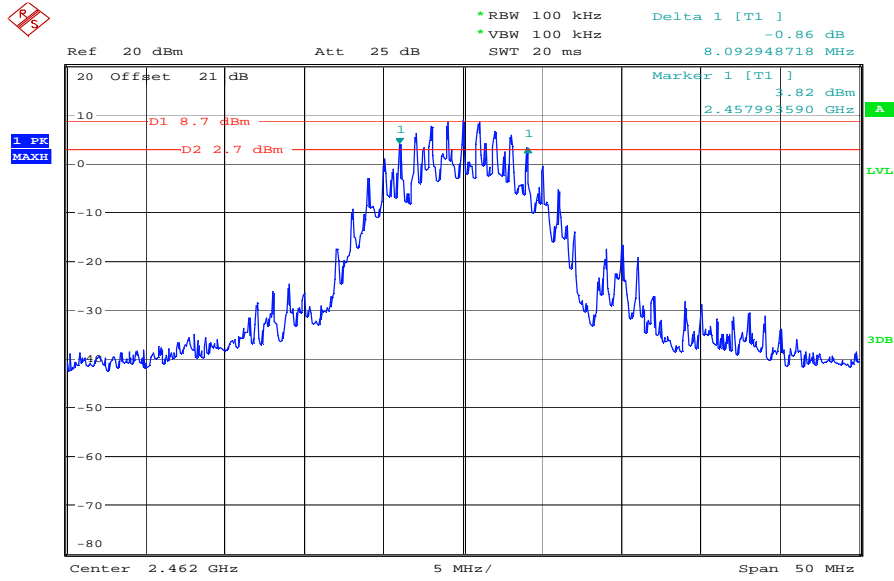
Date: 11.FEB.2009 10:14:28

Plot 2:



Date: 11.FEB.2009 10:15:57

Plot 3:



Date: 11.FEB.2009 10:18:19

Results:

Test conditions		6 dB BANDWIDTH [MHz]		
Frequency [MHz]		2412	2437	2462
T <sub>nom</sub>	V <sub>nom</sub>	8.093	8.093	8.093
Measurement uncertainty		±1kHz		

RBW: 100 kHz / VBW 100 kHz

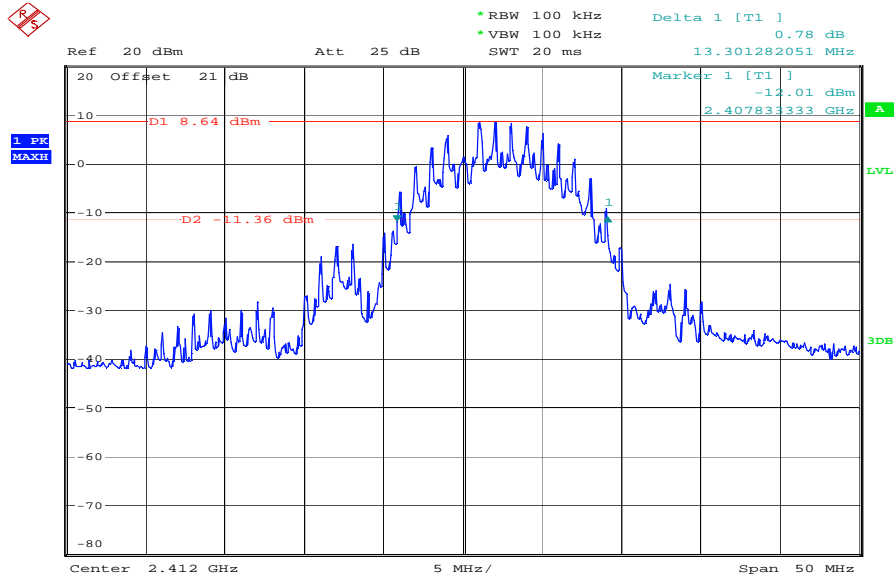
Limits:

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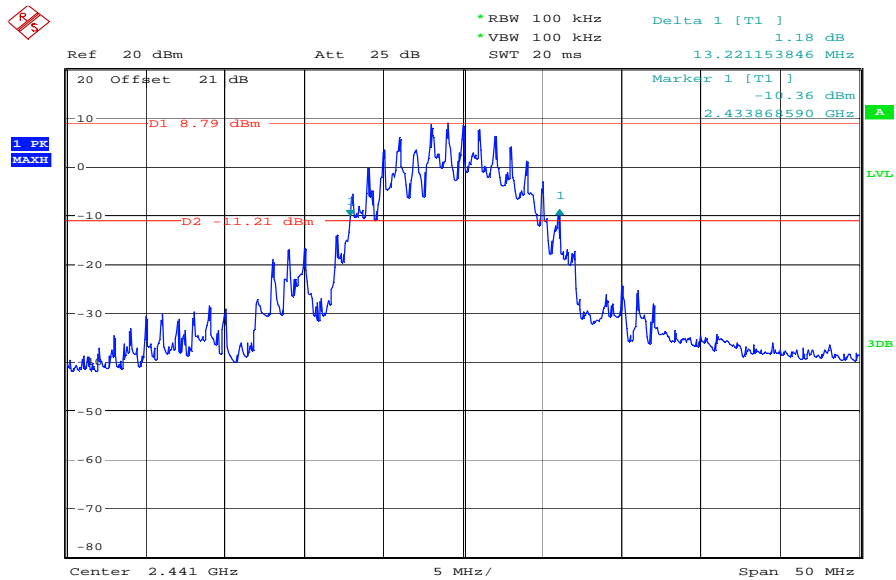
### 5.7 Spectrum Bandwidth of a DSSS System / 20 dB Bandwidth

Plot 1:



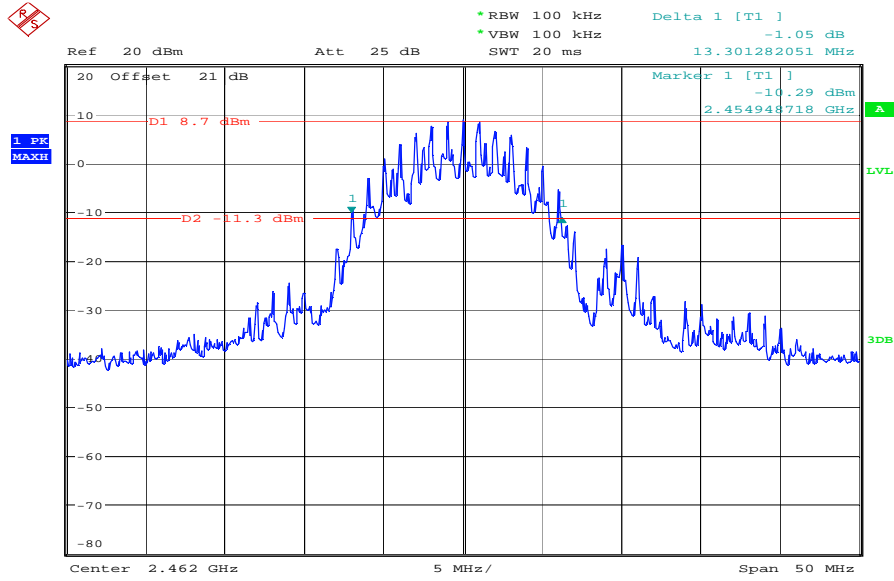
Date: 11.FEB.2009 10:14:58

Plot 2:



Date: 11.FEB.2009 10:16:46

Plot 3:



Date: 11.FEB.2009 10:18:47

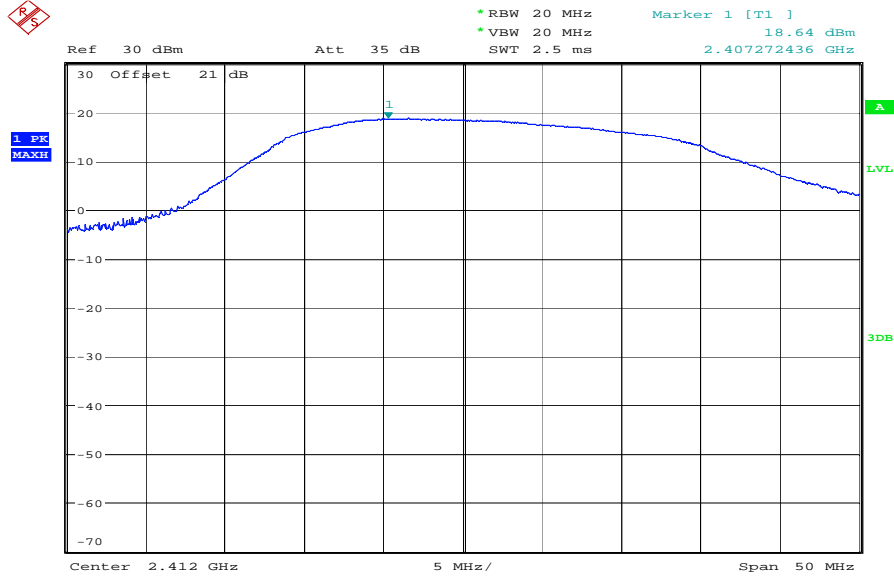
Results:

Test conditions		20 dB BANDWIDTH [MHz]		
		2412	2437	2462
Frequency [MHz]		2412	2437	2462
T <sub>nom</sub>	V <sub>nom</sub>	13.301	13.221	13.301
Measurement uncertainty		±1kHz		

RBW: 100 kHz / VBW: 100 kHz

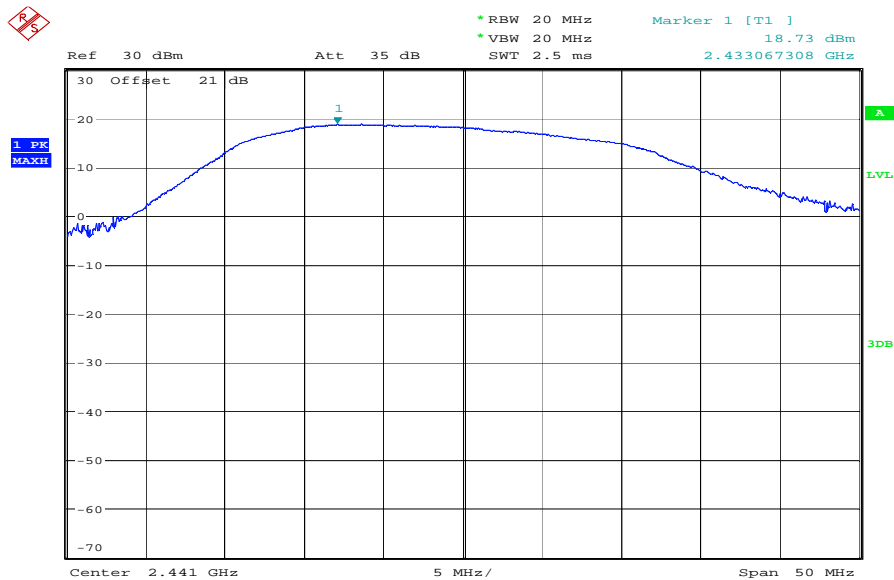
### 5.8 Maximum output power (conducted) §15.247 (b)(3)

