



## 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)**

*The Bluetooth word mark and logos are owned by the Bluetooth SIG, Inc. and any use of such marks by Cetecom ICT is under license*

**Test report no. : 2-4550-16-09/07**  
**Type identification : DDA-0002012**  
**Applicant : Sony Ericsson Mobile Communications AB**  
**FCC ID : PY7DDA-2012**  
**IC Certification No : 4170B-DDA2012**  
**Test standards : 47 CFR Part 15**  
**RSS - 210 Issue 7**

## Table of contents

<b>1</b>	<b>General information</b> .....	<b>3</b>
1.1	Notes .....	3
1.2	Testing laboratory .....	4
1.3	Details of applicant .....	4
1.4	Application details .....	4
<b>2</b>	<b>Test standard/s:</b> .....	<b>5</b>
<b>3</b>	<b>Technical tests</b> .....	<b>6</b>
3.1	Details of manufacturer.....	6
3.1.1	Test item.....	6
3.1.2	Additional EUT information For IC Canada (appendix 2).....	7
3.1.3	EUT operating modes.....	8
3.1.4	Extreme conditions testing values.....	8
<b>4</b>	<b>Summary of Measurement Results and list of all performed test cases</b> .....	<b>9</b>
<b>5</b>	<b>RF measurement testing</b> .....	<b>10</b>
5.1	Description of test set-up.....	10
5.1.1	Radiated measurements.....	10
5.1.2	Conducted measurements.....	10
5.2	Referenced documents .....	11
5.3	Additional comments .....	11
5.4	Antenna gain .....	11
5.5	Carrier frequency separation §15.247(a)(1) .....	12
5.6	Number of hopping channels §15.247(a)(1) .....	13
5.7	Time of occupancy (dwell time) §15.247(a)(1)(iii).....	14
5.8	Power Spectral density (Hybrid system in Inquiry mode/Page scan) §15.247(e) .....	15
5.9	Spectrum Bandwidth of a FHSS System / 20dB Bandwidth §15.247(a)(1).....	16
5.10	Maximum output power (conducted) § 15.247 (b)(1).....	21
5.11	Max. peak output power (radiated) § 15.247 (b)(1) .....	26
5.12	Band-edge compliance of conducted emissions §15.247 (d) .....	27
5.13	Band-edge compliance of radiated emissions §15.205 .....	34
5.14	Spurious Emissions - conducted (Transmitter) § 15.247 (c)(1) .....	37
5.15	Spurious Emissions > 30 MHz- radiated (Transmitter) § 15.247 (c)(1).....	43
5.16	Spurious Emissions - radiated (Receiver) § 15.109 .....	51
5.17	Spurious Emissions < 30 MHz - Transmitter radiated § 15.209 .....	54
5.18	Conducted Emissions <30 MHz § 15.107/207.....	55
<b>6</b>	<b>Test equipment and ancillaries used for tests</b> .....	<b>56</b>
<b>7</b>	<b>Photographs of the Test Set-up</b> .....	<b>57</b>
<b>8</b>	<b>Photographs of the EUT</b> .....	<b>59</b>

---

## 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

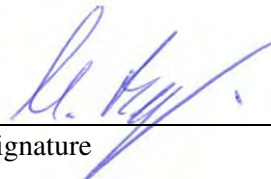
Name

Signature

#### Technical responsibility for area of testing:

2007-11-12

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>Sony Ericsson Mobile Communications AB</b>
<b>Street:</b>	<b>Torshamnsgatan 27</b>
<b>Town:</b>	<b>164 94 Kista</b>
<b>Country:</b>	<b>Sweden</b>
<b>Telephone:</b>	<b>+46 46 19 40 00</b>
<b>Fax:</b>	<b>+46 (0) 8 404 3430</b>
<b>Contact:</b>	<b>Kenth Skoglund</b>
<b>E-mail:</b>	<b>kenth.skoglund@sonyericsson.com</b>
<b>Telephone:</b>	<b>+46 (0) 70 320 7056</b>

## 1.4 Application details

<b>Date of receipt of order:</b>	<b>2007-09-26</b>
<b>Date of receipt of test item:</b>	<b>2007-11-08</b>
<b>Date of start test:</b>	<b>2007-11-09</b>
<b>Date of end test:</b>	<b>2007-11-12</b>
<b>Persons(s) who have been present during the test:</b>	

## 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:	Sony Ericsson Mobile Communications AB
Street:	Nya Vattentorget
Town:	22188 Lund
Country:	Sweden

##### 3.1.1 Test item

Kind of test item	:	Bluetooth headset (EDR)
Type identification	:	DDA-0002012
S/N serial number	:	BDA: 001813F2EC7F Rad. BDA: 001CA436CFB8 Cond.
HW hardware status	:	FP2
SW software status	:	01E
Frequency Band [MHz]	:	ISM 2.400 - 2.483,5
Type of Modulation	:	FHSS
Number of channels	:	79
Antenna	:	Integrated antenna
Power Supply	:	3.7 V DC by Li - Polymer Battery
Temperature Range	:	- 20 °C to + 60 °C

Max. power radiated: 6.16 dBm (8 DPSK modulation)

Max. power conducted: 4.47 dBm (8 DPSK modulation)

FCC ID: PY7DDA-2012  
IC: 4170B-DDA2012

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

IC Registration Number:	<b>4170B-DDA2012</b>
Model Name:	<b>DDA-0002012</b>
Manufacturer (complete Address):	<b>Sony Ericsson Mobile Communications AB Nya Vattentorget 22188 Lund Sweden</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>2.400 – 2.483,5 MHz</b>
RF: Power [W] (max):	<b>Rad. EIRP: 2.69 mW (GFSK) Conducted : 1.82 mW (GFSK)</b>  <b>Rad. EIRP: 3.87 mW (Pi/4 DQPSK) Conducted : 2.62 mW (Pi/4 DQPSK)</b>  <b>Rad. EIRP: 4.13 mW (8 DPSK) Conducted : 2.80 mW (8 DPSK)</b>
Antenna Type:	<b>Integrated antenna</b>
Occupied Bandwidth (99% BW) [kHz]:	<b>926 GFSK 1317 Pi/4 DQPSK 1269 8DPSK</b>
Type of Modulation:	<b>GFSK, Pi/4 DQPSK , 8DPSK</b>
Emission Designator (TRC-43):	<b>926KFXD GFSK 1M32GXD Pi/4 DQPSK 1M27GXD 8DPSK</b>
Transmitter Spurious [ $\mu$ V/m in 3m]:	<b>No critical peaks found.</b>
Receiver Spurious [ $\mu$ V/m in 3m]:	<b>No critical peaks found.</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: Bertolino Marco

Date: 2007-11-12

### 3.1.3 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

### 3.1.4 Extreme conditions testing values

Description	Shortcut	Unit	Value
Nominal Temperature	T <sub>nom</sub>	°C	23
Nominal Humidity	H <sub>nom</sub>	%	44
Nominal Power Source	V <sub>nom</sub>	V	3.7

Type of power source: DC by Li - Polymer Battery

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	2007-11-12	Pass

Test Specification Clause	Test Case	Modulation	Pass	Fail	N/A	Not performed
None	Antenna Gain	GFSK	Yes			
§15.247(a1)	Carrier frequency separation	GFSK	Yes			
§15.247(a1)	Number of hopping channels	GFSK	Yes			
§15.247(a)(1)(iii)	Time of occupancy (dwell time)	--	Yes			
§15.247(e)	Power Spectral density (Hybrid system in Inquiry mode/Page scan)	--			Yes	
§15.247(a)(1)	Spectrum Bandwidth of a FHSS System / 20dB Bandwith	GFSK Pi/4 DQPSK 8 DPSK	Yes Yes Yes			
§ 15.247 (b)(1)	Maximum output power (conducted)	GFSK Pi/4 DQPSK 8 DPSK	Yes Yes Yes			
§ 15.247 (b)(1)	Max. peak output power (radiated)	GFSK	Yes			
§ 15.247 (d)	Band-edge compliance of conducted emissions	GFSK Pi/4 DQPSK 8 DPSK	Yes			
§ 15.205	Band-edge compliance of radiated emissions	Widest modulation	Yes			
§ 15.247 (d)	Spurious Emission - conducted (Transmitter)	GFSK Pi/4 DQPSK 8 DPSK	Yes			
§ 15.247 (d)	Spurious Emission - radiated (Transmitter) >30 MHz	8 DPSK	Yes			
§ 15.109	Spurious Emissions - radiated (Receiver)	GFSK	Yes			
§ 15.209	Spurious Emissions - radiated (Transmitter) <30 MHz	8 DPSK	Yes			
§ 15.107/207	Conducted Emissions <30 MHz	8 DPSK	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 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2003 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 setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63-4-2003 clause 4.2.

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

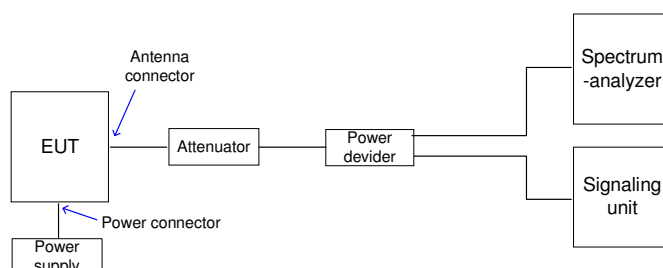
- 9 kHz - 150 kHz: Quasi Peak measurement, 200 Hz Bandwidth, passive loop antenna.
- 150 kHz - 30 MHz: Quasi Peak measurement, 9 kHz Bandwidth, passive loop antenna.
- 30 MHz - 200 MHz: Quasi Peak measurement, 120 kHz Bandwidth, biconical antenna
- 200MHz - 1GHz: Quasi Peak measurement, 120 kHz Bandwidth, log periodic antenna
- >1GHz: Average, RBW 1MHz, VBW 10 Hz, waveguide horn

All measurements are done in accordance with the Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems DA 00-705 and Appendix A "BLUETOOTH APPROVALS"

The EUT is powered by an external power supply with nominal voltage. The signalling is performed from outside the chamber with a signalling unit (CMU200 or other) by air link using signalling antenna.

#### 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 first 10dB attenuated before it is power divided (~6dB loss per branch). One of the signal path is connected to the communication base Station (CMU200 or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm.



**5.2 Referenced documents**

None

**5.3 Additional comments**

None

**5.4 Antenna gain**

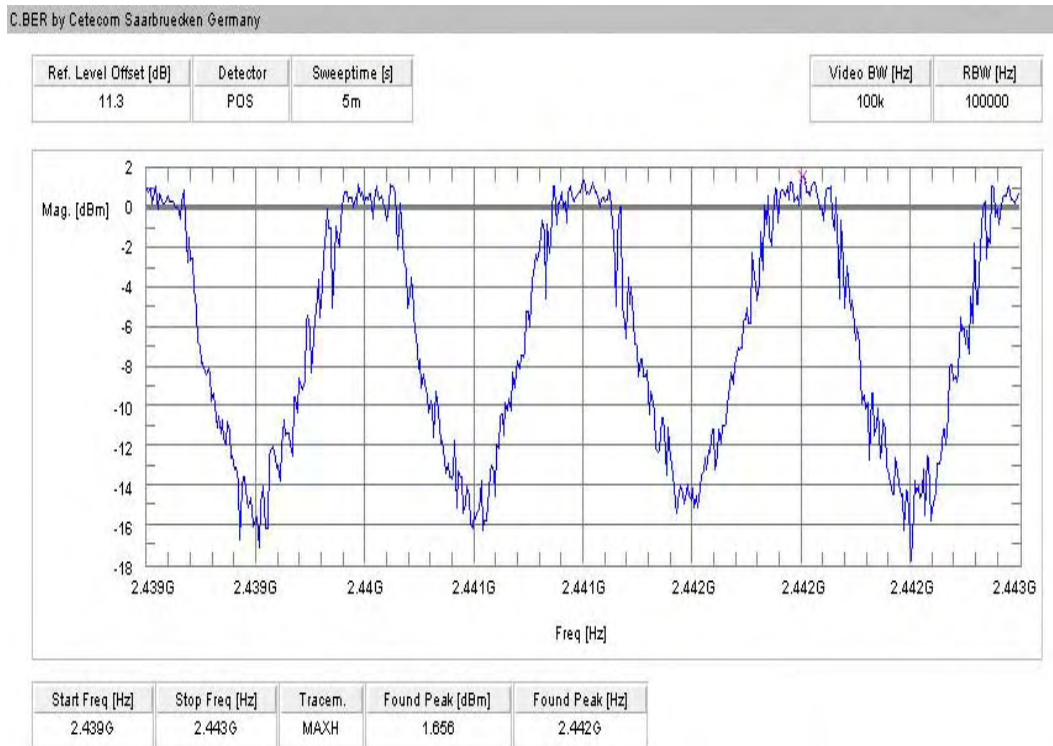
The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

	low channel	mid channel	high channel
Conducted power [dBm] GFSK modulation ; measured	1.90	2.41	<b>2.61</b>
Radiated power [dBm] GFSK modulation ; measured	3.94	4.19	<b>4.30</b>
Gain [dBi] calculated	<b>2.04</b>	1.78	1.69

**5.5 Carrier frequency separation §15.247(a)(1)**

Modulation: GFSK

Plot 1 of 1:



Result: Channel separation is: ~ 1 MHz

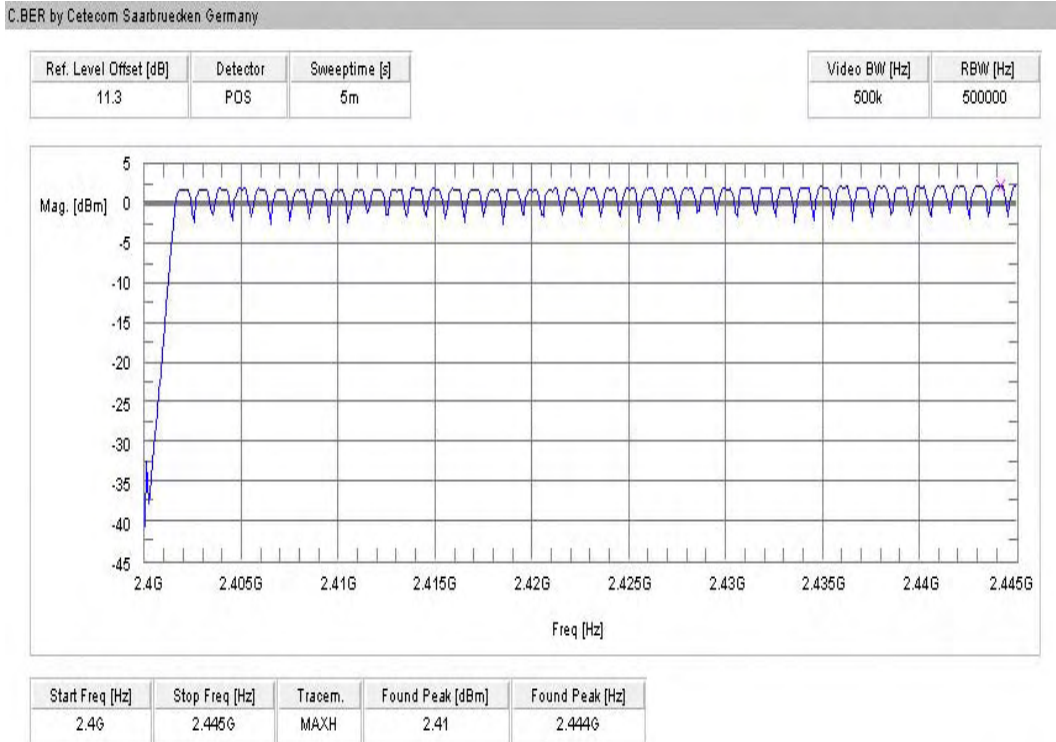
Limits:

Under normal test conditions only	Minimum 25 kHz or 20 dB Bandwidth of the hopping system
-----------------------------------	---

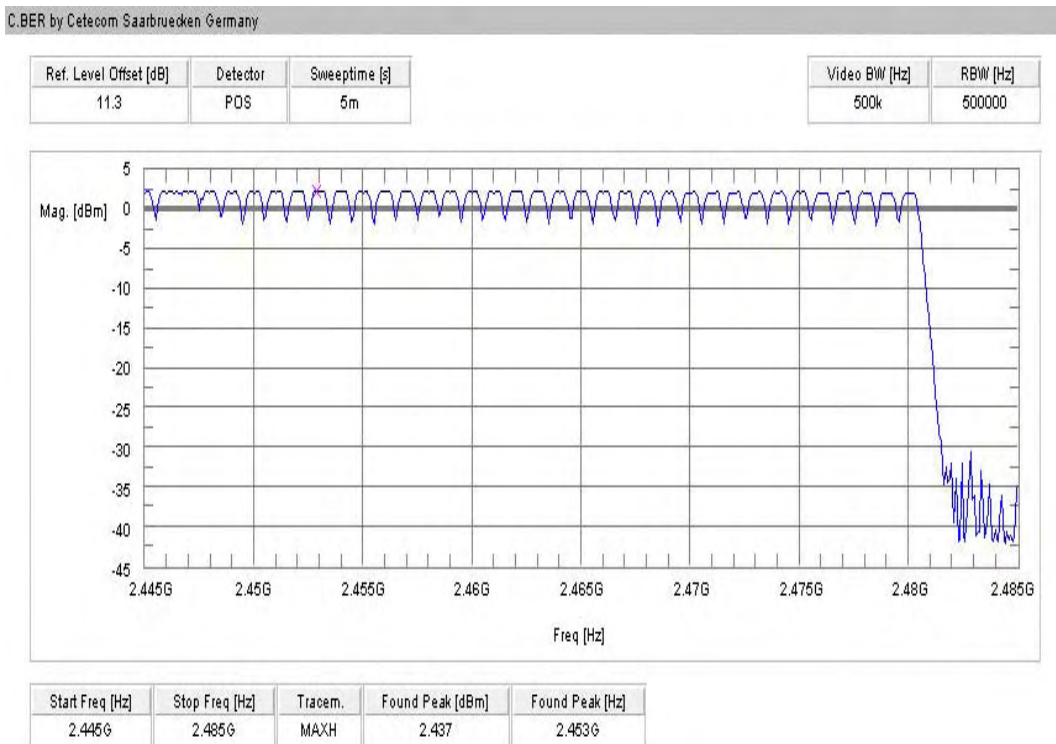
**5.6 Number of hopping channels §15.247(a)(1)**

Modulation: GFSK

Plot 1 of 2:



Plot 2 of 2:



Result : The number of hopping channels is: 79

Limits :

Under normal test conditions only	at least 15 non-overlapping channels
-----------------------------------	--------------------------------------

---

## 5.7 Time of occupancy (dwell time) §15.247(a)(1)(iii)

For Bluetooth devices:

The dwell time of 0.4 s within a 31.6 second period in data mode is independent from the packet type (packet length). The calculation for a 31.6 second period is as follows:

Dwell time = time slot length \* hop rate / number of hopping channels \* 31.6 s

Example for a DH1 packet (with a maximum length of one time slot)

Dwell time =  $625 \mu\text{s} * 1600 \text{ 1/s} / 79 * 31.6 \text{ s} = 0.4 \text{ s}$  (in a 31.6 s period)

For multi-slot packet the hopping is reduced according to the length of the packet.