Plot 1:



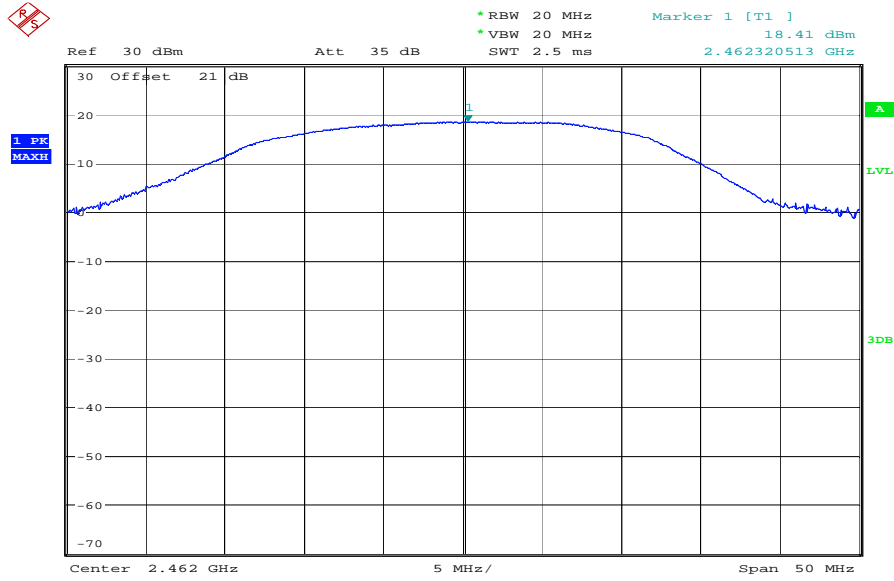
Date: 11.FEB.2009 10:07:53

Plot 2:



Date: 11.FEB.2009 10:09:32

Plot 3:



Date: 11.FEB.2009 10:08:54

Results:

Test conditions		Max. peak output power [dBm]		
		2412	2437	2462
Frequency [MHz]				
T <sub>nom</sub>	V <sub>nom</sub>	18.64	18.73	18.41
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/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 isotropically radiated power

#### Calculation:

(Calculated for max. EIRP)

EIRP: 20.60 dBm (114.82 mW)

calculated at distance of 20 cm:

$$\text{power density} = 114.82/4\pi 20^2 = 0.023 \text{ mW/ cm}^2$$

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>	20.60	20.22	20.35
Measurement uncertainty		±3dB		

RBW: 50 MHz

VBW: 30 MHz

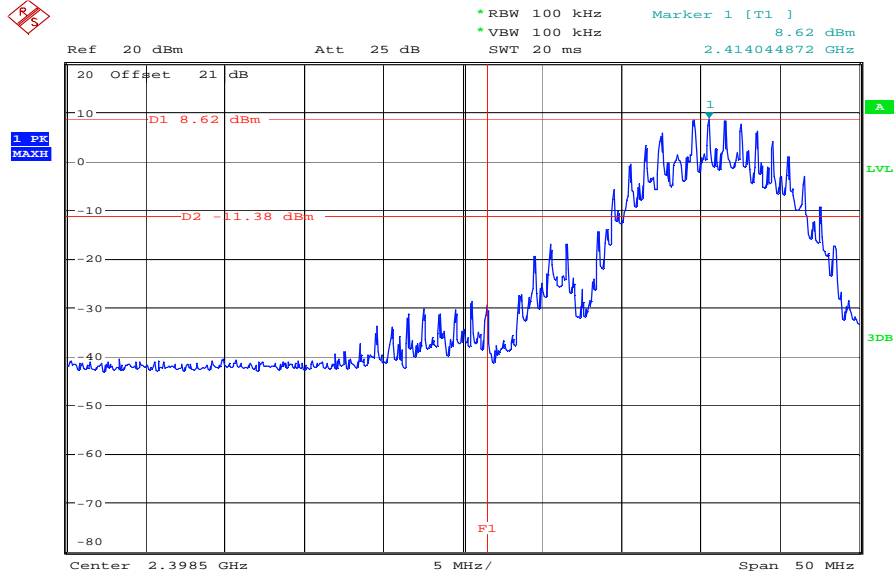
Measured at a distance of 3m

Limits:

Under normal test conditions only, for frequency range 2400-2483.5 MHz	Max. 1.0 Watt
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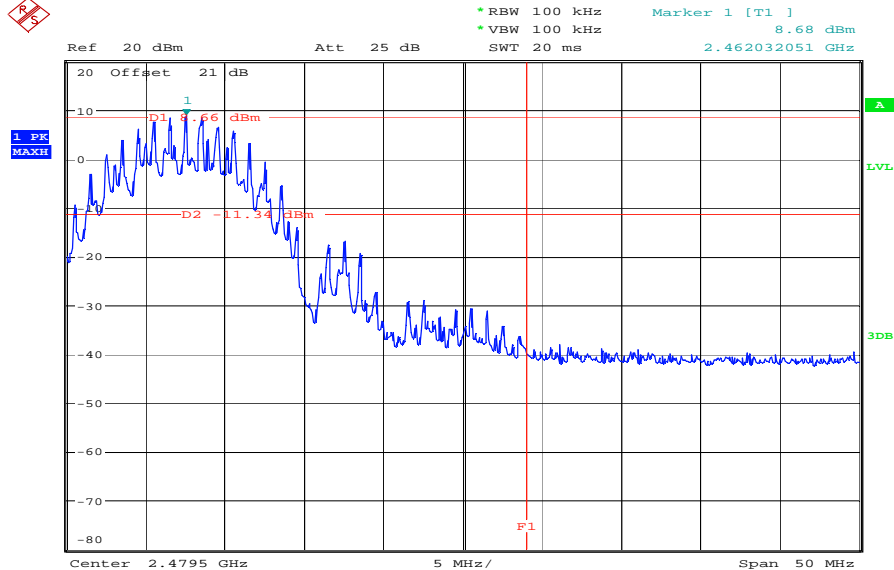
5.10 Band-edge compliance of conducted emissions §15.247 (d)

Plot 1: lowest channel



Date: 11.FEB.2009 10:21:03

Plot 2: highest channel



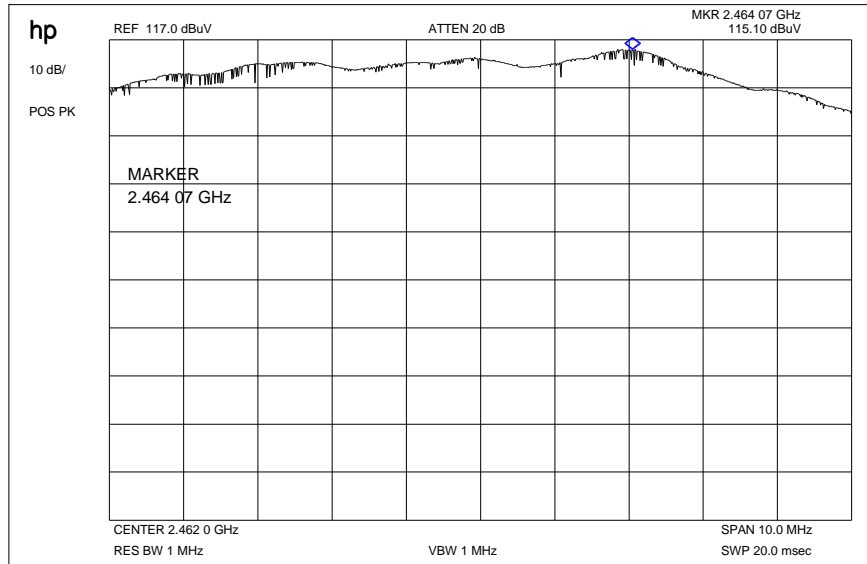
Date: 11.FEB.2009 10:20:03

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**

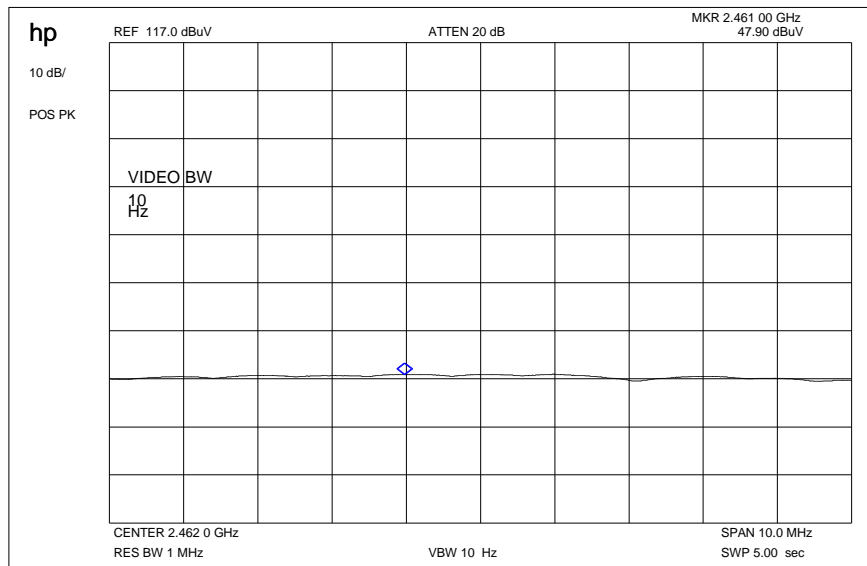
Plot 1: Max field strength in 3m distance (single frequency) peak



Result:

Frequency	Meter reading	Correction factor	Results
2462 MHz	115.10	-6.4 dB	108.70

Plot 2 : Max field strength in 3m distance (single frequency) average

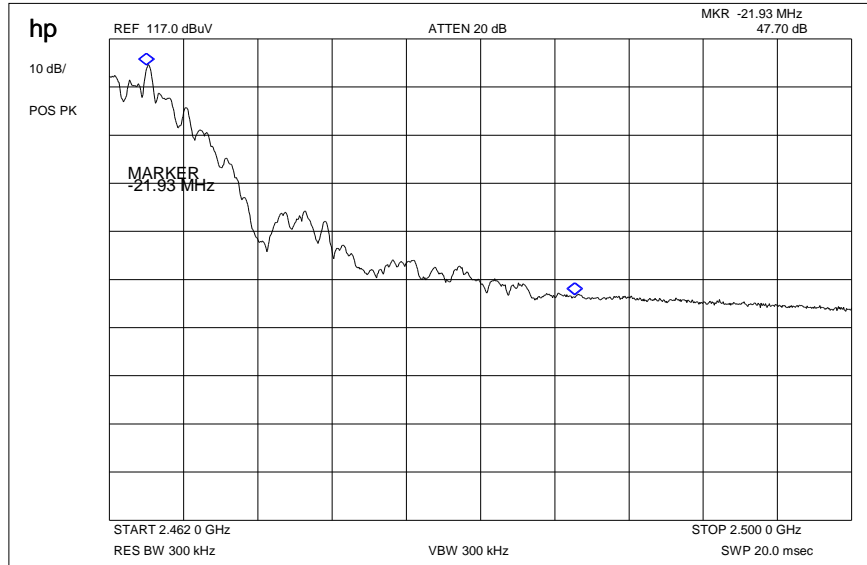


Result:

Frequency	Meter reading	Correction factor	Results
2462 MHz	47.90	-6.4 dB	41.50



Plot 3: Marker-Delta Method RBW/VBW = 300 kHz



Result:

Marker-Delta-Value: 47.70 dB

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

Results & Limits:

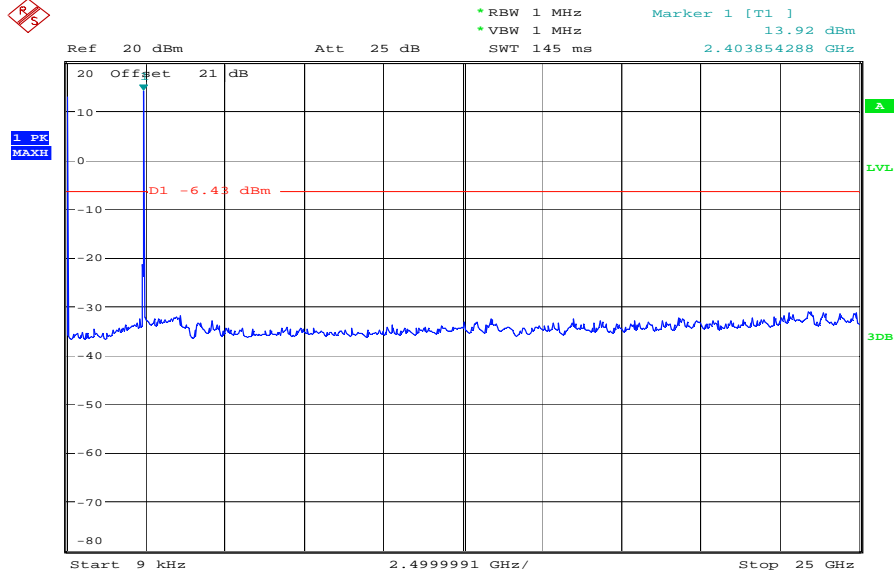
Radiated field strength

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	115.10 dB $\mu$ V/m	-6.4 dB	108.70 dB $\mu$ V/m
Max. average value	1 MHz RBW 10 Hz VBW	47.90 dB $\mu$ V/m	-6.4 dB	41.50 dB $\mu$ V/m
Delta value	Peak 300 kHz RBW/VBW	47.70 dB		
Value at band edge	limit 54 dB $\mu$ V/m			Calculated -6.20 dB $\mu$ V/m
Statement:				<b>Complies</b>

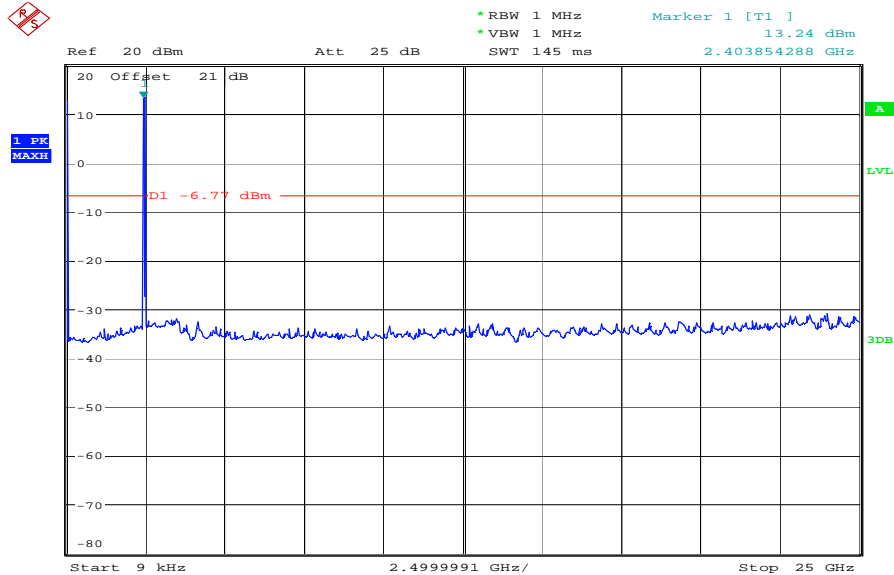
### 5.12 Spurious Emissions - conducted (Transmitter) §15.247 (c)

Plot 1: Lowest Channel



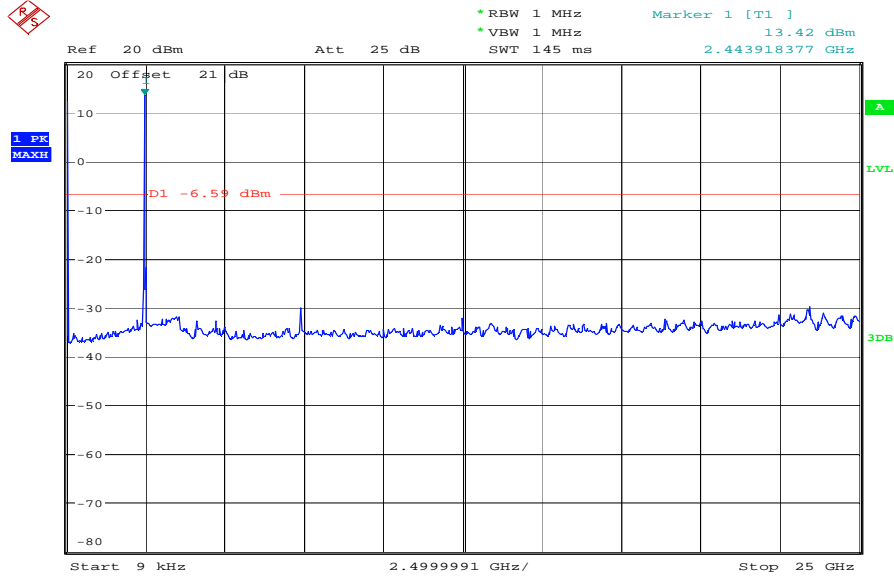
Date: 11.FEB.2009 10:22:45

Plot 2: Middle Channel



Date: 11.FEB.2009 10:23:27

Plot 3: Highest Channel



Date: 11.FEB.2009 10:24:11

Result & Limits:

Emission Limitations					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2412		13.92	30 dBm	-	Operating frequency
			-20 dBc		
2437		13.24	30 dBm		Operating frequency
			-20 dBc		
2462		13.42	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.

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

Plot 1: 0.03 - 1 GHz (lowest channel)

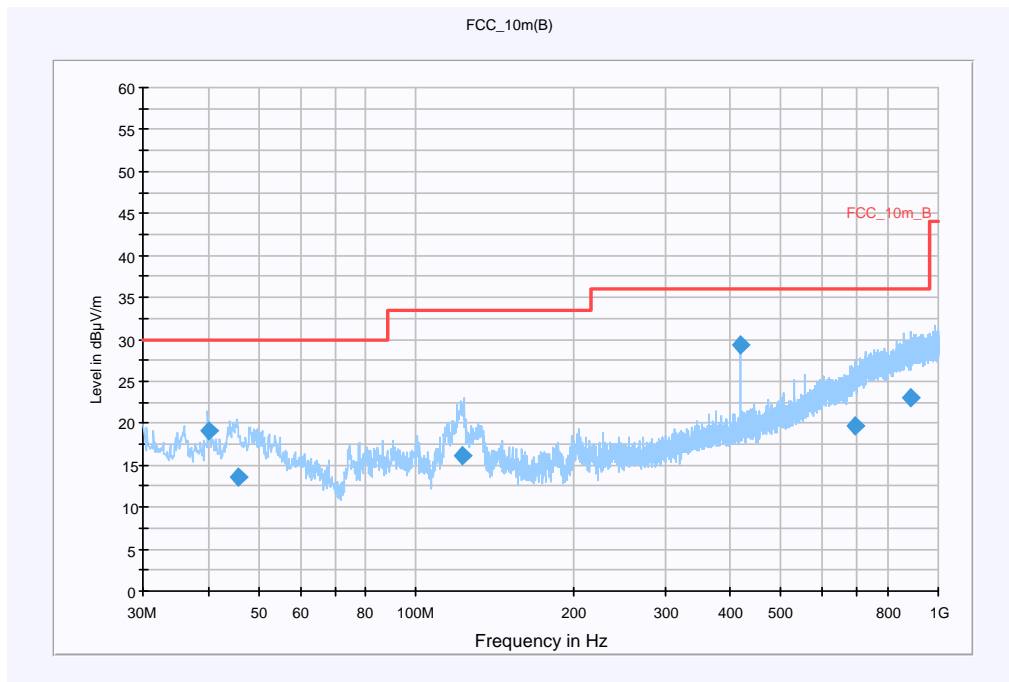
**Common Information**

EUT:	MCW-D 53X + CA 2457
Serial Number:	none + TR10R180-01A1
Test Description:	FCC @ 10 m
Operating Conditions:	Transmit continuous bottom frequency (2414 MHz)
Operator Name:	Folz
Comment:	Powered with AC 115V/ 60 Hz