Example for a DH5 packet (with a maximum length of five time slots)

Dwell time =  $5 * 625 \mu\text{s} * 1600 * 1/5 * 1/s / 79 * 31.6 \text{ s} = 0.4 \text{ s}$  (in a 31.6 s period)

This is according to the Bluetooth Core Specification V 1.1 & V 1.2 & V2.0 (+ critical errata) for all Bluetooth devices.

Therefore, all Bluetooth devices comply with the FCC dwell time requirement in the data mode.

This was checked during the Bluetooth Qualification tests.

The Dwell time in hybrid mode is approximately 2.6 ms (in a 12.8s period)

**5.8 Power Spectral density (Hybrid system in Inquiry mode/Page scan)  
§15.247(e)**

Plot 1 of 1:

**Not applicable**

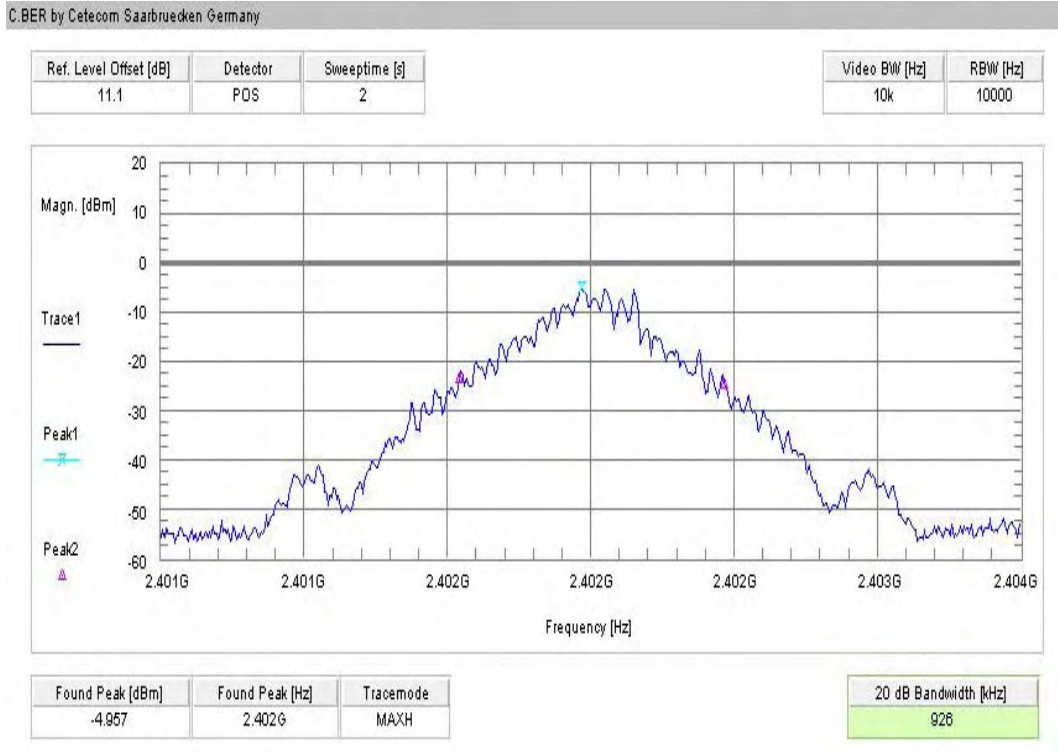
Result: Power density: - dBm/Hz = - dBm / 3 kHz  
Correction factor from dBm/Hz to dBm / 3 kHz is +34,8 dB

Limits :

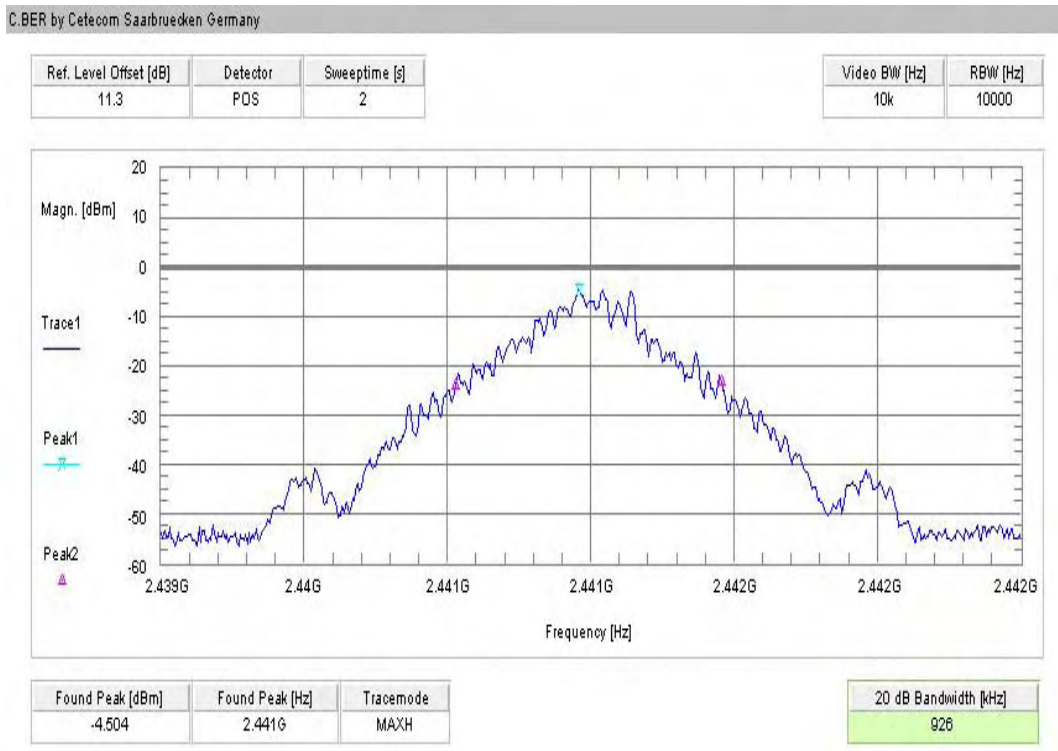
Under normal test conditions only	For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission
-----------------------------------	---