**Scan Setup: FCC\_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)
40.023200	19.1	15000.000	120.000	107.0	H	56.0	13.6	10.9	30.0
45.754000	13.5	15000.000	120.000	135.0	V	27.0	13.4	16.5	30.0
123.141350	16.1	15000.000	120.000	146.0	V	50.0	10.3	17.4	33.5
418.014250	29.3	15000.000	120.000	266.0	H	209.0	17.2	6.7	36.0
691.643800	19.7	15000.000	120.000	200.0	H	22.0	22.4	16.3	36.0
883.382100	22.9	15000.000	120.000	400.0	H	55.0	25.6	13.1	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 3.32, CAL 07.01.2009

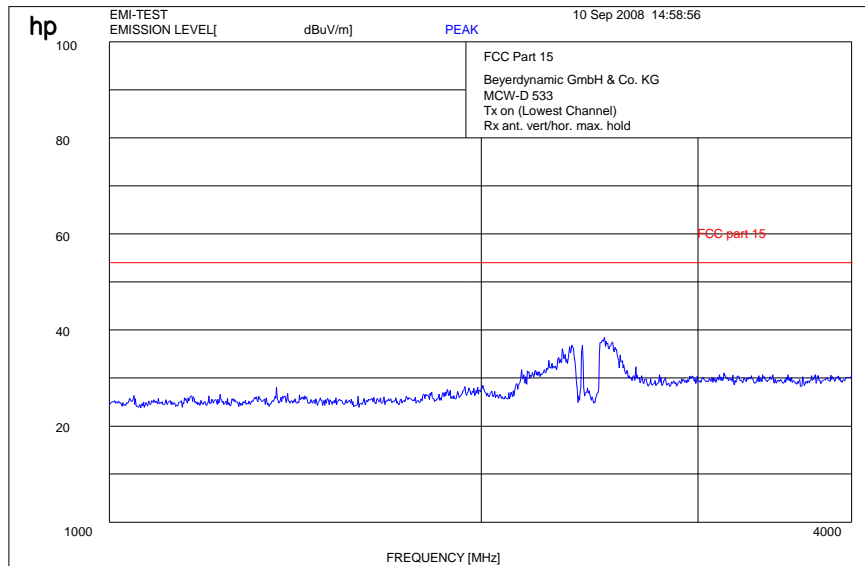
Signal Path: without Notch  
FW 1.0

Antenna: VULB 9163  
SN 9163-295, FW ---, CAL 08.04.2010  
Correction Table (vertical): VULP6113  
Correction Table (horizontal): VULP6113  
Correction Table: Cabel with switch (0908)

Antenna Tower: Tower [EMCO 2090 Antenna Tower]  
@ GPIB0 (ADR 8), FW REV 3.12

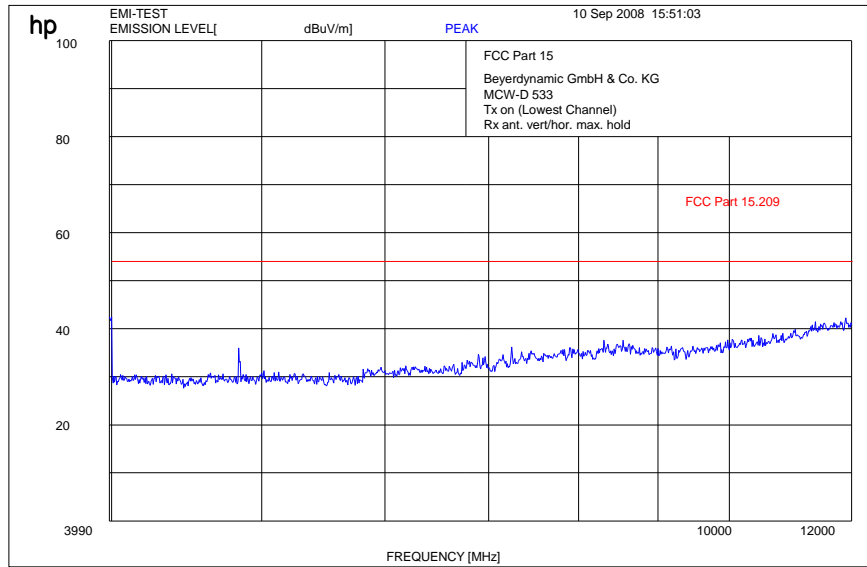
Turntable: Turntable [EMCO Turntable]  
@ GPIB0 (ADR 9), FW REV 3.12

Plot 2: 1 - 4 GHz (lowest channel)

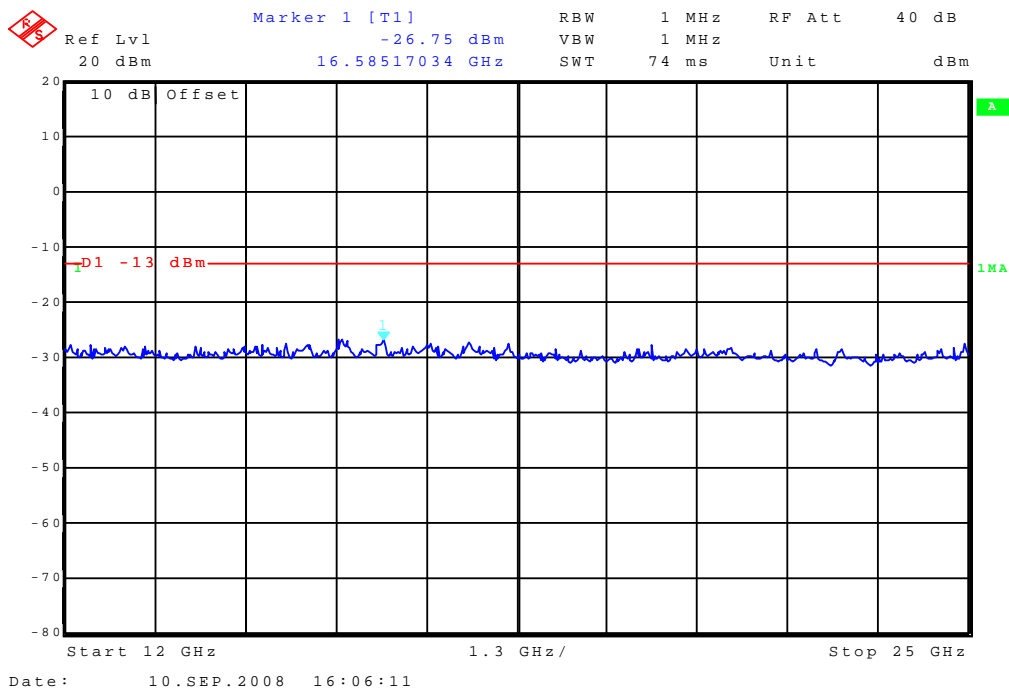


Carrier notched with 2.4 GHz rejection filter

Plot 3: 4- 12 GHz (lowest channel)



Plot 4: 12- 25 GHz (valid for all channels)



Plot 5: 0.03 - 1 GHz (middle channel)

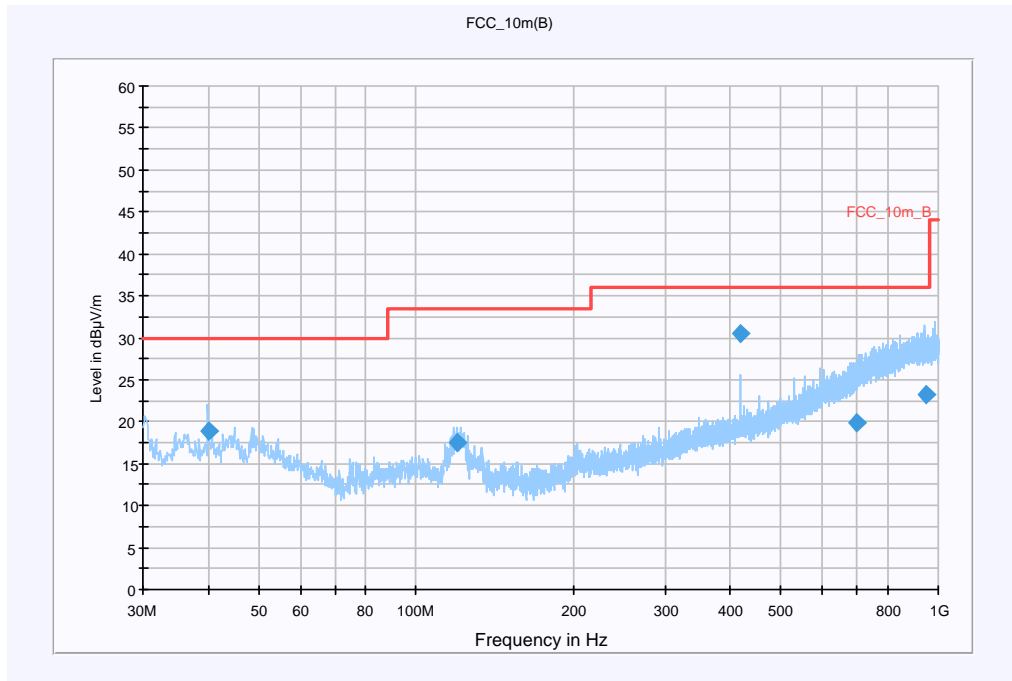
**Common Information**

EUT:	MCW-D 53X + CA 2457
Serial Number:	none + TR10R180-01A1
Test Description:	FCC @ 10 m
Operating Conditions:	Transmit continuous mid frequency (2440 MHz)
Operator Name:	Folz
Comment:	Powered with AC 115V/ 60 Hz

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

Hardware Setup:	Electric Field (NOS)
Level Unit:	dB $\mu$ V/m

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



**Final Result 1**

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)
39.978050	18.8	15000.000	120.000	100.0	V	243.0	13.6	11.2	30.0
120.031150	17.5	15000.000	120.000	200.0	V	262.0	10.5	16.0	33.5
418.011400	30.5	15000.000	120.000	200.0	H	348.0	17.2	5.5	36.0
697.686750	19.9	15000.000	120.000	400.0	V	265.0	22.5	16.1	36.0
944.248100	23.2	15000.000	120.000	214.0	V	123.0	25.9	12.8	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 3.32, CAL 07.01.2009

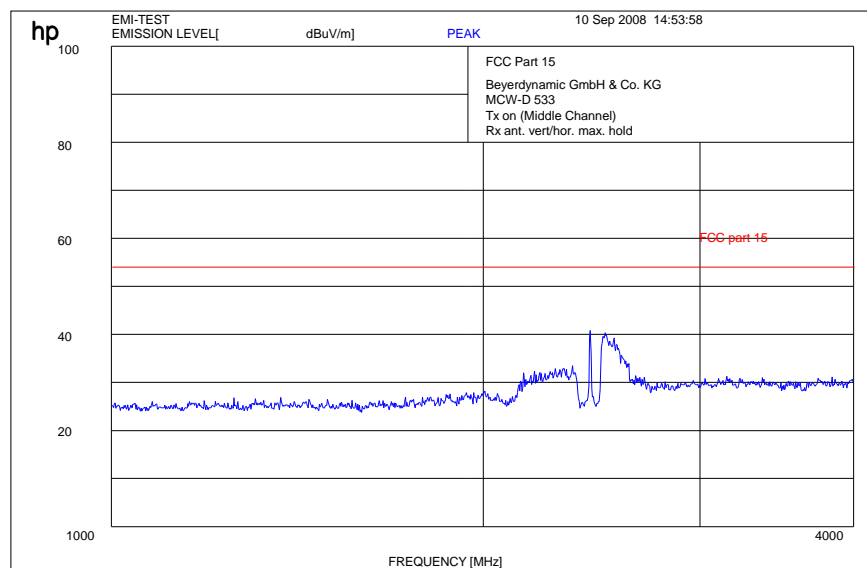
Signal Path: without Notch  
FW 1.0

Antenna: VULB 9163  
SN 9163-295, FW ---, CAL 08.04.2010  
Correction Table (vertical): VULP6113  
Correction Table (horizontal): VULP6113  
Correction Table: Cabel with switch (0908)

Antenna Tower: Tower [EMCO 2090 Antenna Tower]  
@ GPIB0 (ADR 8), FW REV 3.12

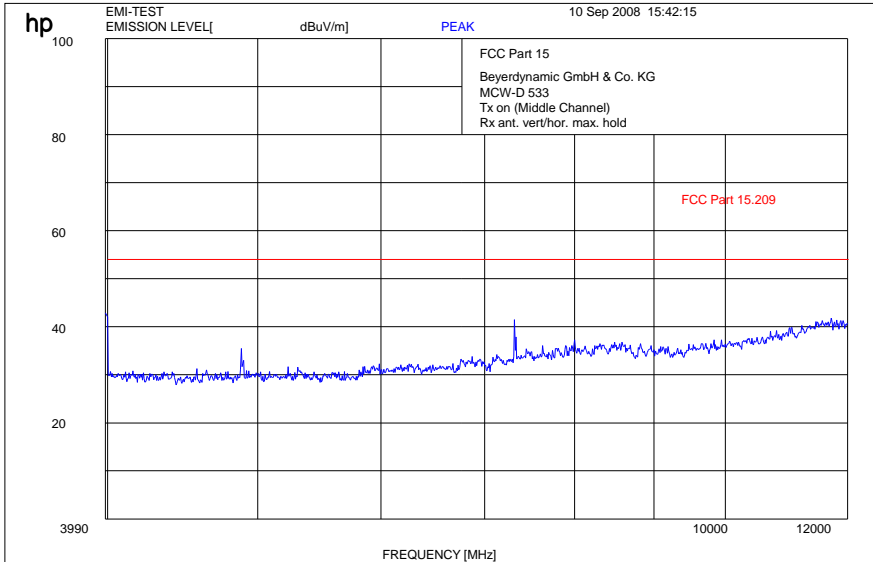
Turntable: Turntable [EMCO Turntable]  
@ GPIB0 (ADR 9), FW REV 3.12

Plot 6: 1 - 4 GHz (middle channel)





Plot 7: 4- 12 GHz (middle channel)



Plot 8: 0.03 - 1 GHz (highest channel)

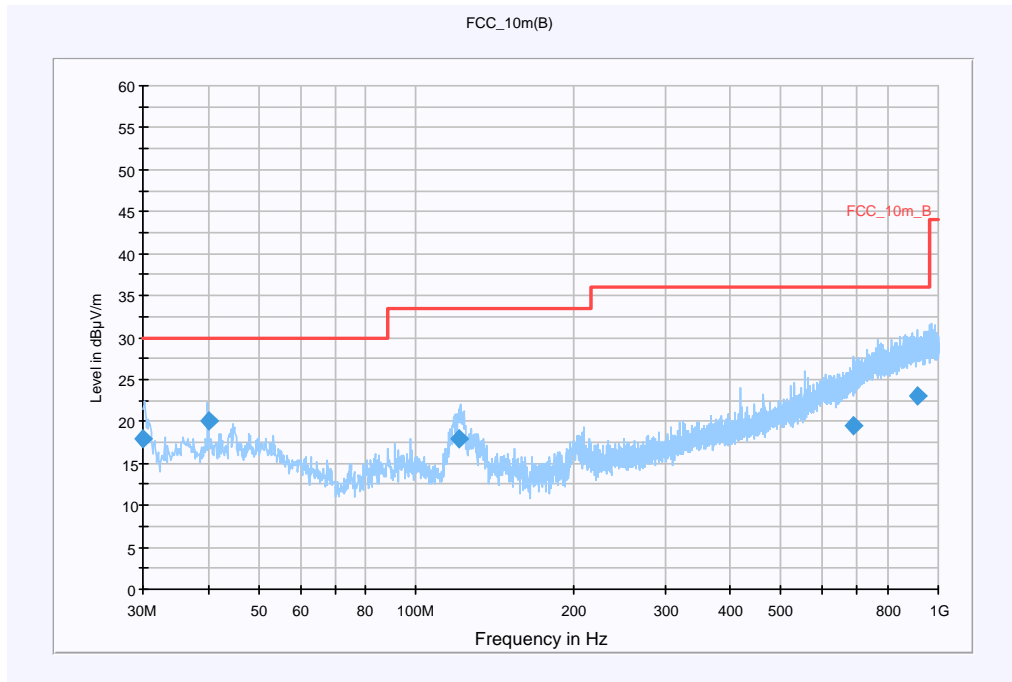
**Common Information**

EUT:	MCW-D 53X + CA 2457
Serial Number:	none + TR10R180-01A1
Test Description:	FCC @ 10 m
Operating Conditions:	Transmit continuous top frequency (2462 MHz)
Operator Name:	Folz
Comment:	Powered with AC 115V/ 60 Hz

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

Hardware Setup:	Electric Field (NOS)
Level Unit:	dB $\mu$ V/m

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



**Final Result 1**

Frequency (MHz)	QuasiPeak (dB $\mu$ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V/m)
30.099626	17.9	15000.000	120.000	111.0	V	227.0	12.6	12.1	30.0
40.007600	20.1	15000.000	120.000	100.0	V	23.0	13.6	9.9	30.0
121.019000	17.9	15000.000	120.000	149.0	V	323.0	10.5	15.6	33.5
687.655250	19.5	15000.000	120.000	400.0	V	218.0	22.3	16.5	36.0
913.469700	23.0	15000.000	120.000	200.0	V	212.0	25.8	13.0	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 3.32, CAL 07.01.2009

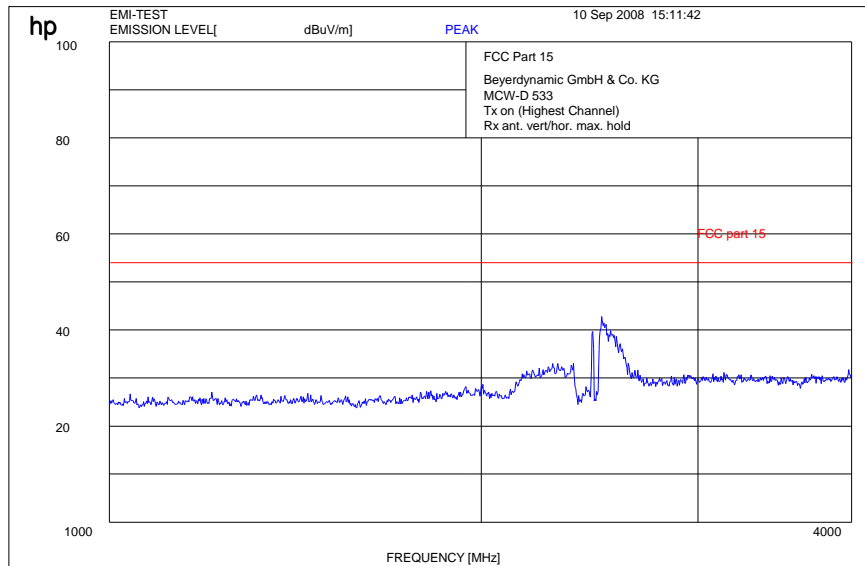
Signal Path: without Notch  
FW 1.0

Antenna: VULB 9163  
SN 9163-295, FW ---, CAL 08.04.2010  
Correction Table (vertical): VULP6113  
Correction Table (horizontal): VULP6113  
Correction Table: Cabel with switch (0908)

Antenna Tower: Tower [EMCO 2090 Antenna Tower]  
@ GPIB0 (ADR 8), FW REV 3.12

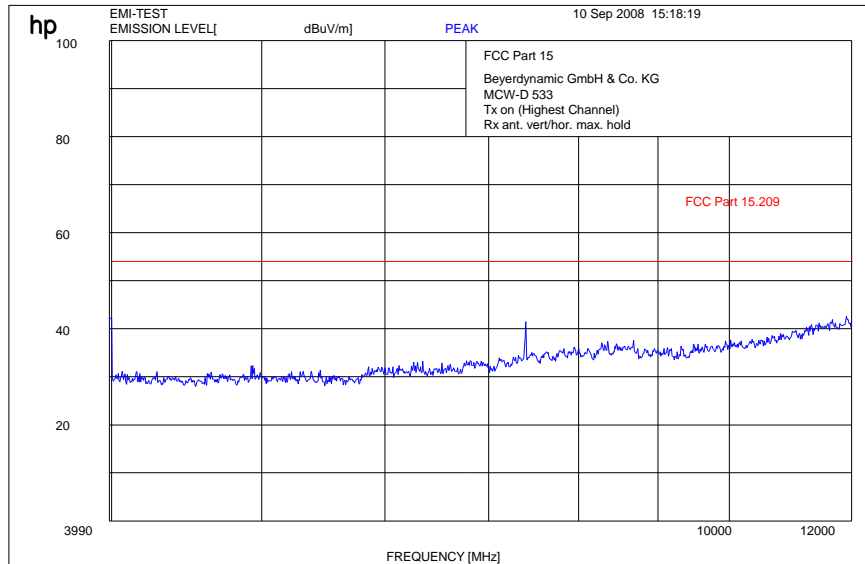
Turntable: Turntable [EMCO Turntable]  
@ GPIB0 (ADR 9), FW REV 3.12