5.9 Spectrum Bandwidth of a FHSS System / 20dB Bandwidth §15.247(a)(1)

Plot 1 GFSK

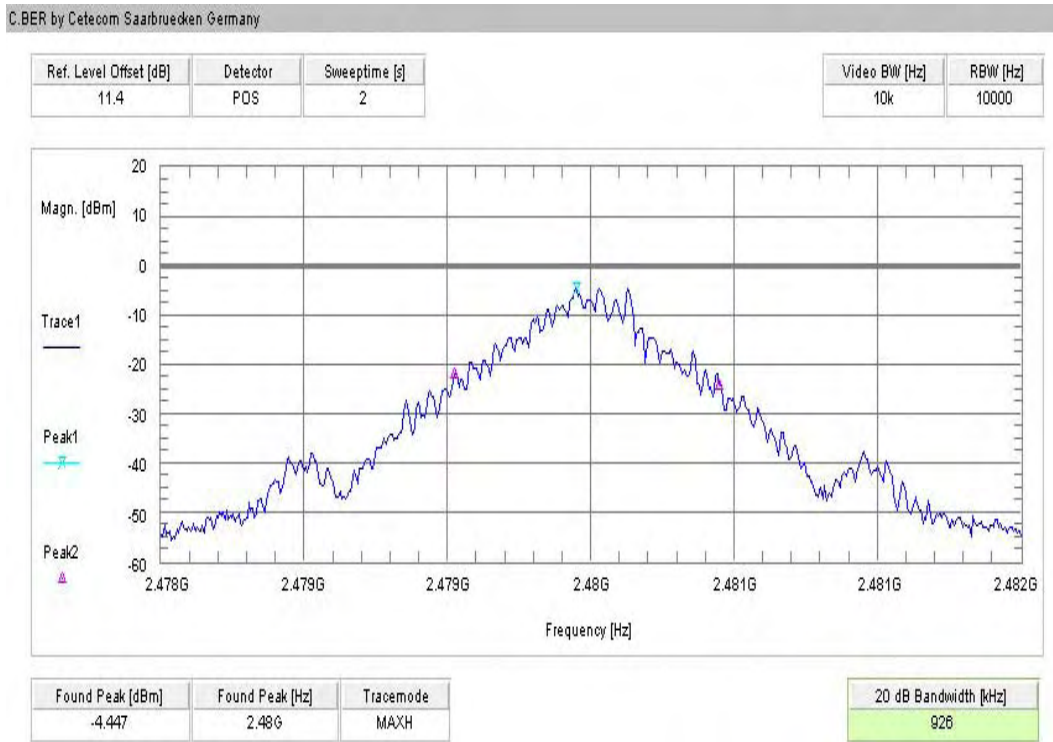


Plot 2 GFSK

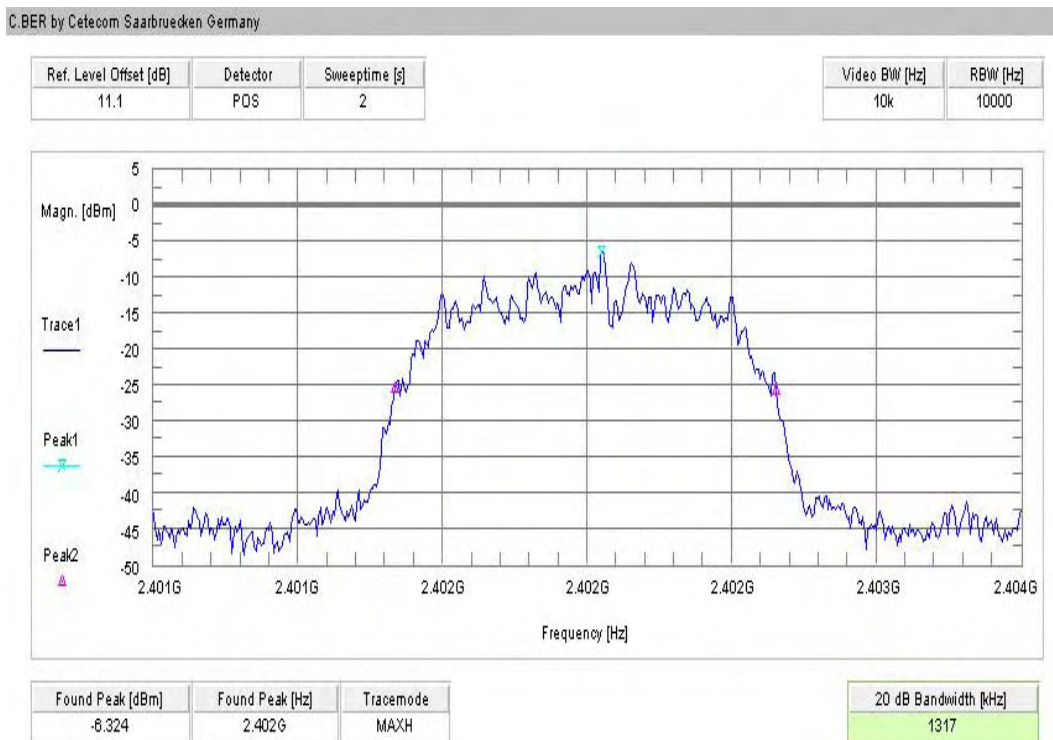




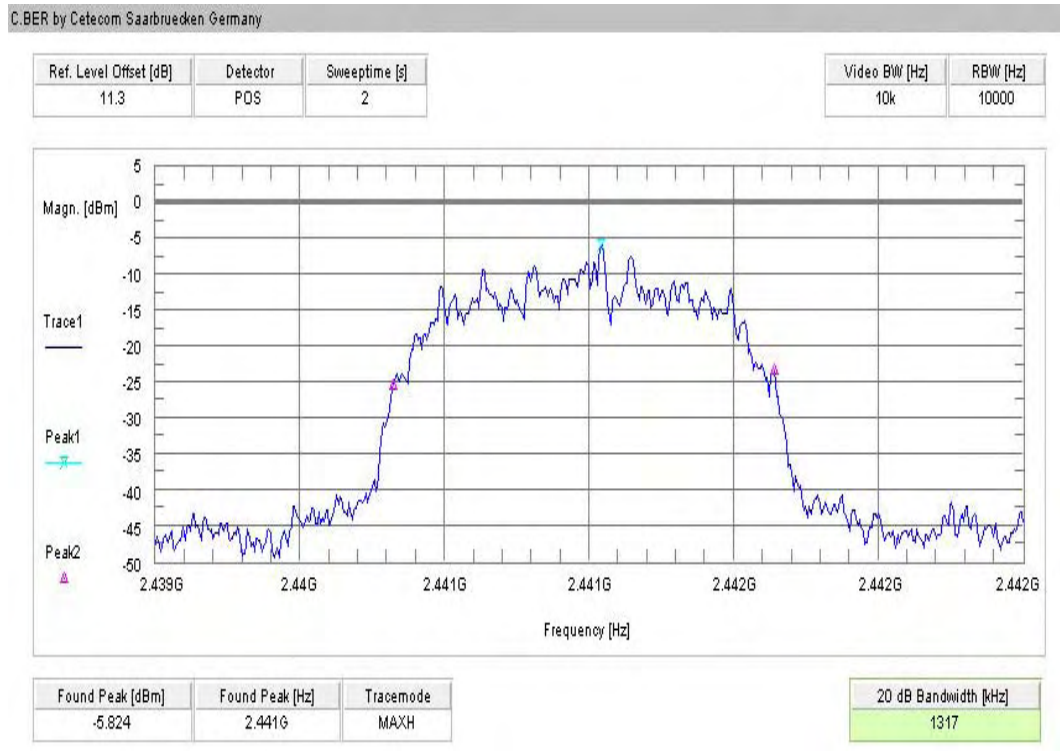
## Plot 3 GFSK



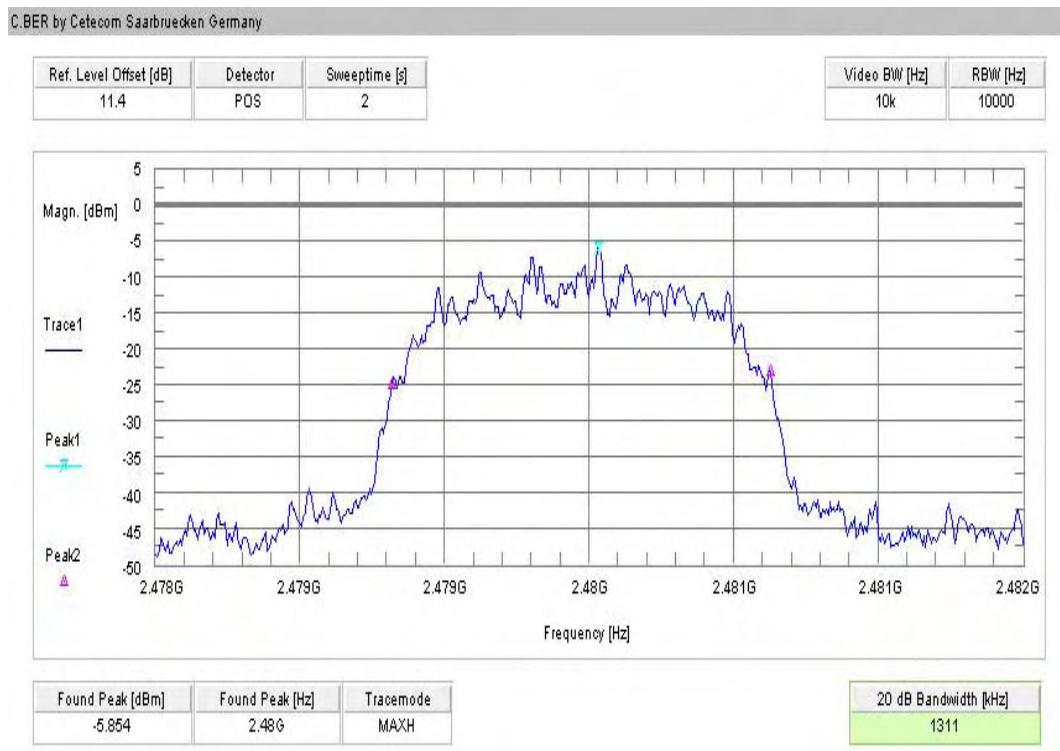
## Plot 4 Pi/4 DQPSK



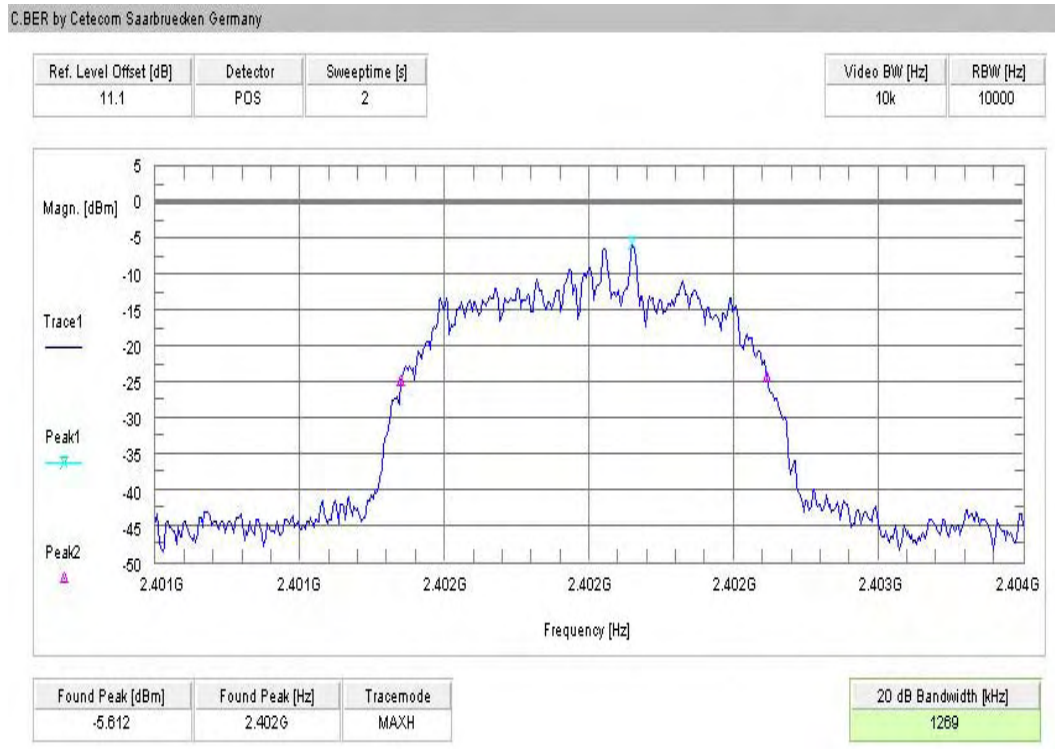
## Plot 5 Pi/4 DQPSK



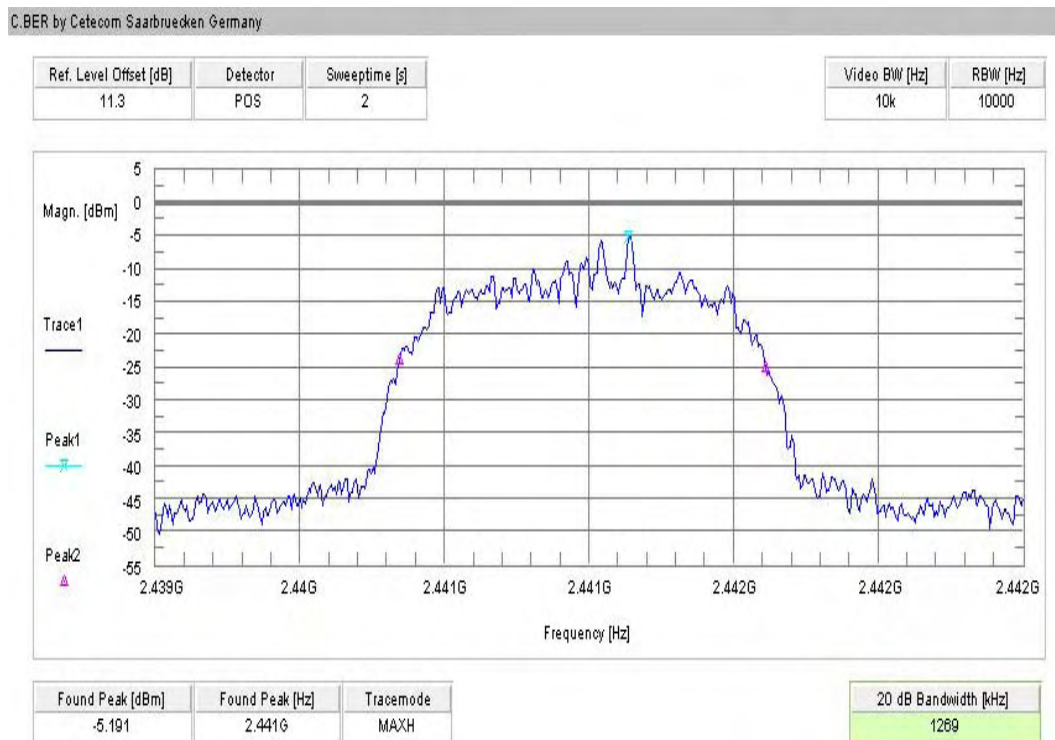
## Plot 6 Pi/4 DQPSK



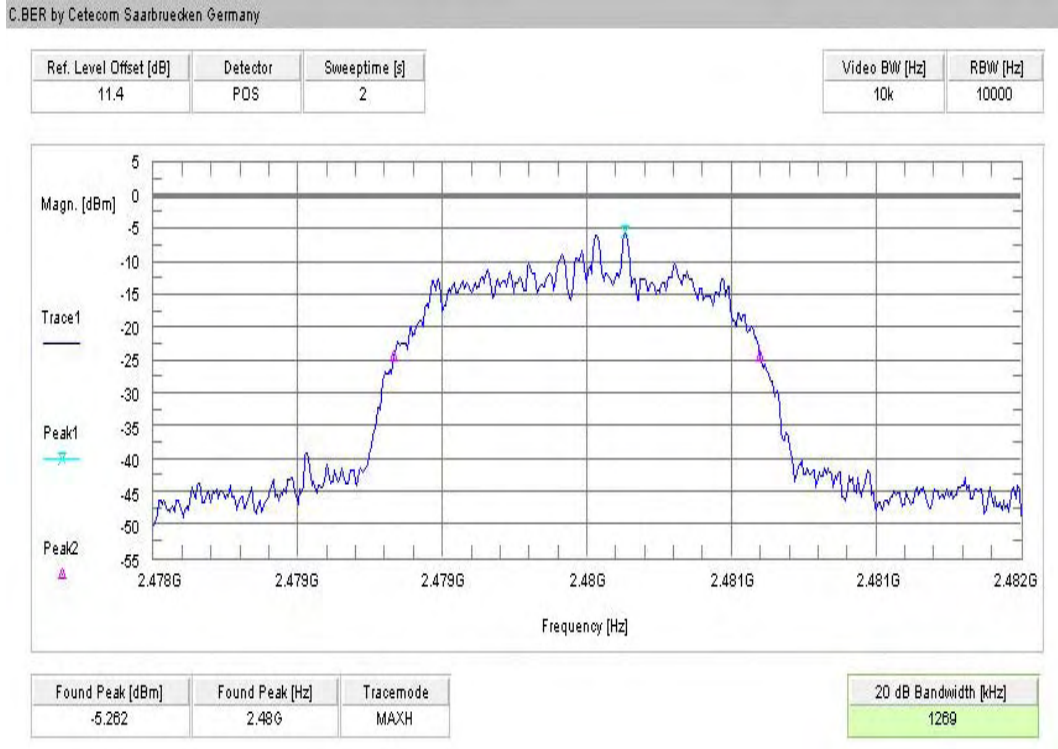
## Plot 7 8DPSK



## Plot 8 8DPSK



Plot 9 8DPSK



RESULTS:

Modulation	20 dB BANDWIDTH [kHz]		
	2402	2441	2480
Frequency [MHz]			
<i>GFSK</i>	<b>926</b>	926	926
<i>Pi/4 DQPSK</i>	<b>1317</b>	1317	1311
<i>8DPSK</i>	<b>1269</b>	1269	1269
Measurement uncertainty	<b>±1kHz</b>		

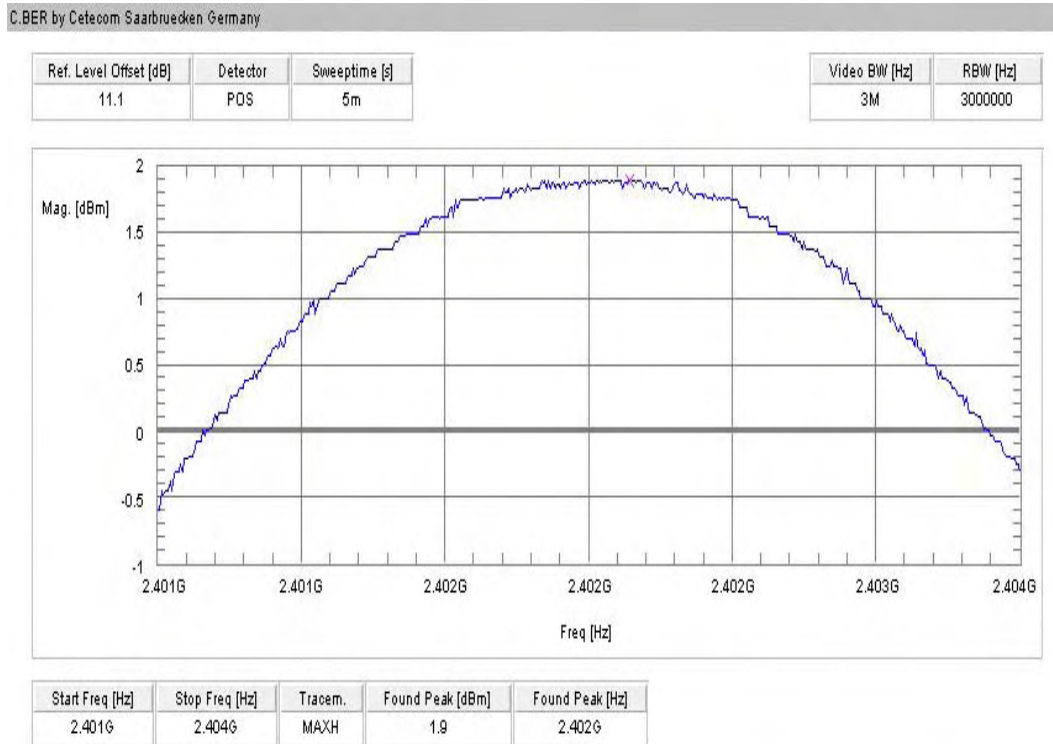
RBW / VBW as provided in the „Measurement Guidelines“ (DA 00-705, March 30, 2000)  
 RBW: 10 kHz / VBW 10 kHz

Limits:

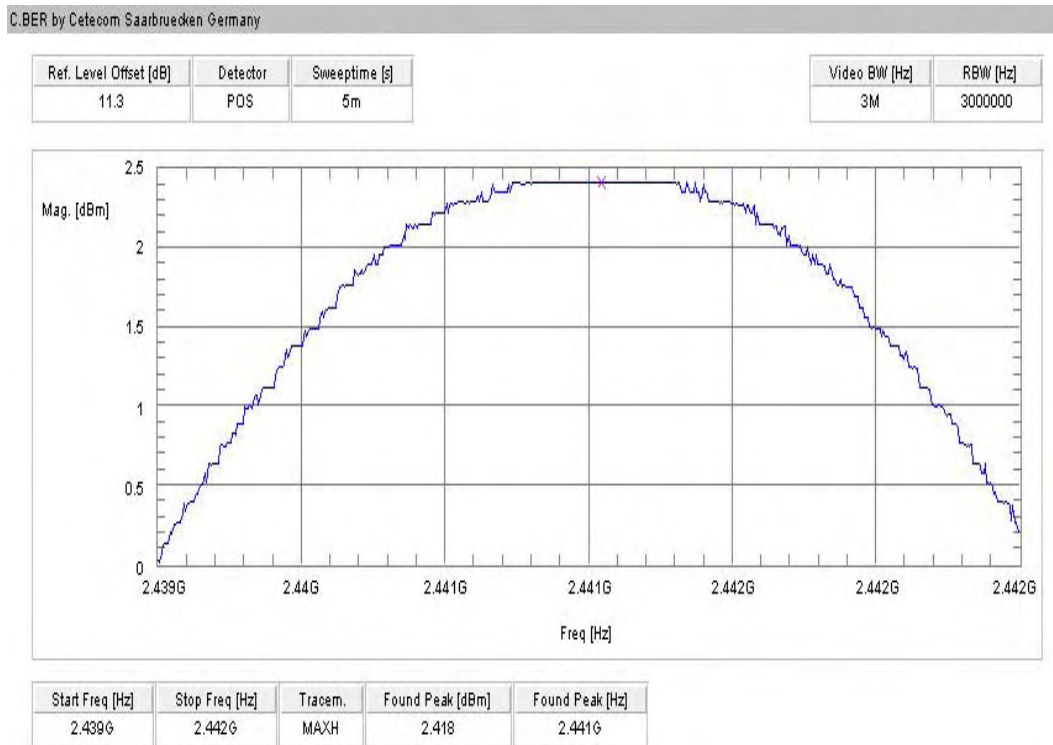
Under normal test conditions only	GFSK < 1000 kHz Pi/4 DQPSK < 1500 8DPSK < 1500
-----------------------------------	--