Plot 9: 1 - 4 GHz (highest channel)



Carrier notched with 2.4 GHz rejection filter

Plot 10: 4- 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]
7236	PK	47.21	4884	PK	42.45	4924	PK	48.80
			7326	PK	50.68	7386	PK	51.96
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)

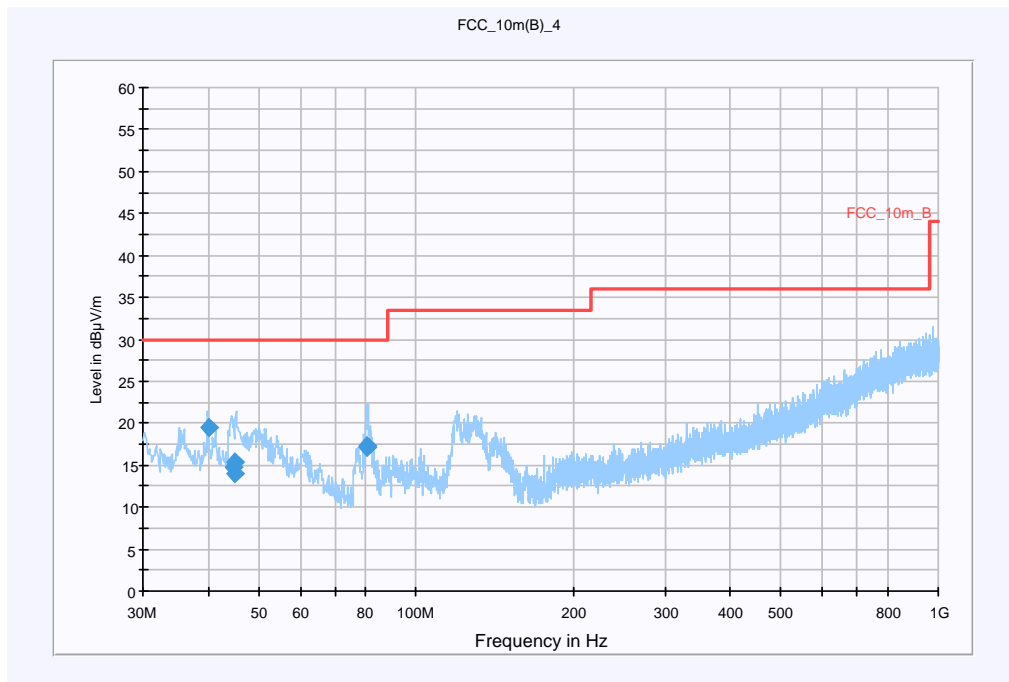
**Common Information**

EUT:	MCW-D 53X + CA 2457
Serial Number:	none + TR10R180-01A1
Test Description:	FCC @ 10 m
Operating Conditions:	Rx/ stand-by
Operator Name:	Folz
Comment:	Powered with AC 115V/ 60 Hz

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

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

Subrange		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)
39.990350	19.4	15000.000	120.000	107.0	H	286.0	13.6	10.6	30.0
44.707050	14.9	15000.000	120.000	107.0	V	323.0	13.4	15.1	30.0
44.845400	15.4	15000.000	120.000	100.0	V	190.0	13.4	14.6	30.0
45.116200	14.0	15000.000	120.000	220.0	V	14.0	13.4	16.0	30.0
80.247750	17.3	15000.000	120.000	220.0	V	287.0	9.4	12.7	30.0
80.394150	17.0	15000.000	120.000	220.0	V	288.0	9.4	13.0	30.0

**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 3.32, CAL 07.01.2009

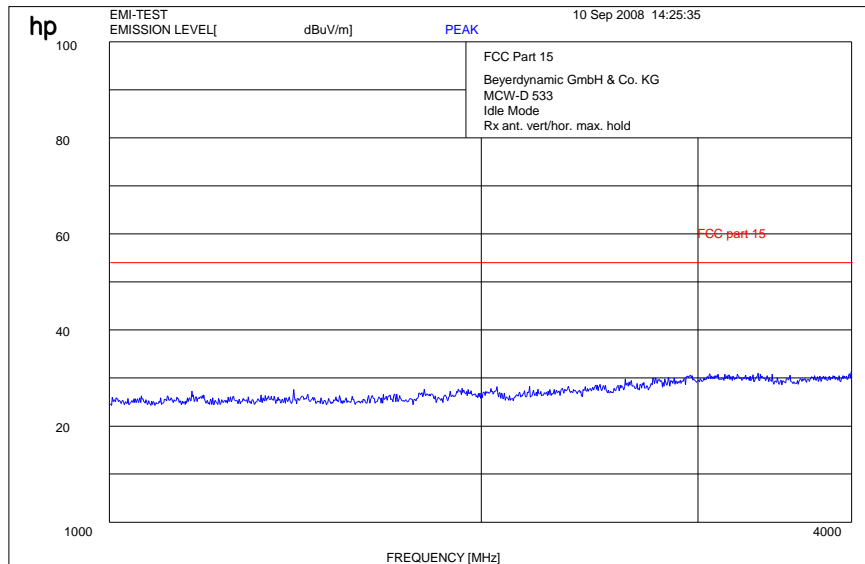
Signal Path: without Notch  
FW 1.0

Antenna: VULB 9163  
SN 9163-295, FW ---, CAL 08.04.2010  
Correction Table (vertical): VULP6113  
Correction Table (horizontal): VULP6113  
Correction Table: Cabel with switch (0908)

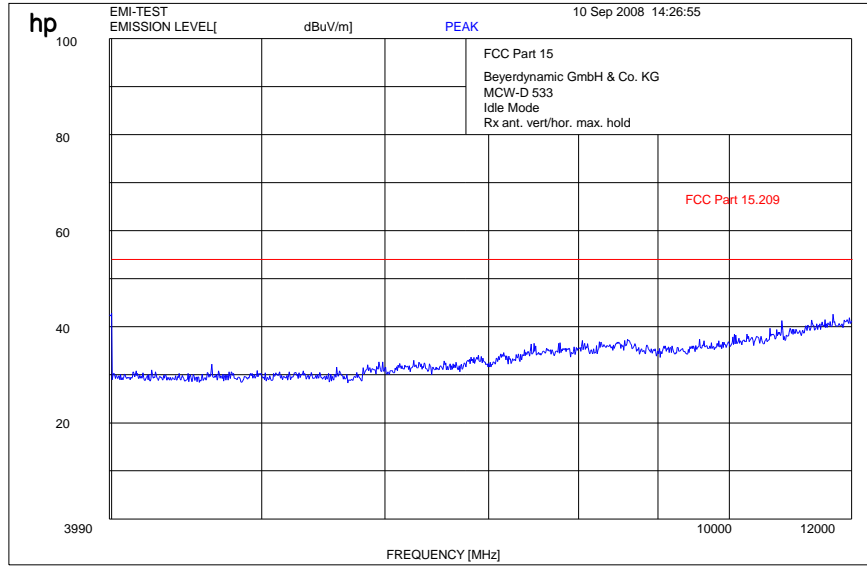
Antenna Tower: Tower [EMCO 2090 Antenna Tower]  
@ GPIB0 (ADR 8), FW REV 3.12

Turntable: Turntable [EMCO Turntable]  
@ GPIB0 (ADR 9), FW REV 3.12

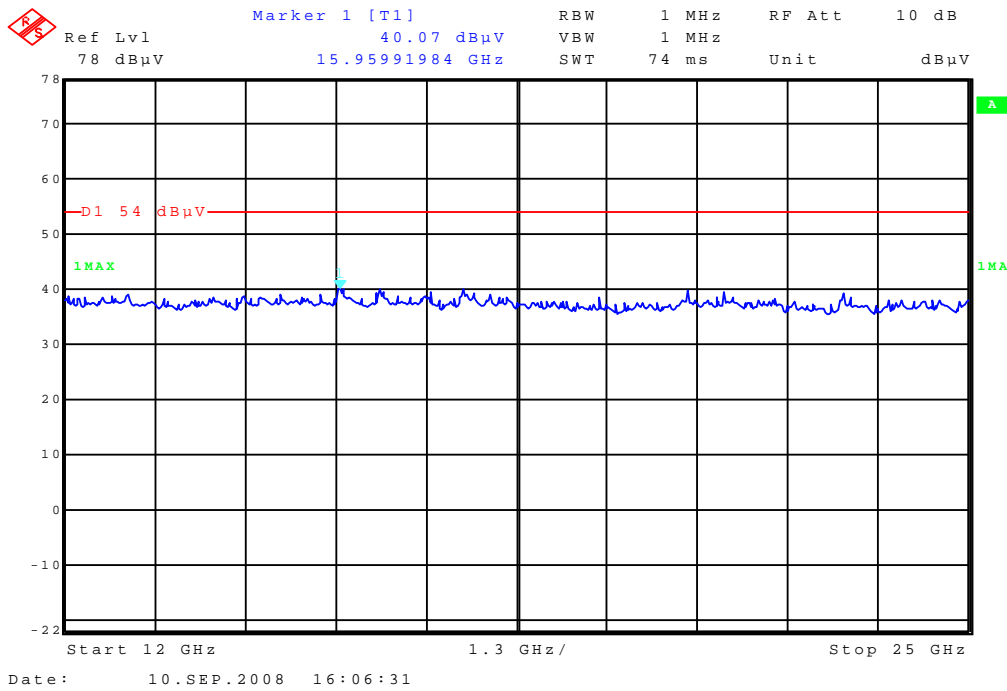
Plot 2: 1 - 4 GHz vertical / horizontal (receiver)



Plot 3: 4- 12 GHz (receiver)



Plot 4: 12- 25 GHz (receiver)



Results:

Spurious Emissions level [dB $\mu$ V/m]		
f[MHz]	Detector	Level [dB $\mu$ V/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 (dB $\mu$ V/m)	Measurement distance (m)
30 - 88	30.0	10
88 - 216	33.5	10
216 - 960	36.0	10
above 960	54.0	3

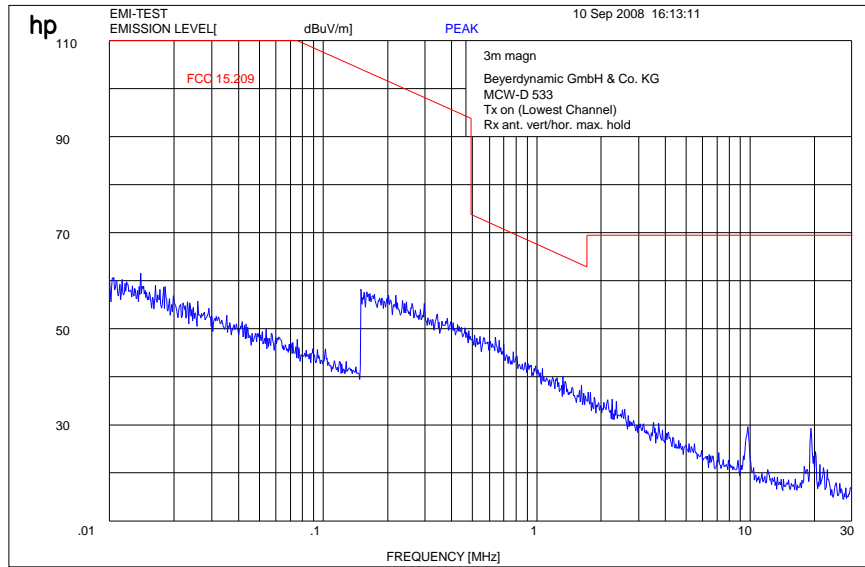


**5.15 Spurious Emissions - radiated <30 MHz §15.209**

Measured at 3 m distance.