**5.10 Maximum output power (conducted) § 15.247 (b)(1)**

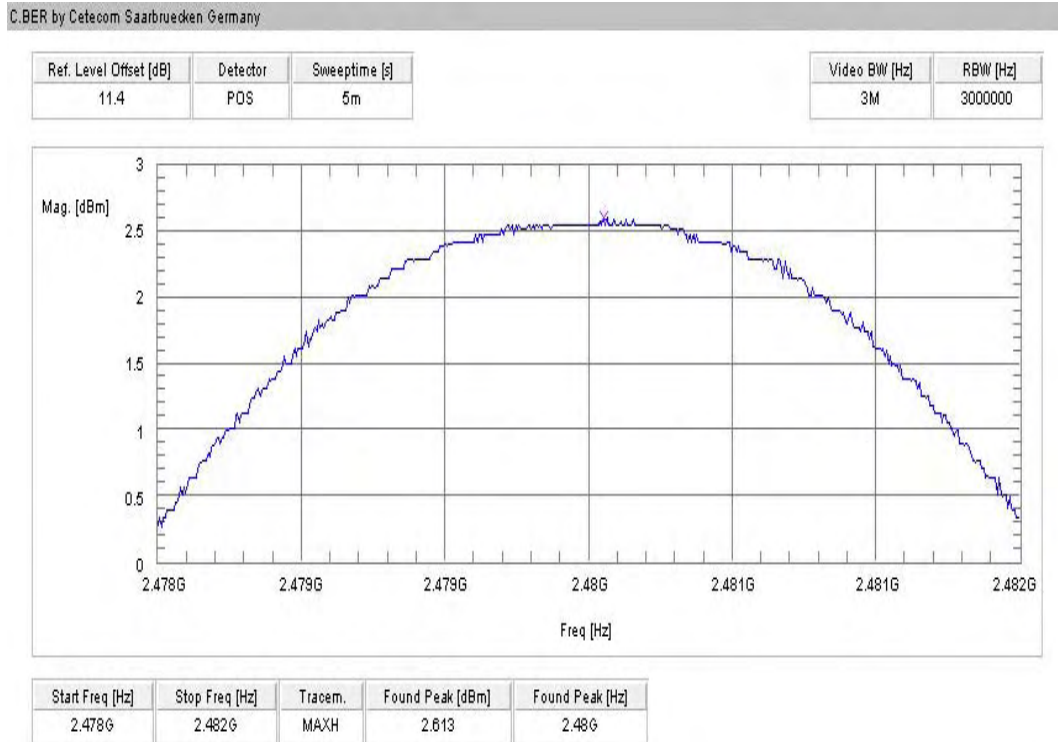
Plot 1 GFSK



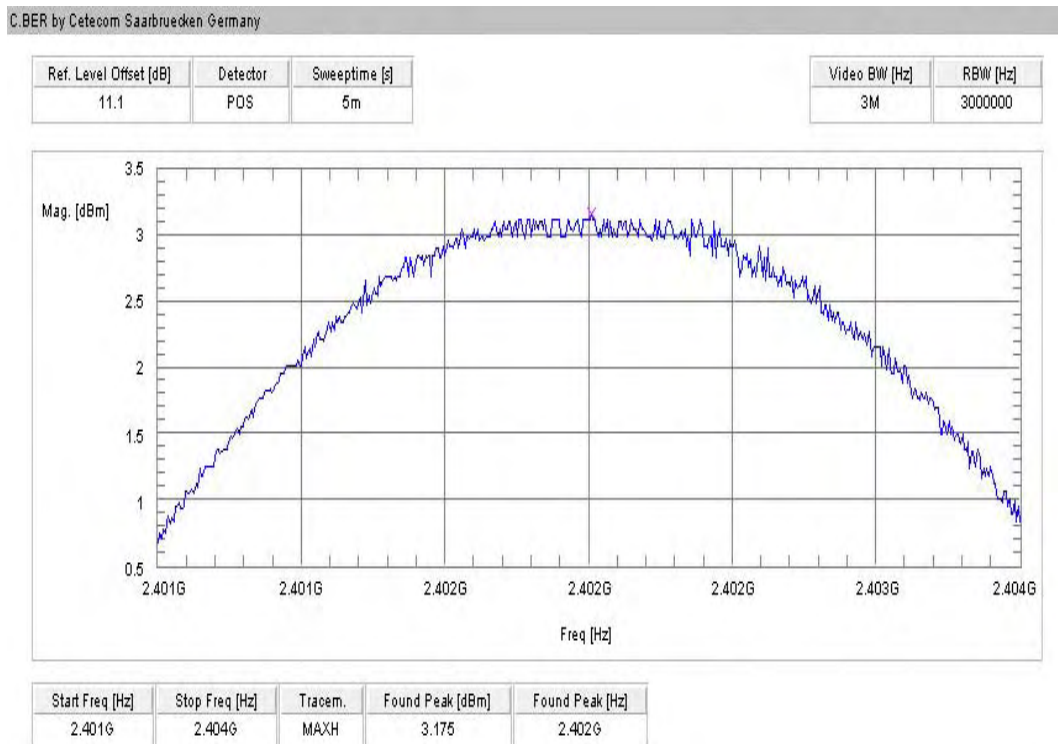
Plot 2 GFSK



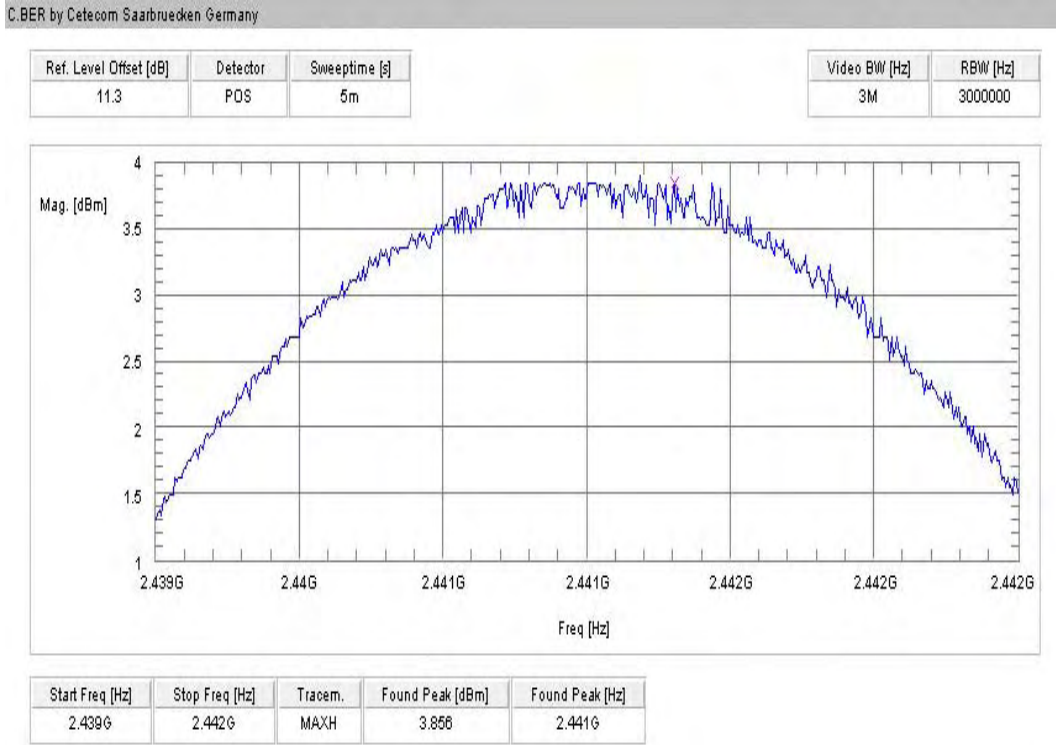
## Plot 3 GFSK



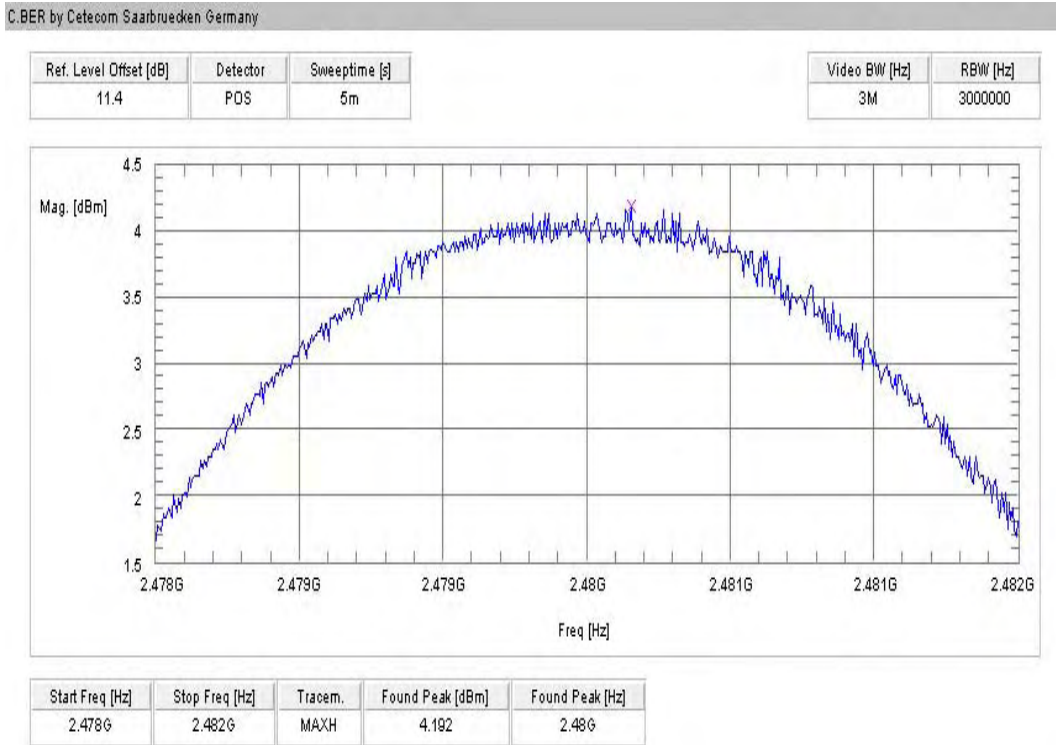
## Plot 4 Pi/4 DQPSK



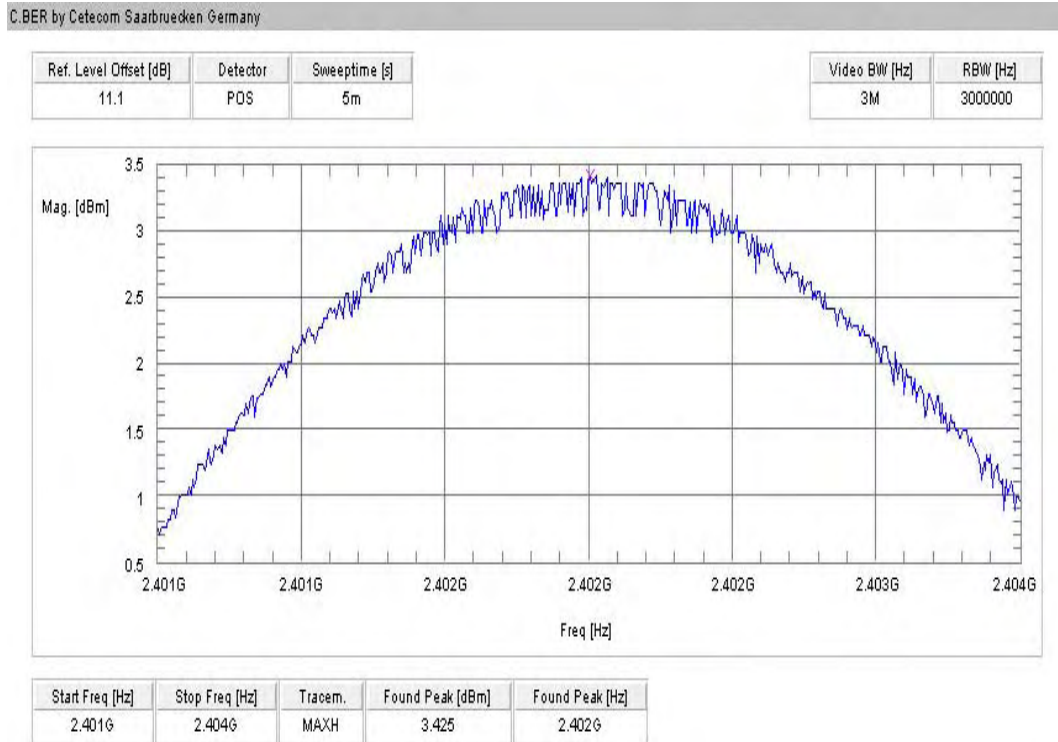
Plot 5 Pi/4 DQPSK



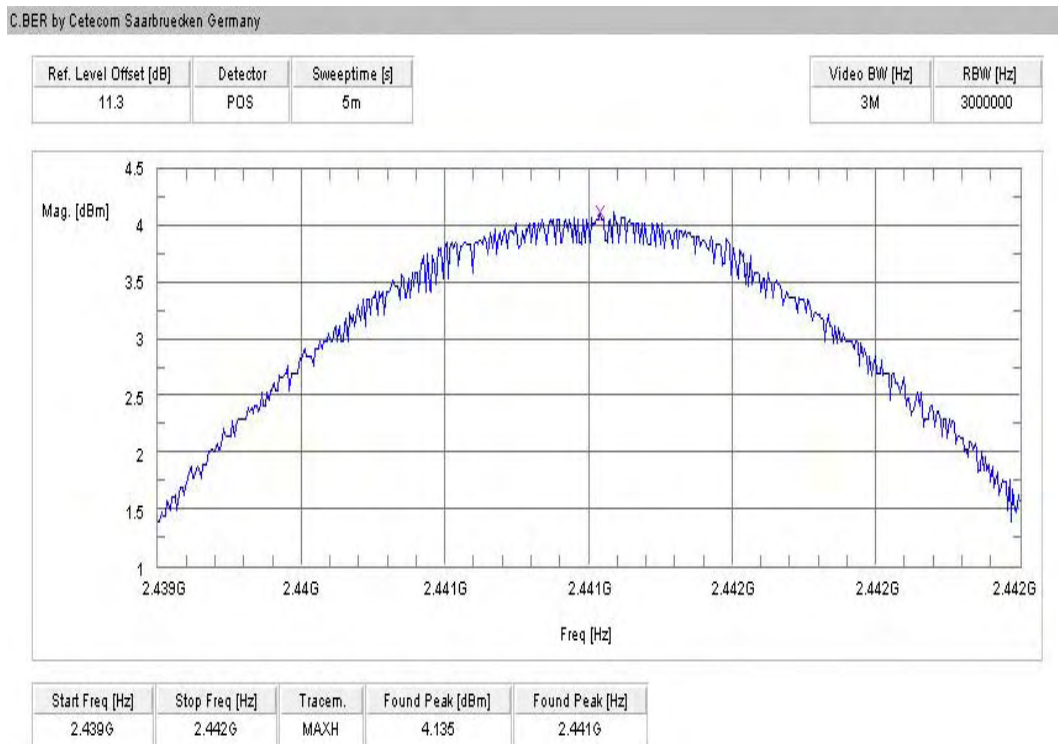
Plot 6 Pi/4 DQPSK



## Plot 7 8DPSK

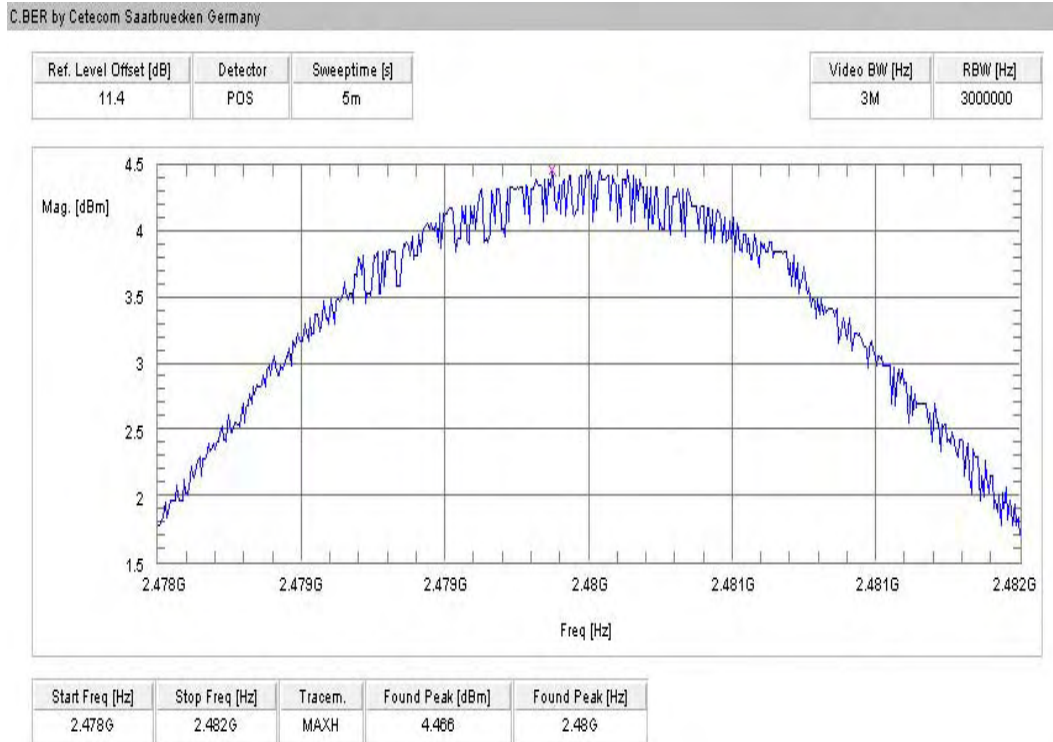


## Plot 8 8DPSK





Plot 9 8DPSK



Results:

Modulation	Max. peak output power [dBm]		
	2402	2441	2480
Frequency [MHz]			
<i>GFSK</i>	1.90	2.41	<b>2.61</b>
<i>Pi/4 DQPSK</i>	3.18	3.86	<b>4.19</b>
<i>8DPSK</i>	3.43	4.14	<b>4.47</b>
Measurement uncertainty	±2dB		

RBW / VBW: 3 MHz

Limits:

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

**5.11 Max. peak output power (radiated) § 15.247 (b)(1)**

Modulation: GFSK

Results:

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T <sub>nom</sub>	V <sub>nom</sub>	3.94	4.19	<b>4.30</b>
Measurement uncertainty		±3dB		

RBW / VBW: 3 MHz

Measured at a distance of 3m

Modulation: Pi/4 DQPSK

Results:

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T <sub>nom</sub>	V <sub>nom</sub>	5.22	5.64	<b>5.88</b>
Measurement uncertainty		±3dB		

RBW / VBW: 3 MHz

Measured at a distance of 3m

Modulation: 8DPSK

Results:

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T <sub>nom</sub>	V <sub>nom</sub>	5.47	5.92	<b>6.16</b>
Measurement uncertainty		±3dB		

RBW / VBW: 3 MHz

Measured at a distance of 3m

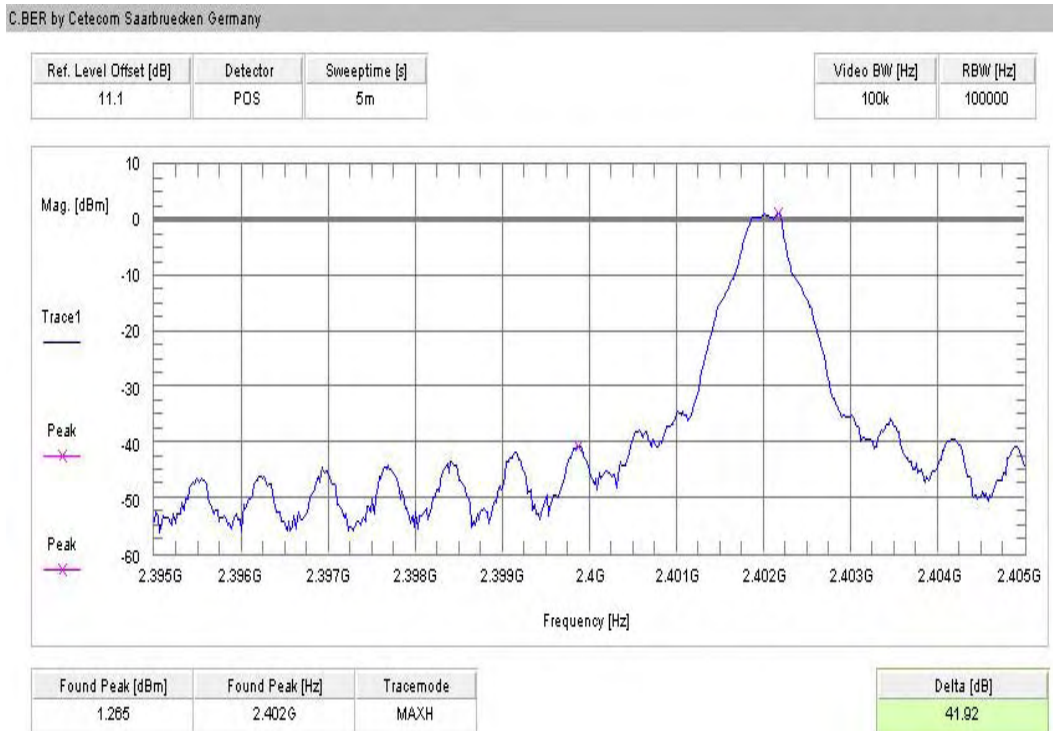
Limits:

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

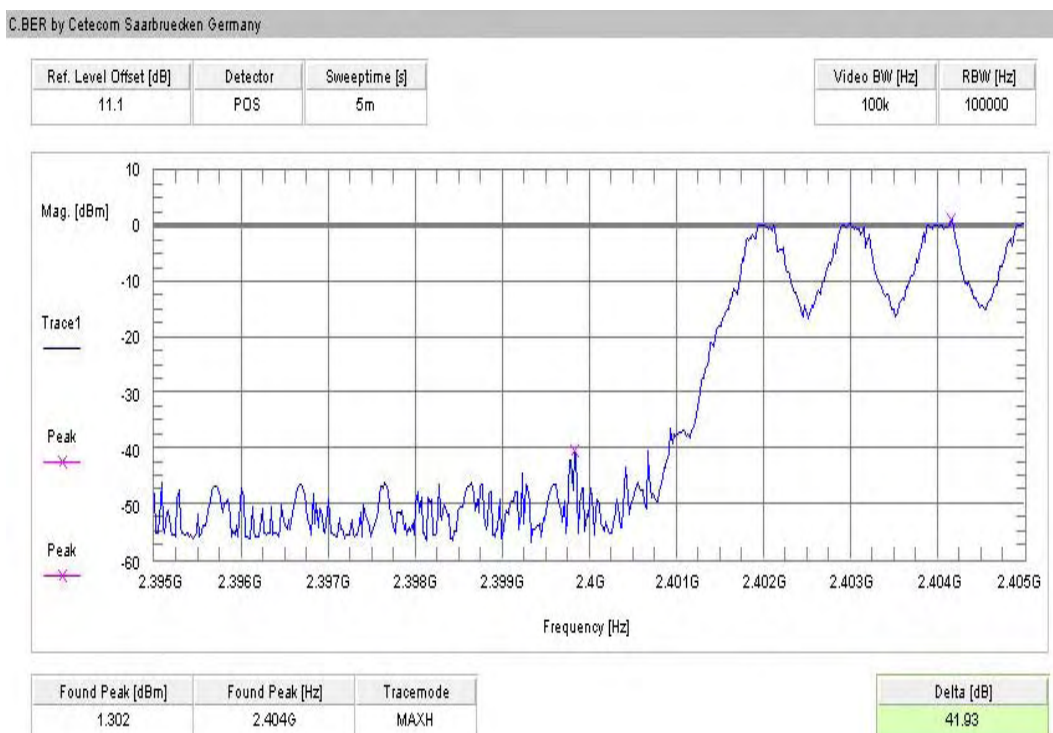
### 5.12 Band-edge compliance of conducted emissions §15.247 (d)

Modulation: GFSK

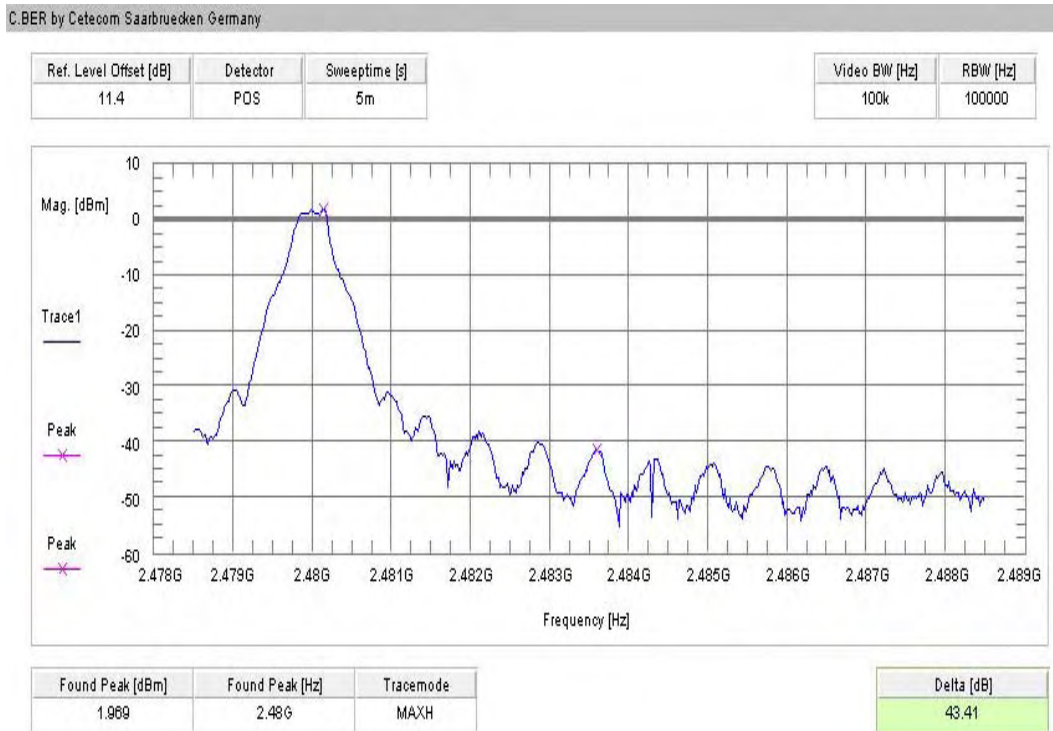
Plot 1 of 4 (hopping off, lowest frequency):



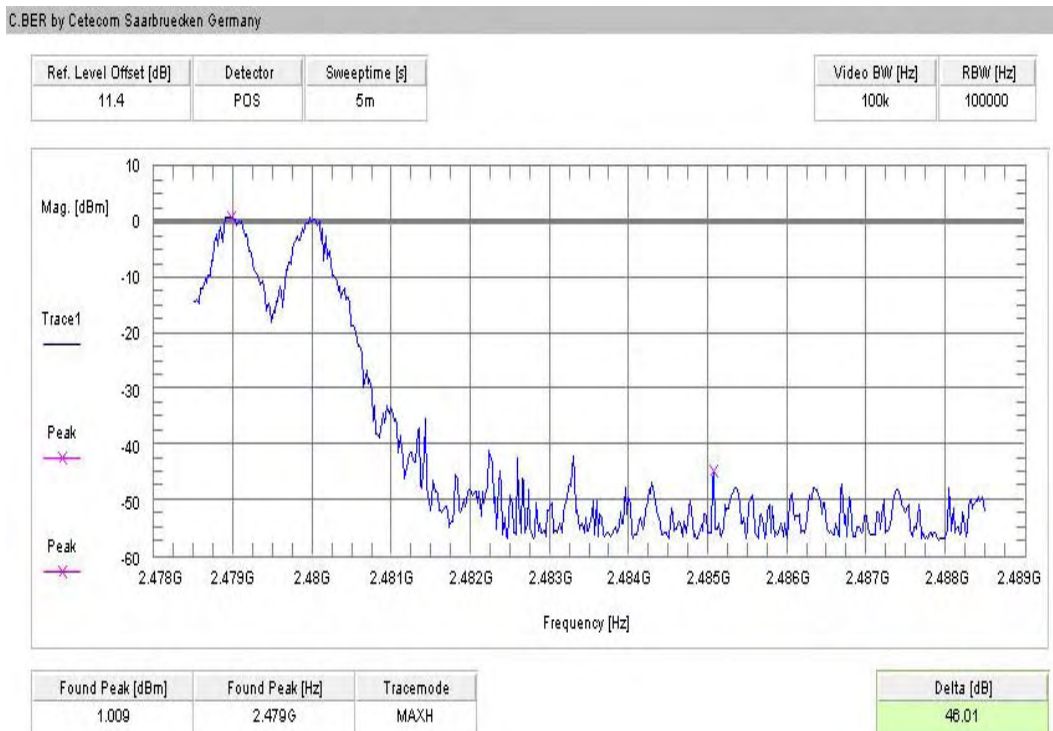
Plot 2 of 4 (hopping on, lowest frequency):



Plot 3 of 4 (hopping off, highest frequency):

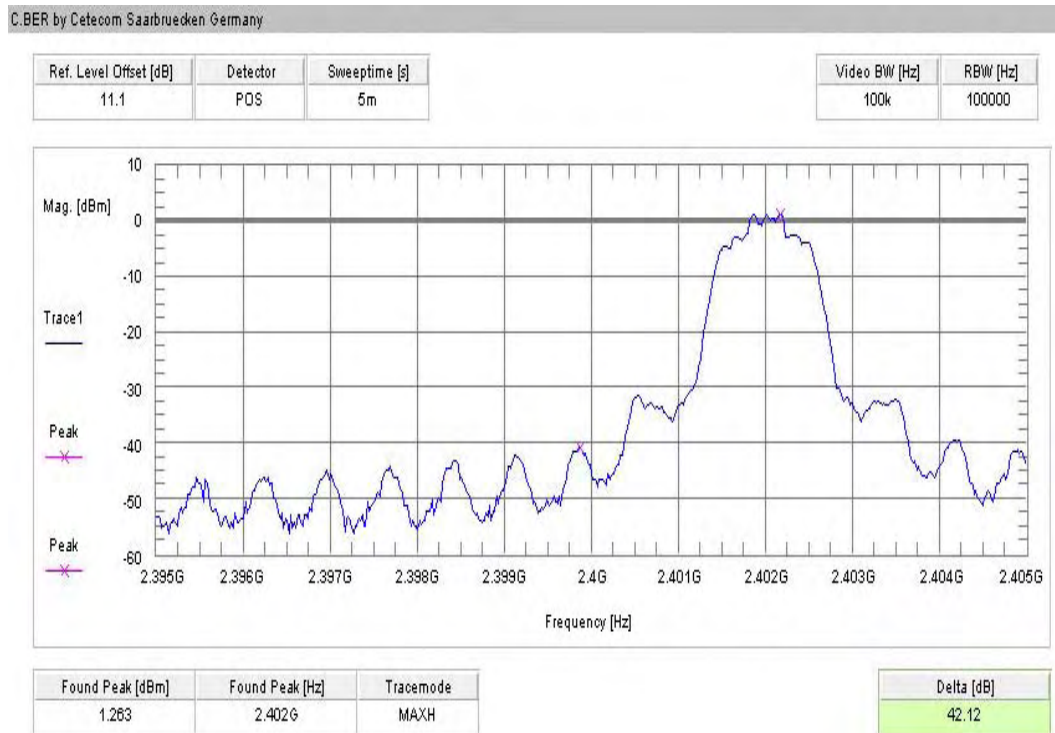


Plot 4 of 4 (hopping on, highest frequency):

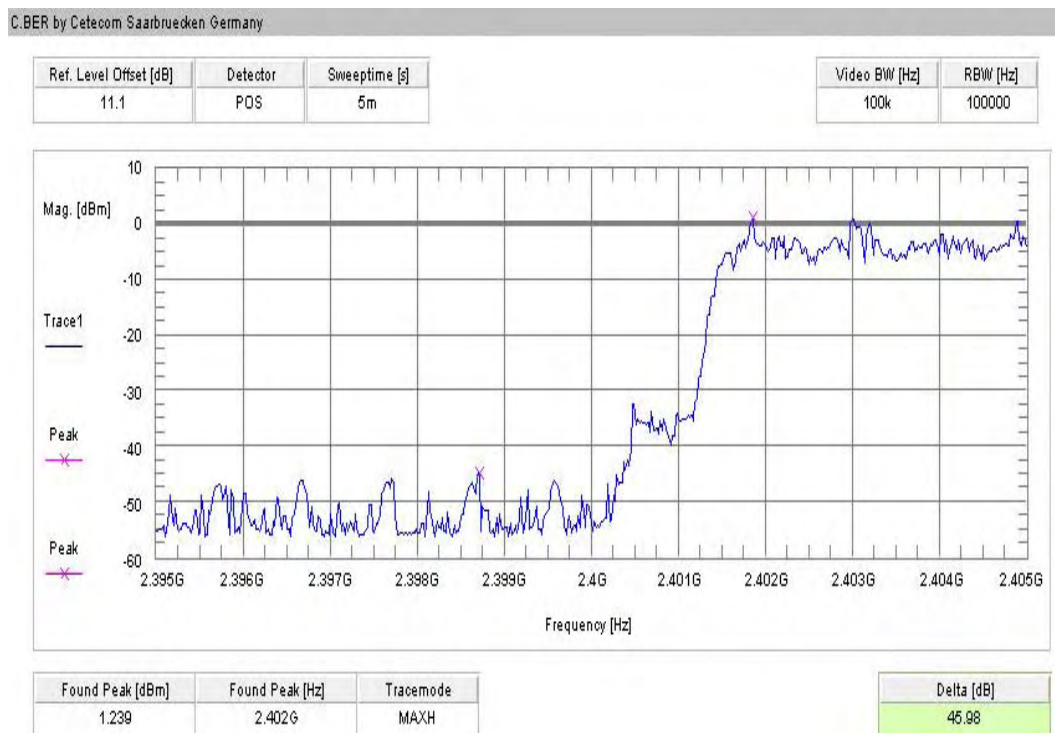


Modulation: Pi/4 DQPSK

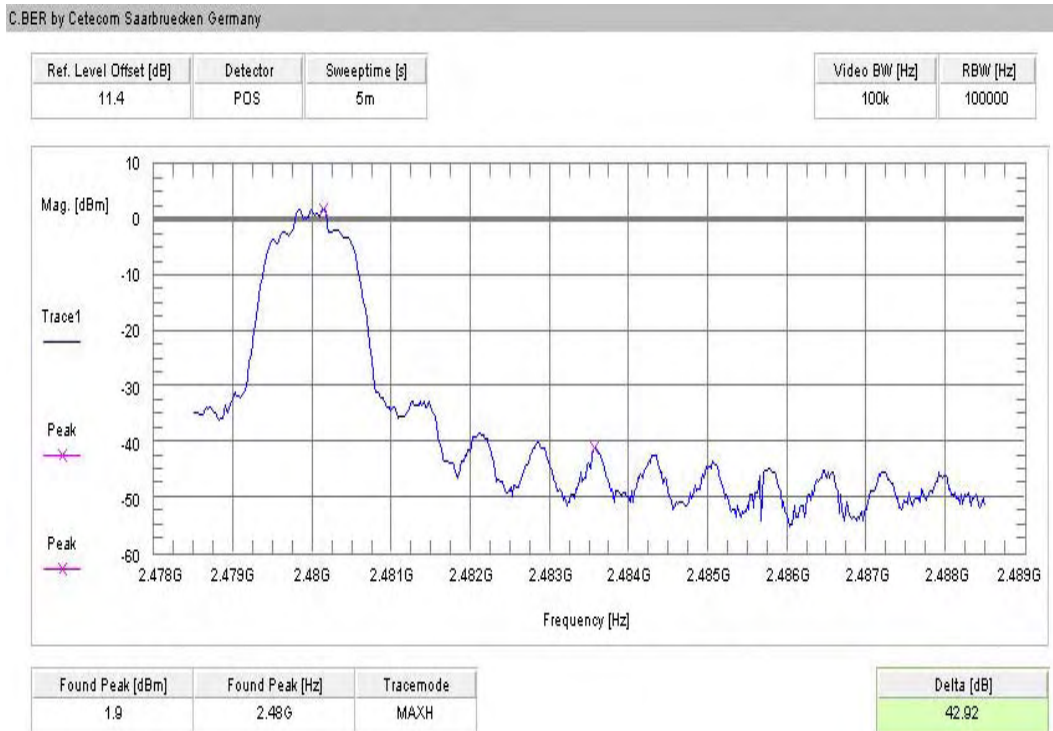
Plot 1 of 4 (hopping off, lowest frequency):



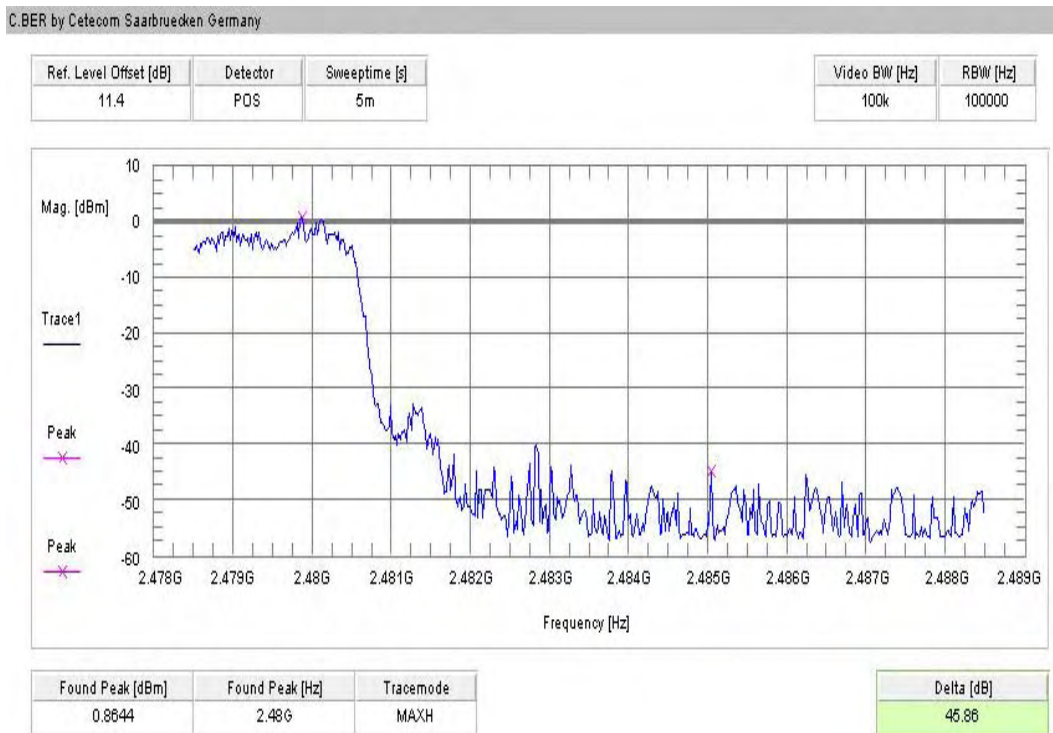
Plot 2 of 4 (hopping on, lowest frequency):



Plot 3 of 4 (hopping off, highest frequency):

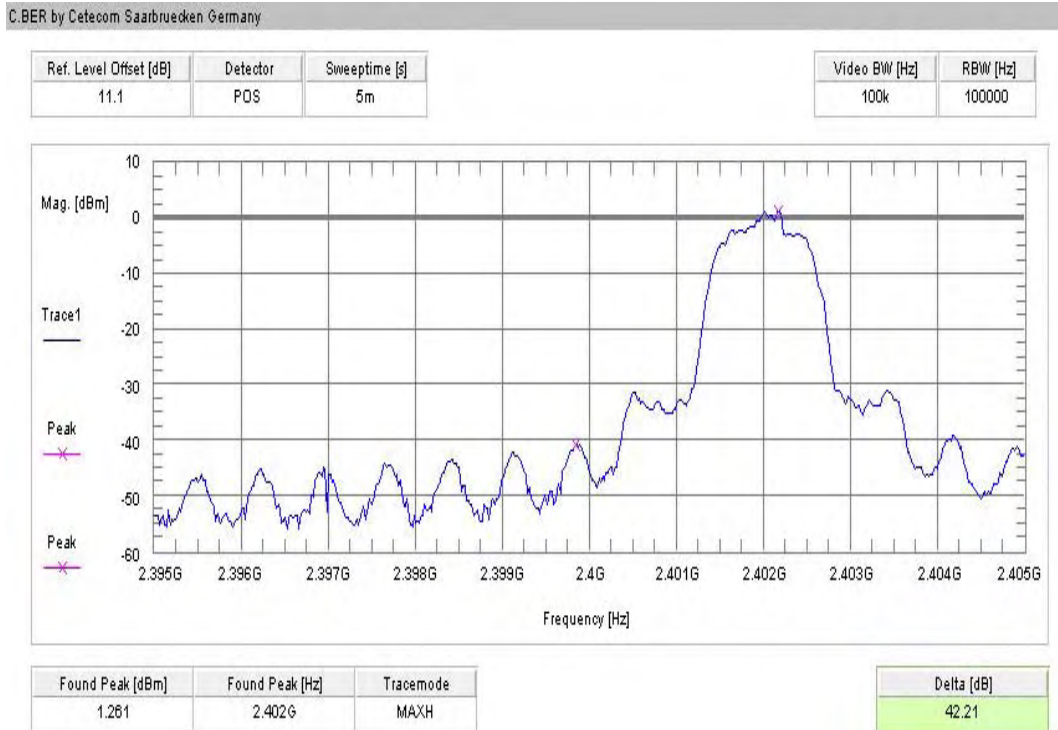


Plot 4 of 4 (hopping on, highest frequency):

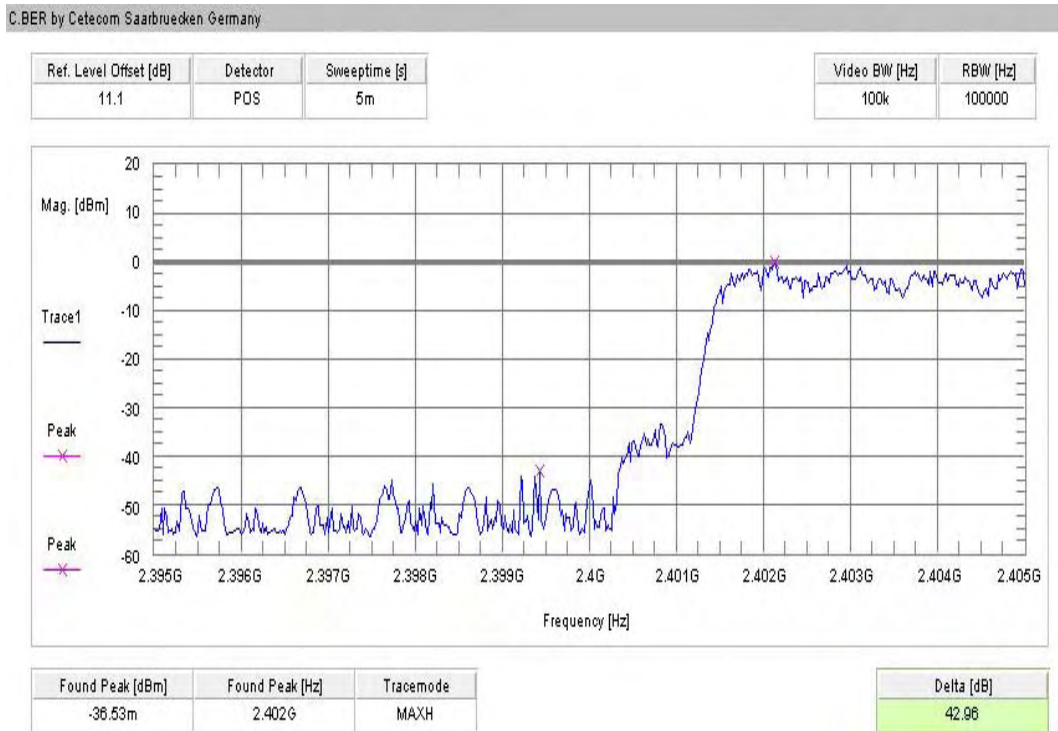


Modulation: 8DPSK

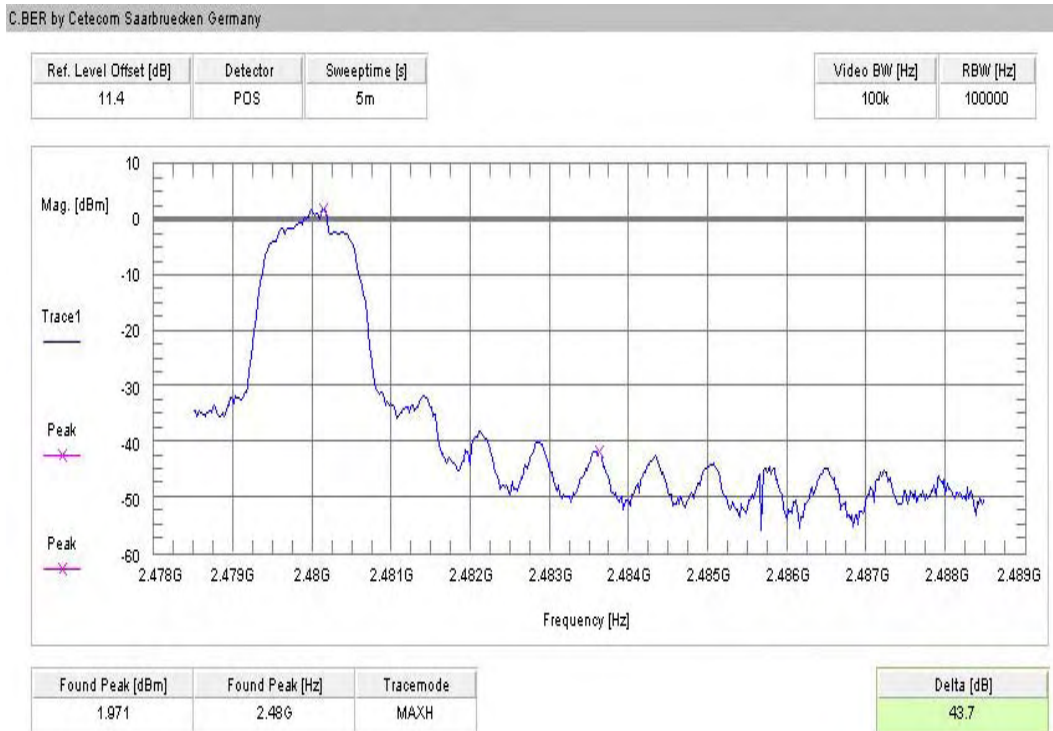
Plot 1 of 4 (hopping off, lowest frequency):



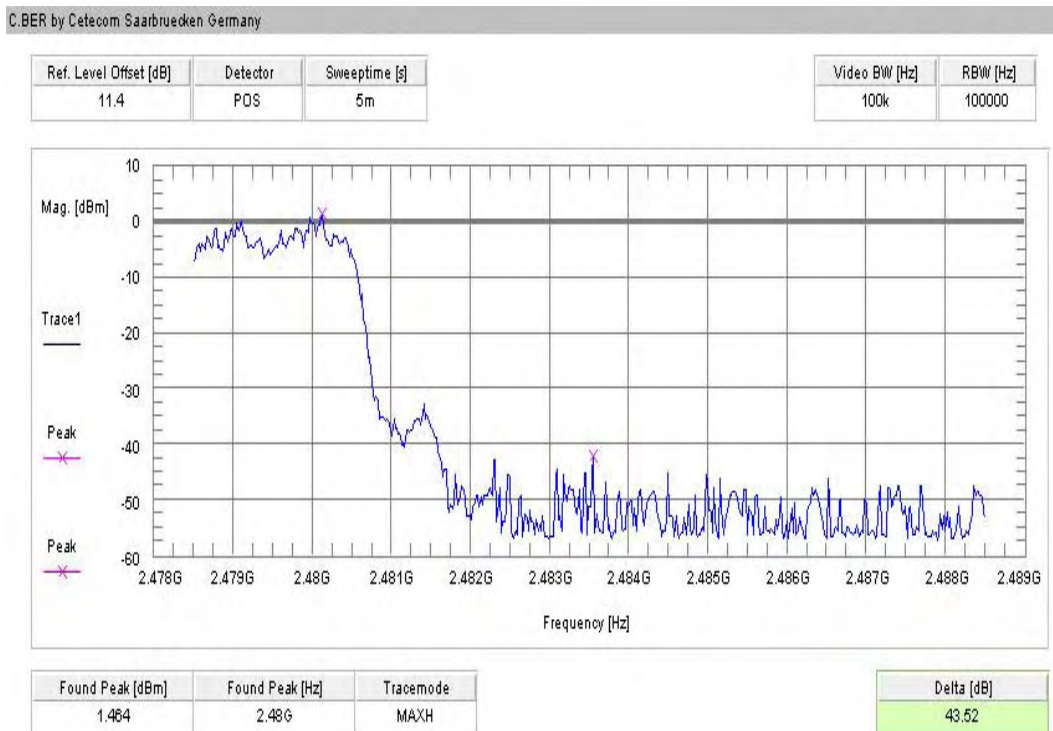
Plot 2 of 4 (hopping on, lowest frequency):



Plot 3 of 4 (hopping off, highest frequency):



Plot 4 of 4 (hopping on, highest frequency):





Results:

SZENARIO	DELTA VALUE [DB]		
	GFSK	Pi/4 DQPSK	8 DPSK
hopping off, lowest frequency	> 20 dB	> 20 dB	> 20 dB
hopping on, lowest frequency	> 20 dB	> 20 dB	> 20 dB
hopping off, highest frequency	> 20 dB	> 20 dB	> 20 dB
hopping on, highest frequency	> 20 dB	> 20 dB	> 20 dB
Measurement uncertainty	±1,5dB		

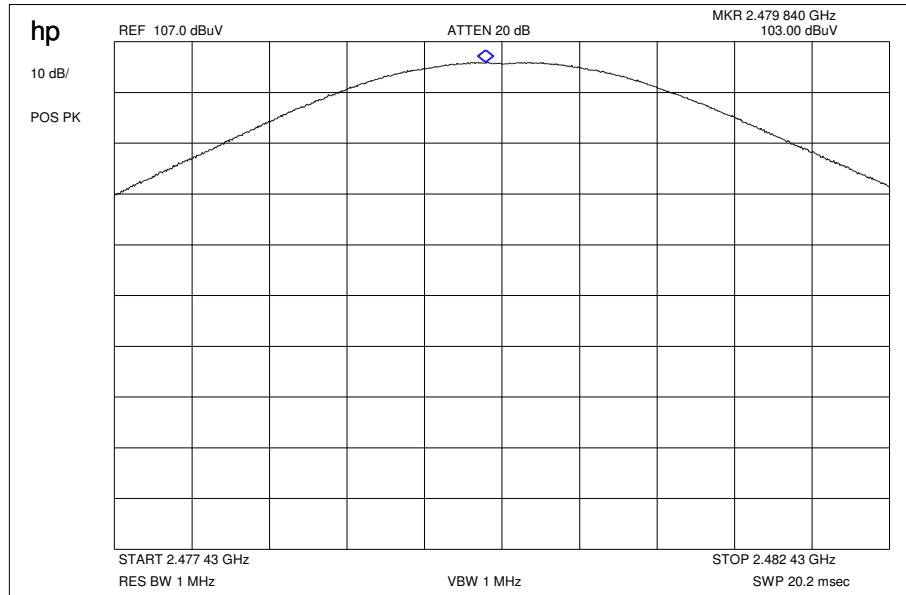
Limits:

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)).
-----------------------------------	--

**5.13 Band-edge compliance of radiated emissions §15.205**

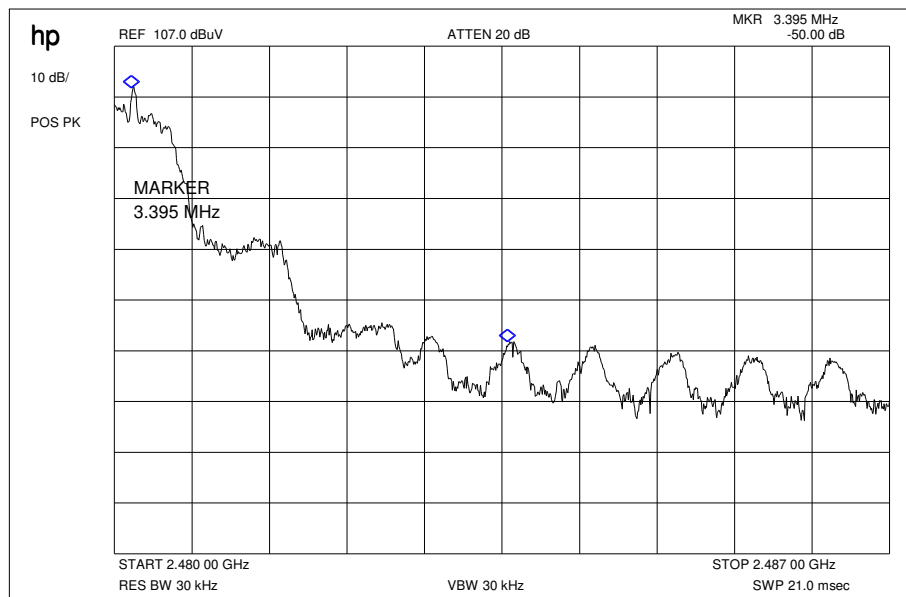
Modulation: widest

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



Result: 103.00 dB $\mu$ V/m

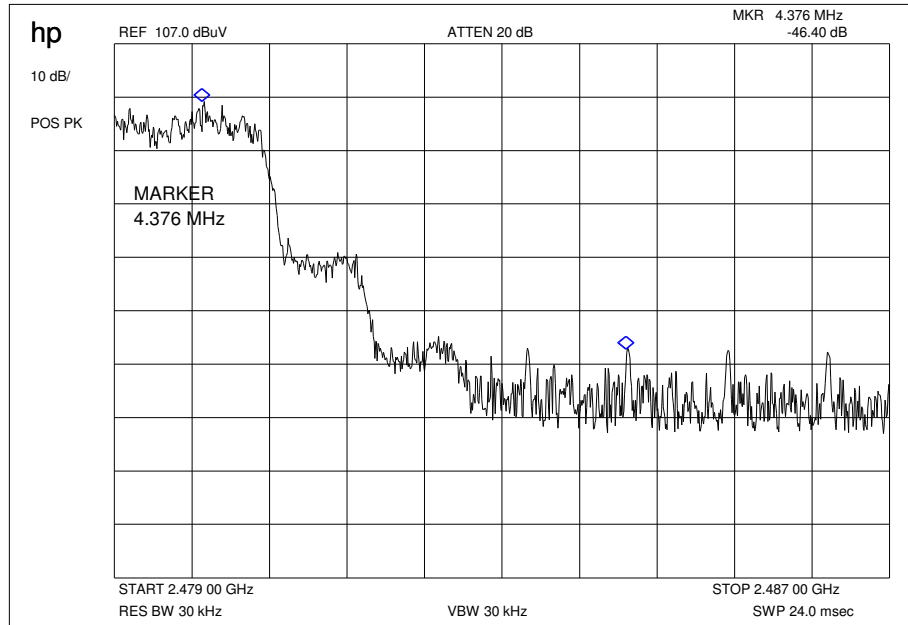
Plot 2: Marker-Delta Method (single carrier)



Marker-Delta-Value: 50.00 dB

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

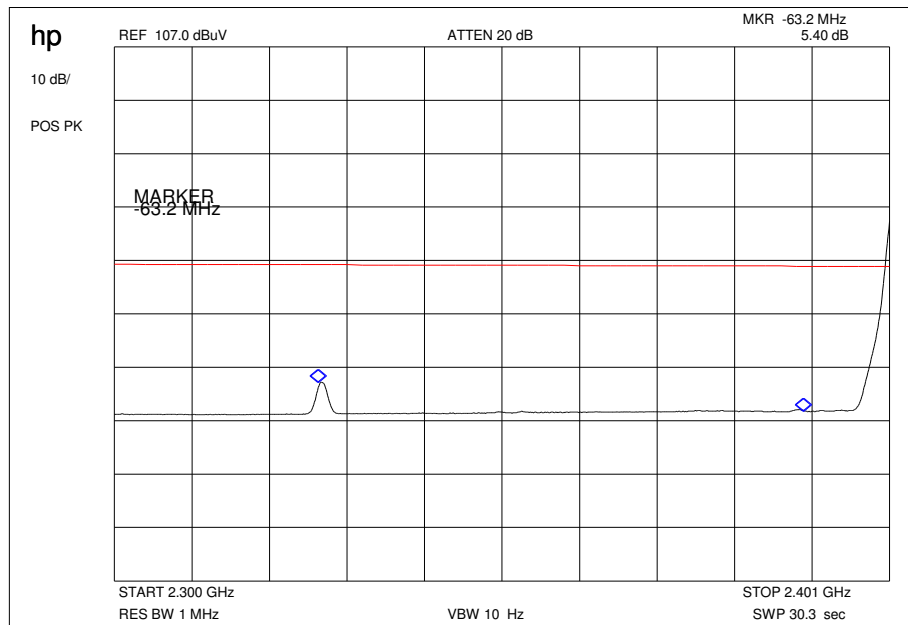
Plot 3: Marker-Delta Method (hopping)



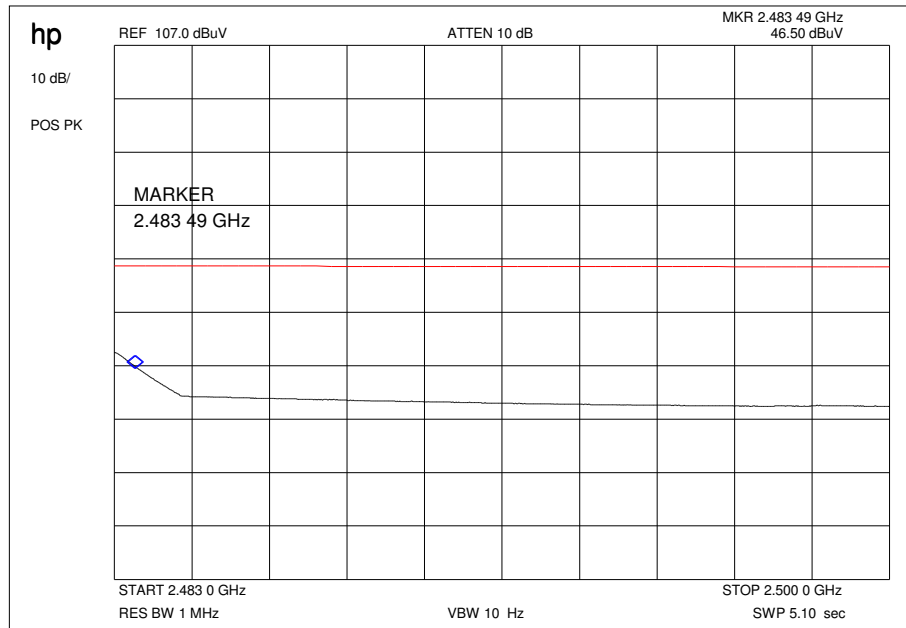
Marker-Delta-Value: 46.40 dB

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

Plot 4: Restricted Bands low



Plot 5: Restricted Bands high



Results & Limits:

Radiated field strength

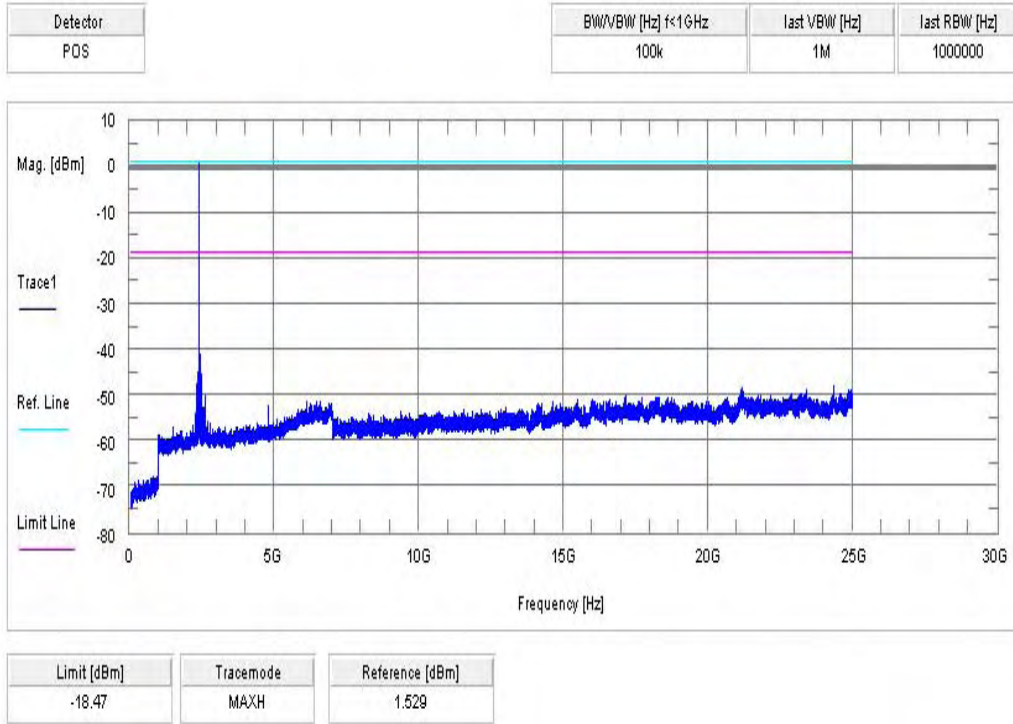
The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

high channel	setup	measured value (3m)	correction factor (3m)	calculated value (3m)
Max. peak value	1 MHz RBW 1 MHz VBW	103.00 dB $\mu$ V/m	-1.77	101.23 dB $\mu$ V/m
Max. average value	Calculated with duty cycle correction factor	101.23 dB $\mu$ V/m peak	-1,07dB duty cycle correction factor (worst case DH5)	100.16 dB $\mu$ V/m
Delta value	Peak 30 kHz RBW/VBW	50.00 dB (single carrier) 46.40 dB (hopping mode)	-	-
Value at band edge	limit 54 dB $\mu$ V/m			50.16 dB $\mu$ V/m (single carrier) 53.76 dB $\mu$ V/m (hopping mode)
Statement:				Complies

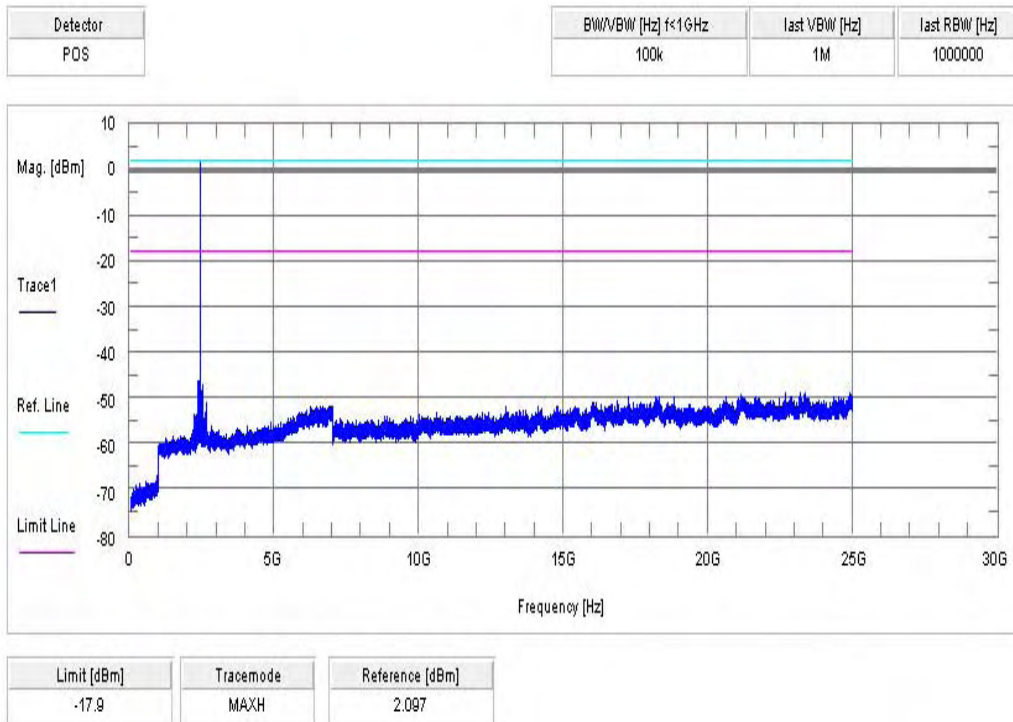
5.14 Spurious Emissions - conducted (Transmitter) § 15.247 (c)(1)

Modulation: GFSK

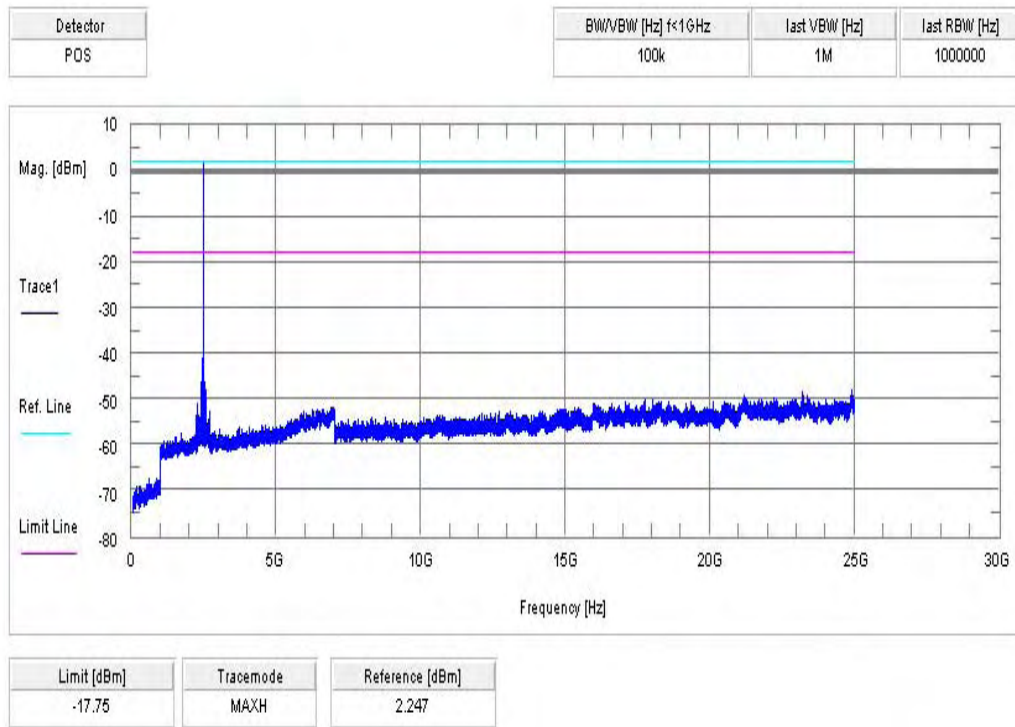
Plot 1 of 3: lowest channel



Plot 2 of 3: middle channel



Plot 3 of 3: highest channel



Result & Limits:

Emission Limitation					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		1.53	30 dBm		Operating frequency
			-20 dBc		complies
					--
2441		2.10	30 dBm		Operating frequency
			-20 dBc		complies
					--
2480		2.25	30 dBm		Operating frequency
			-20 dBc		complies
					--
Measurement uncertainty		± 3dB			

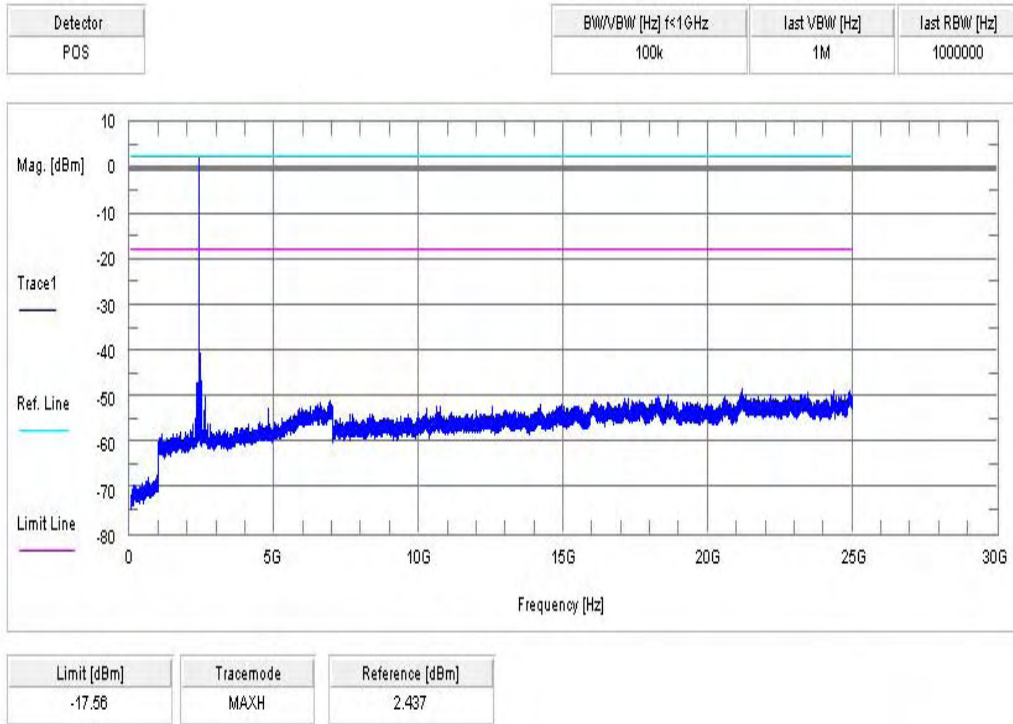
F < 1 GHz: RBW: 100 kHz VBW: 100 kHz  
 F > 1 GHz: RBW: 1 MHz VBW: 1 MHz

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)).
-----------------------------------	--

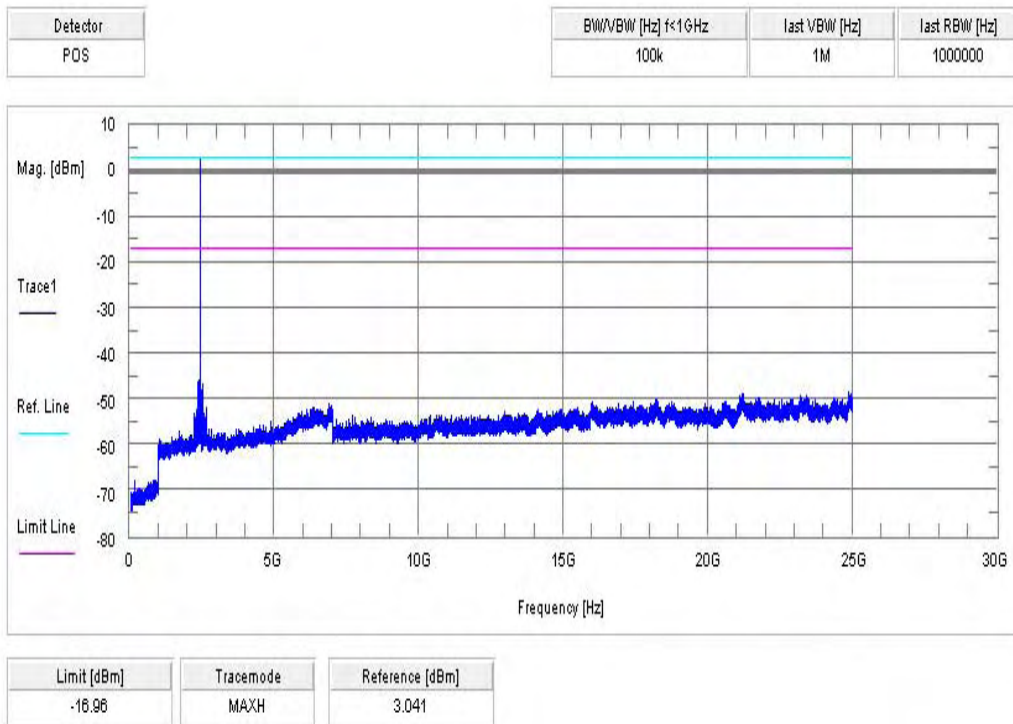
Note: For emissions that fall into restricted bands you find the radiated emissions later in the report.

Modulation: Pi/4 DQPSK

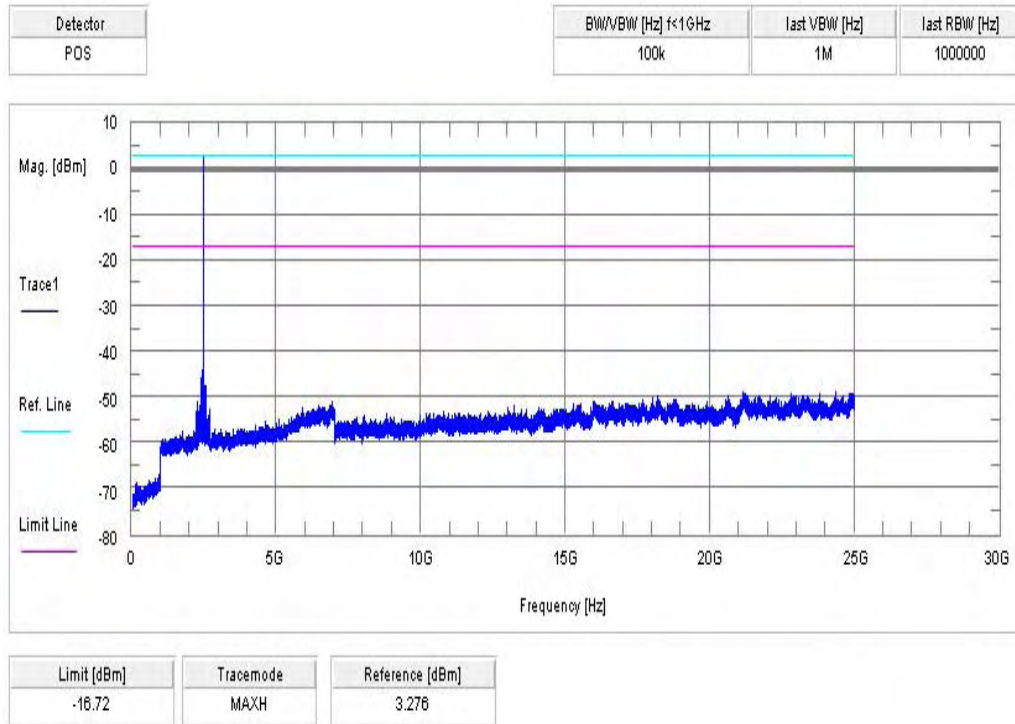
Plot 1 of 3: lowest channel



Plot 2 of 3: middle channel



Plot 3 of 3: highest channel



Result & Limits:

Emission Limitation					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		2.44	30 dBm		Operating frequency complies
			-20 dBc		--
2441		3.04	30 dBm		Operating frequency complies
			-20 dBc		--
2480		3.28	30 dBm		Operating frequency complies
			-20 dBc		--
Measurement uncertainty		± 3dB			

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

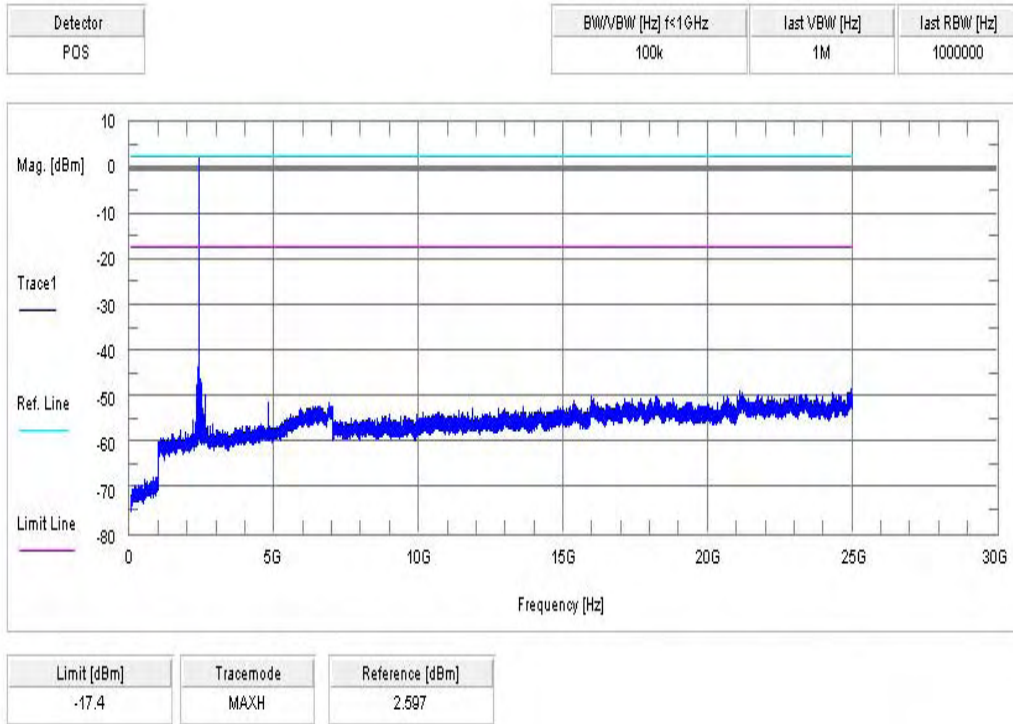
Under normal test conditions only	In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified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

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

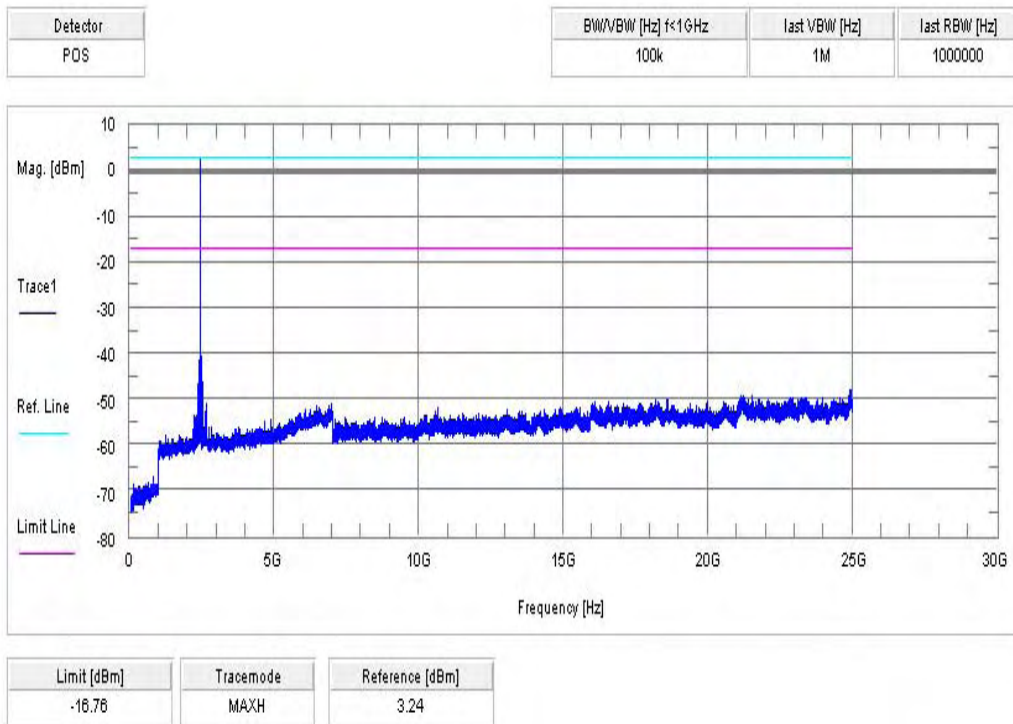


Modulation: 8DPSK

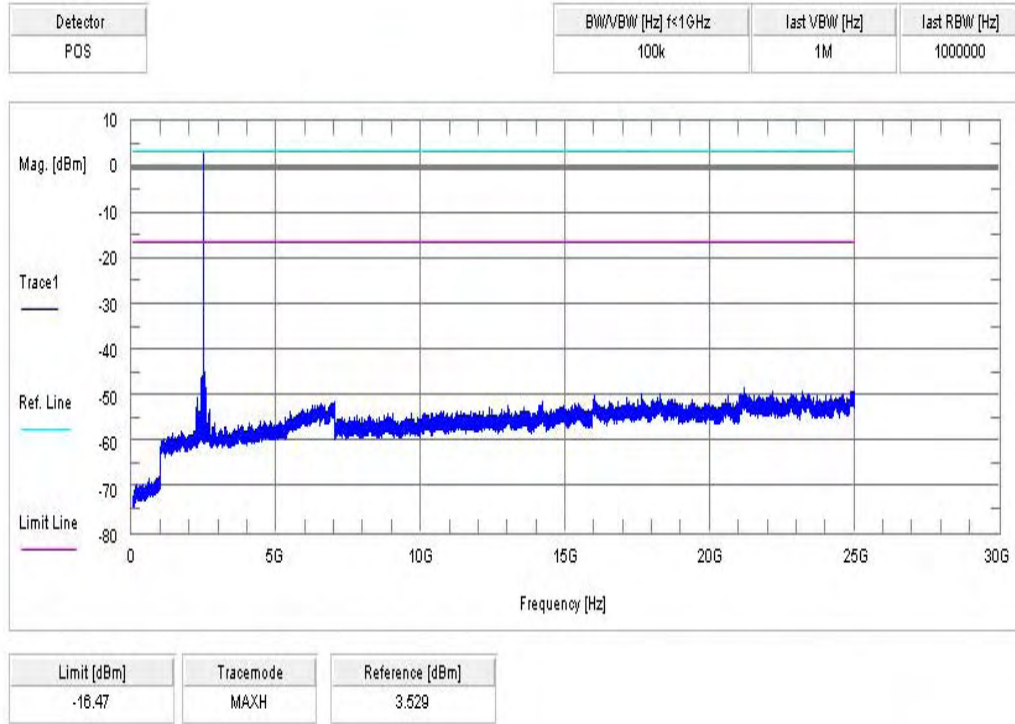
Plot 1 of 3: lowest channel



Plot 2 of 3: middle channel



Plot 3 of 3: highest channel



Result & Limits:

Emission Limitation					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		2.60	30 dBm		Operating frequency complies
			-20 dBc		--
2441		3.24	30 dBm		Operating frequency complies
			-20 dBc		--
2480		3.53	30 dBm		Operating frequency complies
			-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)).
-----------------------------------	--

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

**5.15 Spurious Emissions > 30 MHz- radiated (Transmitter) § 15.247 (c)(1)**

Modulation: 8 DPSK

Plot 1: 0.03 - 1 GHz vertical/horizontal (lowest channel)

**CETECOM ICT Services GmbH**

**Information**

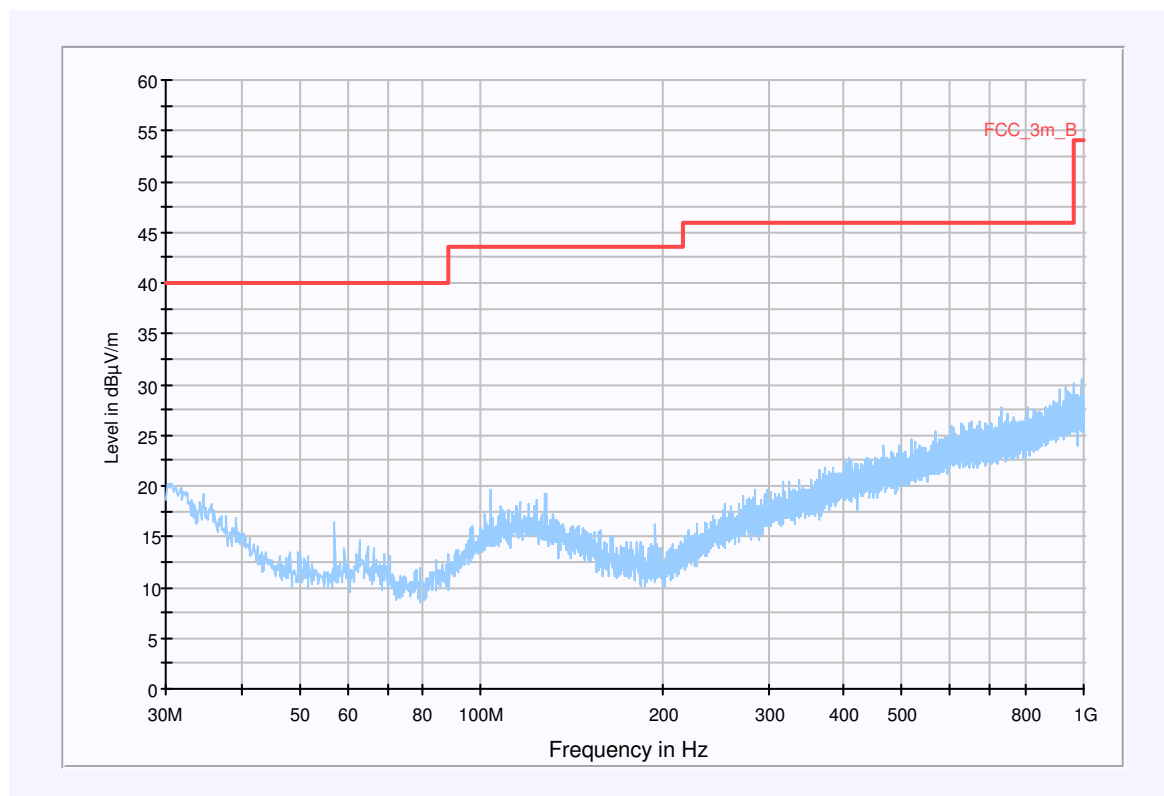
EUT:	HBH-PV712
Serial Number:	IBDA: 001813F2EC7F
Test Description:	FCC part 15 C @ 3 m
Operating Conditions:	BT connection channel 0
Operator Name:	Folz
Comment:	Powered with DC 4.1V

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

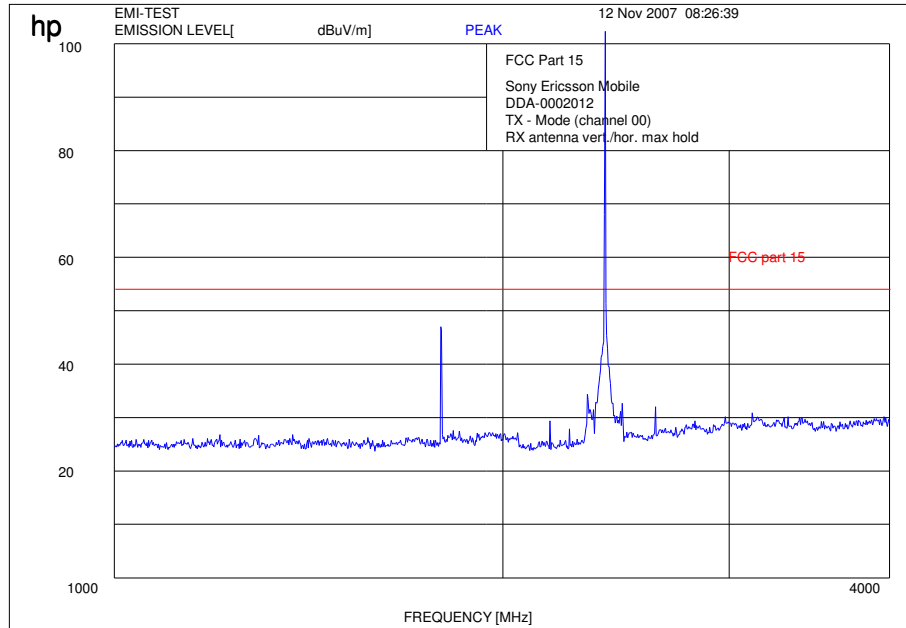
Hardware Setup:	EMI radiated\Electric Field (NOS)
Level Unit:	dBµV/m

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

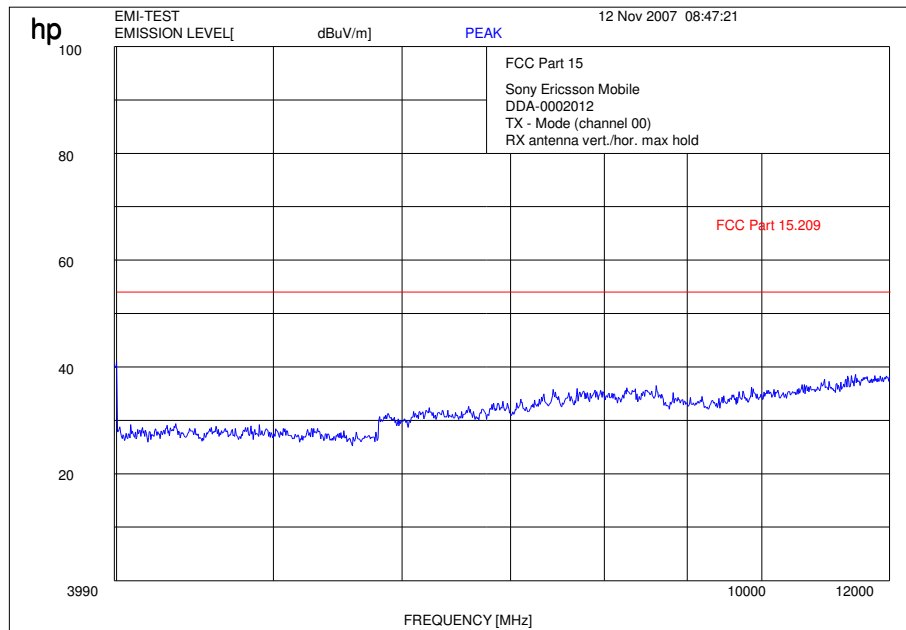
**FCC\_3m\_Fast\_1GHz (B)**



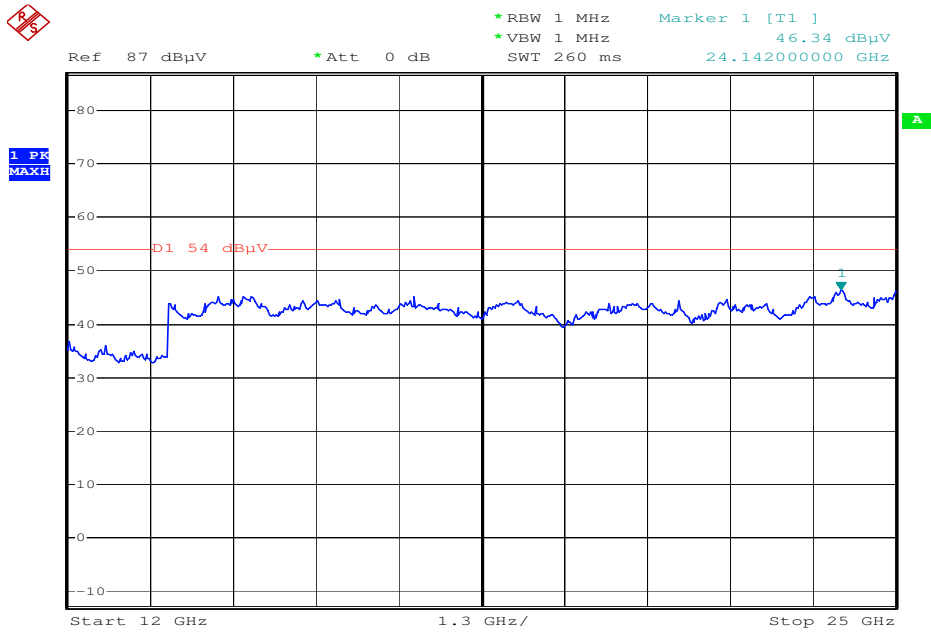
Plot 2: 1- 4 GHz vertical/horizontal (lowest channel)



Plot 3: 4 - 12 GHz vertical/horizontal (lowest channel)



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



Date: 12.NOV.2007 14:35:11

Plot 5: 0.03 - 1 GHz vertical/horizontal (middle channel)

**CETECOM ICT Services GmbH**

**Information**

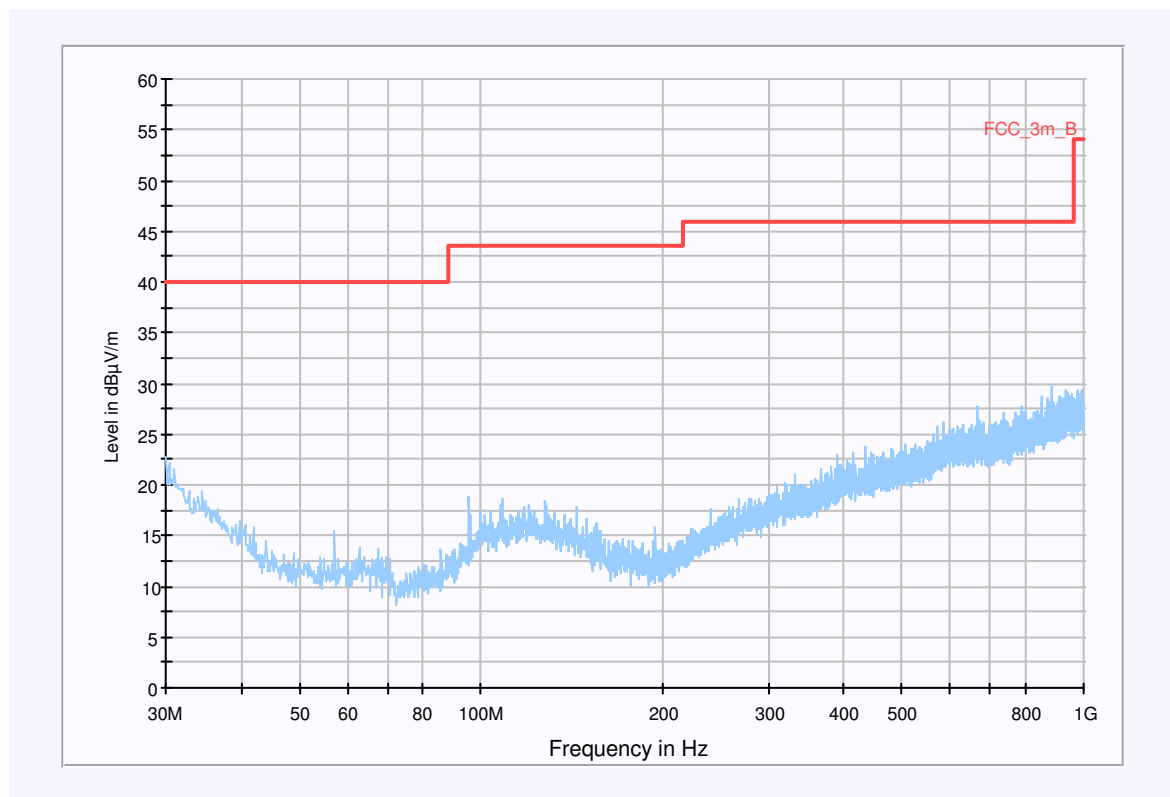
EUT:	HBH-PV712
Serial Number:	IBDA: 001813F2EC7F
Test Description:	FCC part 15 C @ 3 m
Operating Conditions:	BT connection channel 39
Operator Name:	Folz
Comment:	Powered with DC 4.1V

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

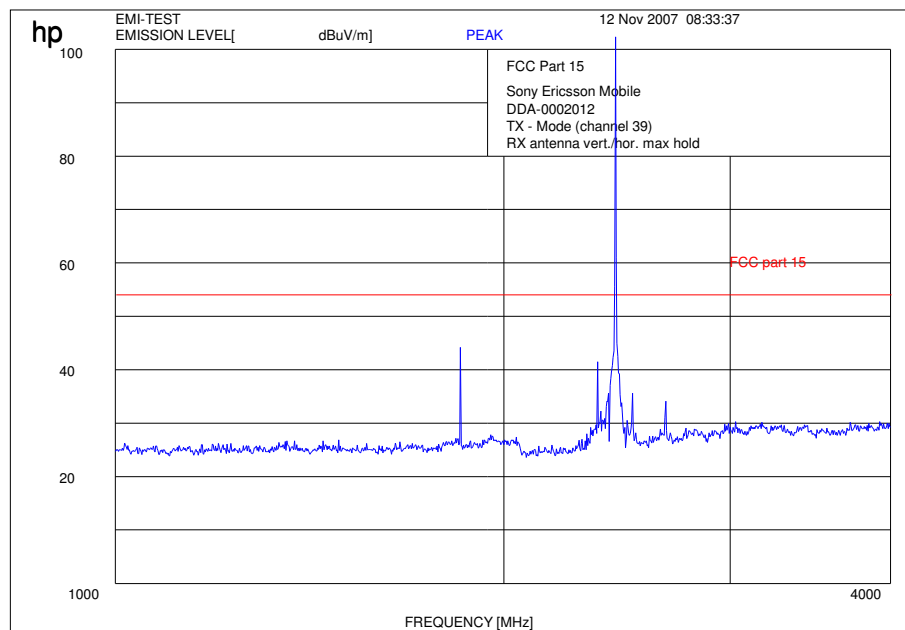
Hardware Setup:	EMI radiated\Electric Field (NOS)
Level Unit:	dBμV/m

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

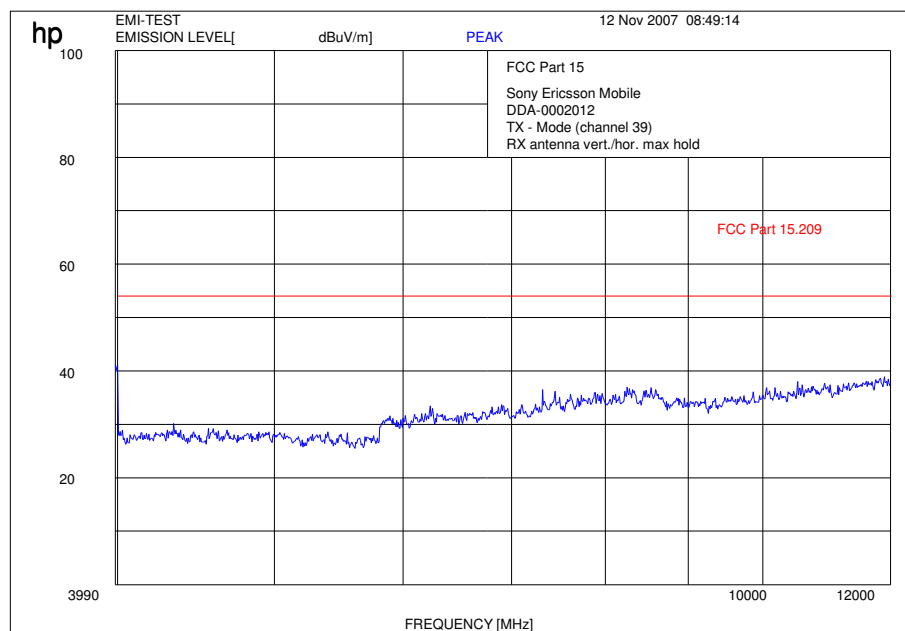
**FCC\_3m\_Fast\_1GHz (B)**



Plot 6: 1 - 4 GHz vertical/horizontal (middle channel)



Plot 7: 4 - 12 GHz vertical/horizontal (middle channel)



Plot 8: 0.03 - 1 GHz vertical/horizontal (highest channel)

**CETECOM ICT Services GmbH**

**Information**