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

Plot 1:

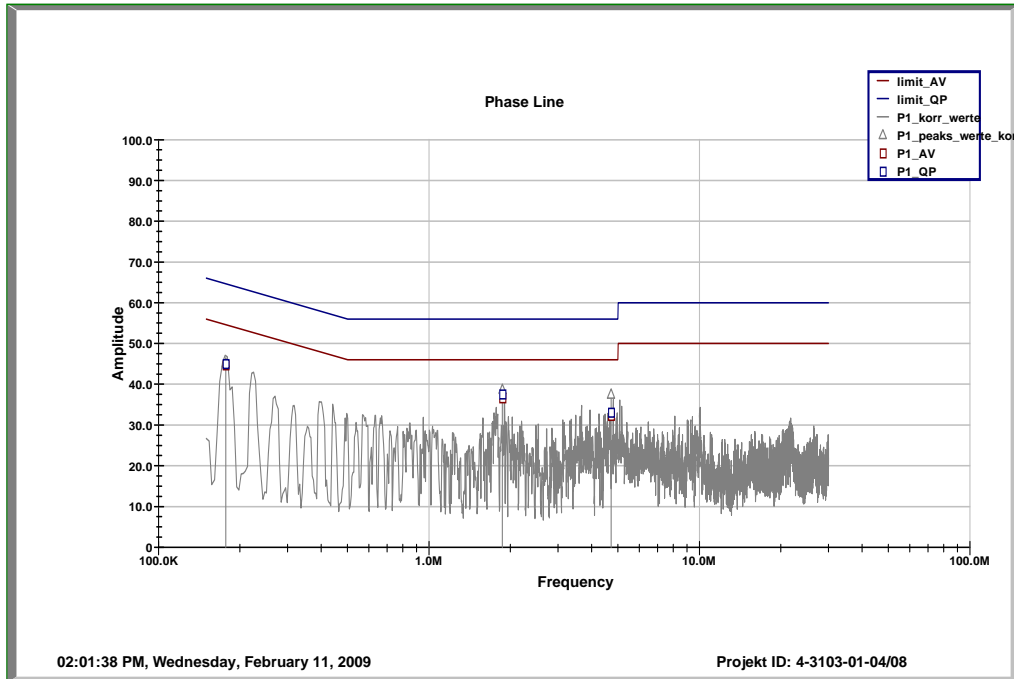


Limits:

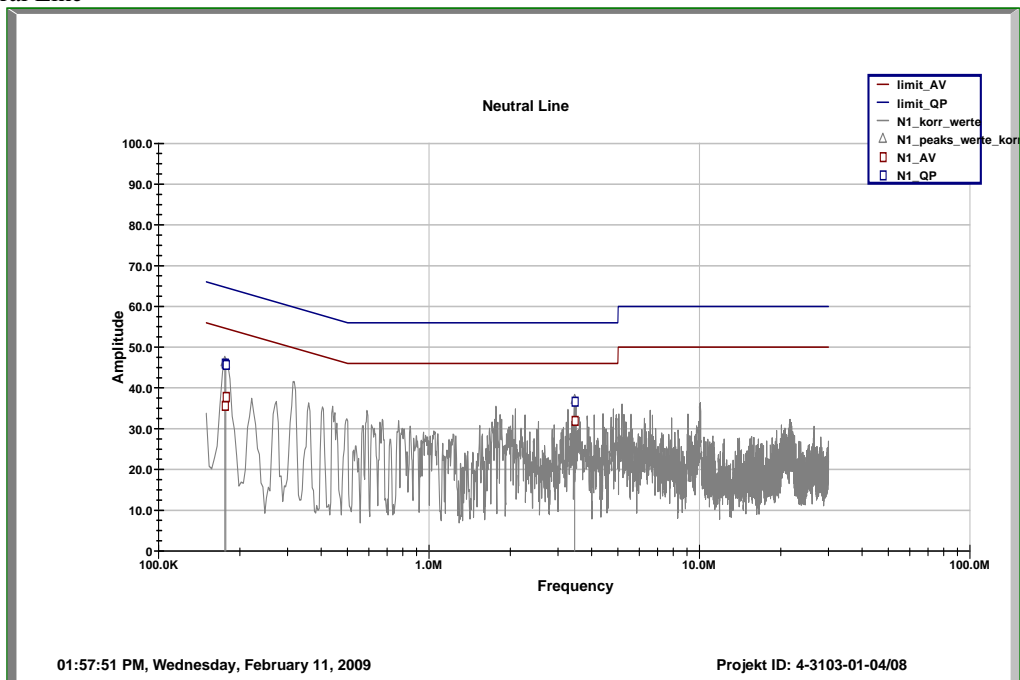
Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30 / 29.5 dBµV/m	30
30 - 88	100 / 40 dBµV/m	3
88 - 216	150 / 43.5 dBµV/m	3
216 - 960	200 / 46 dBµV/m	3
above 960	54 dBµV/m	3

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.

### *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	3138A07614	300001207	13.12.2007	24	13.12.2009
5	Spektrum Analyzer Display 85662A	HP	3144A28627	300001208	13.12.2007	24	13.12.2009
6	Quasi-Peak-Adapter 85650A	HP	2811A01204	300002308	13.12.2007	24	13.12.2009
7	RF-Preselector 85685A	HP	2837A00778	300002448	13.12.2007	24	13.12.2009
8	PC Vectra VL	HP		300001688	n.a.		
9	Software EMI	HP		300000983	n.a.		
10	Measurement System 2						
11	FSP 30	R&S	100886	300003575	25.08.2008	24	25.08.2010
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.)		

### *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	9163-295	-/-	-/-	30.04.2008	24	30.04.2010
3	Amplifier - 0518C-138	Veritech Microwave Inc.	-/-	-/-	-/-	-/-	-/-
4	Switch - 3488A	HP		300000368	-/-	-/-	-/-
5	EMI Test receiver - ESCI	R&S	100083	300003312	31.01.2009	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

Photo 1:

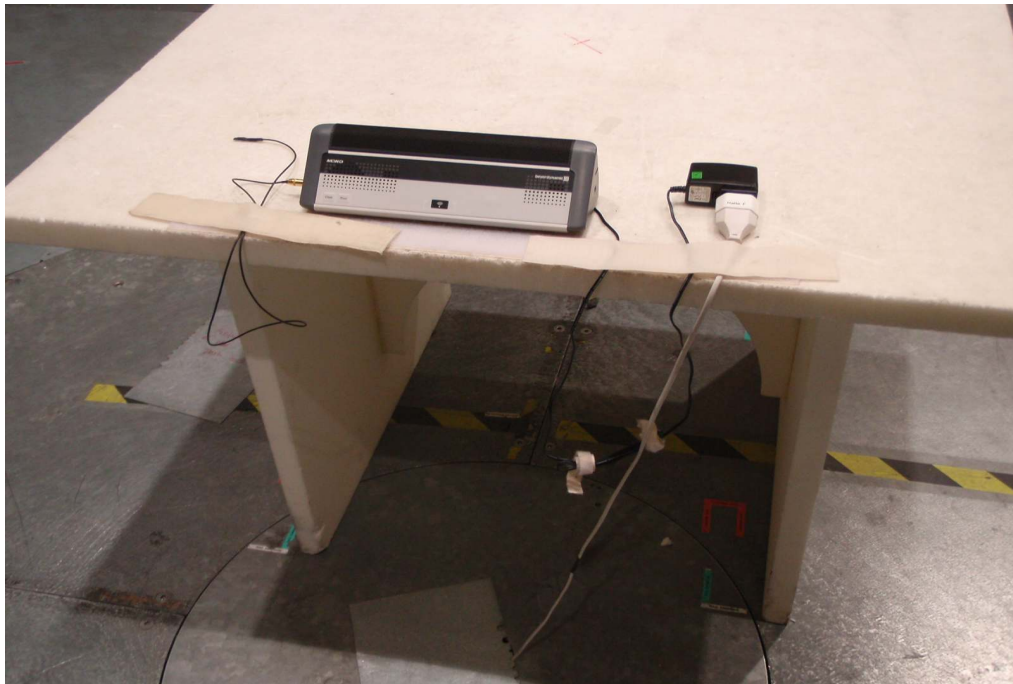


Photo 2:



Photo 3:



## 8 Photographs of the EUT

Photo documentation

Photo 4:



Photo 5:

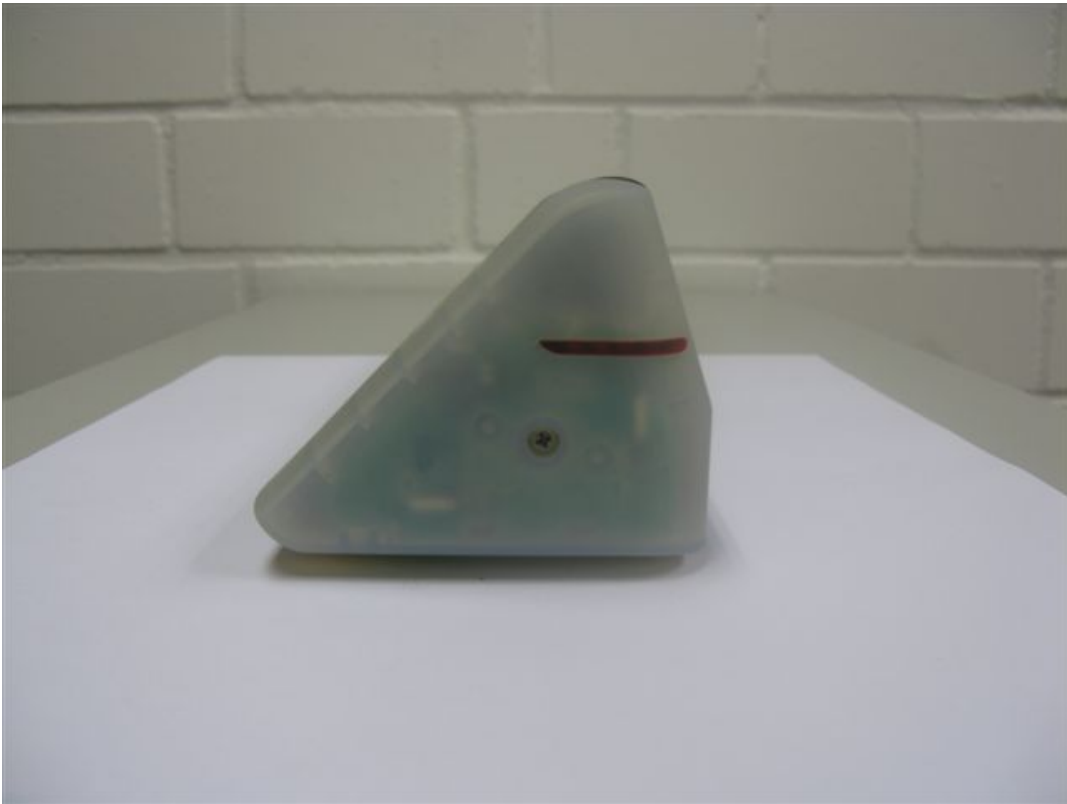


Photo 6:





Photo 7:

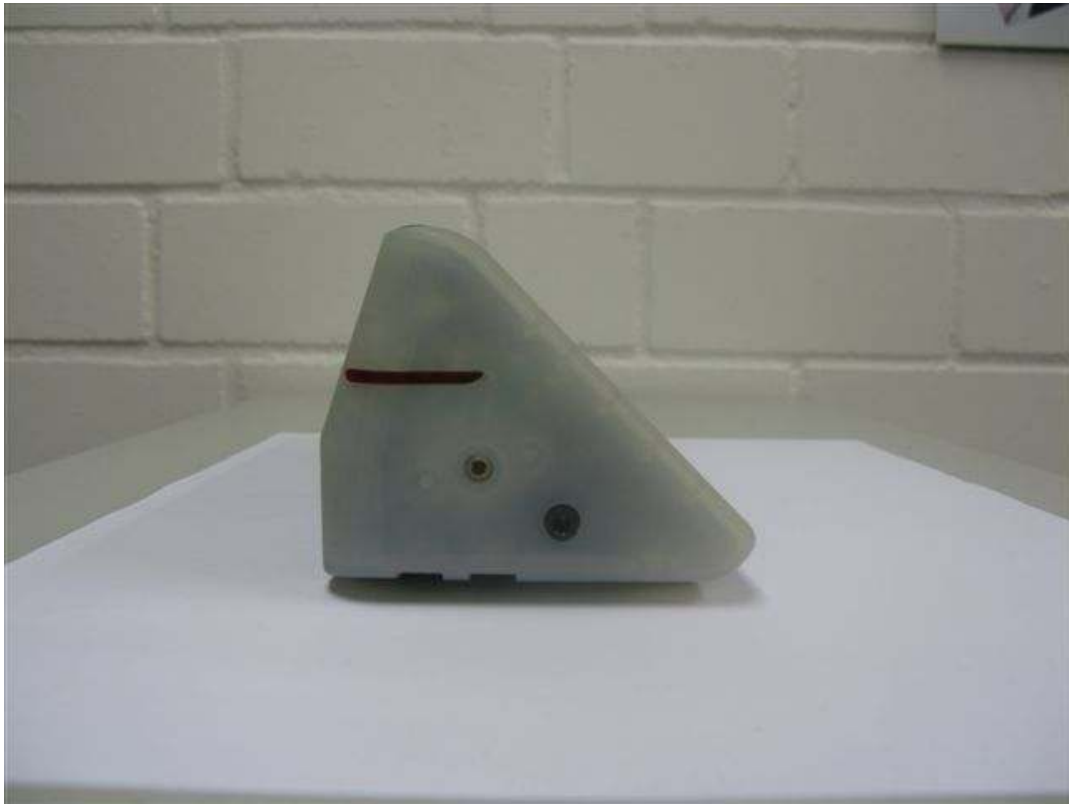


Photo 8:





Photo 9:

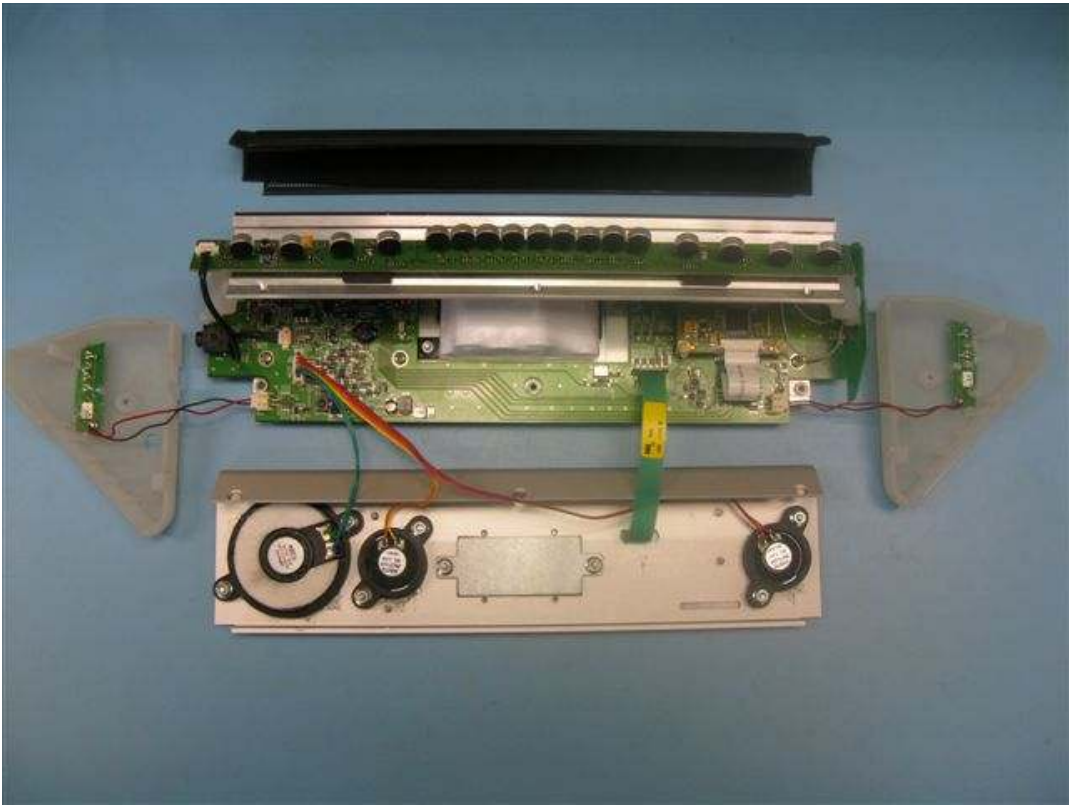


Photo 10:



Photo 11:



Photo 12:





Photo 13:

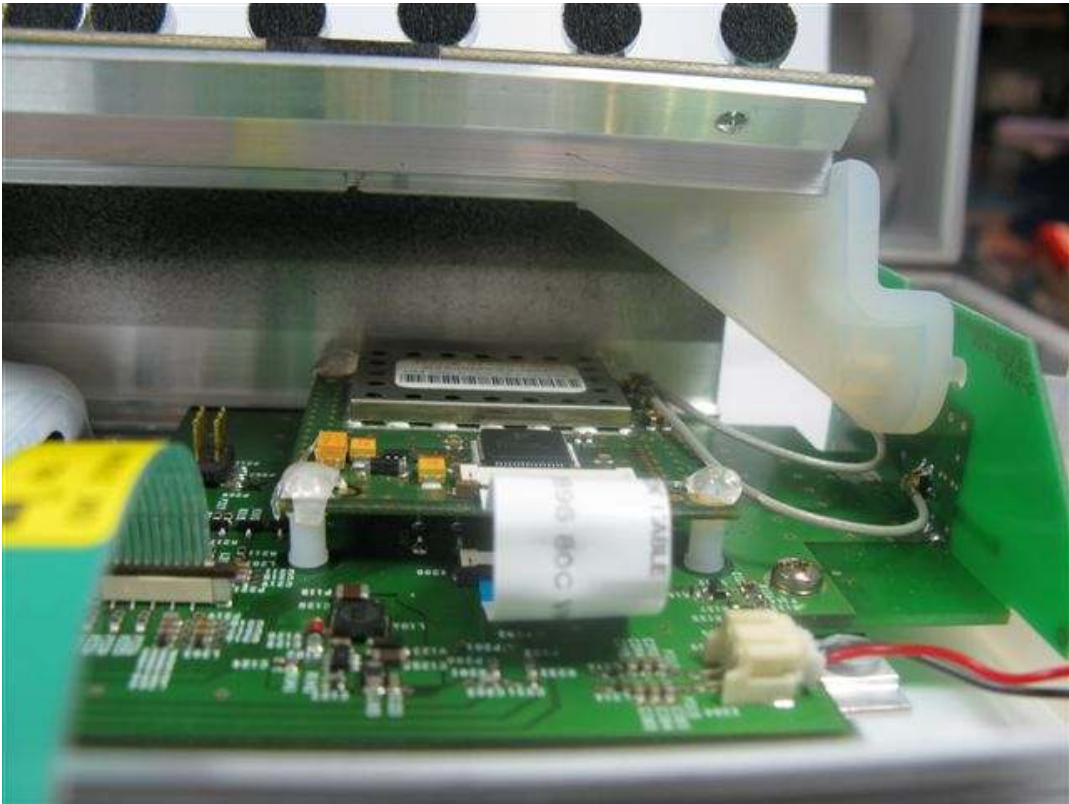


Photo 14:



Photo 15:



Photo 16:

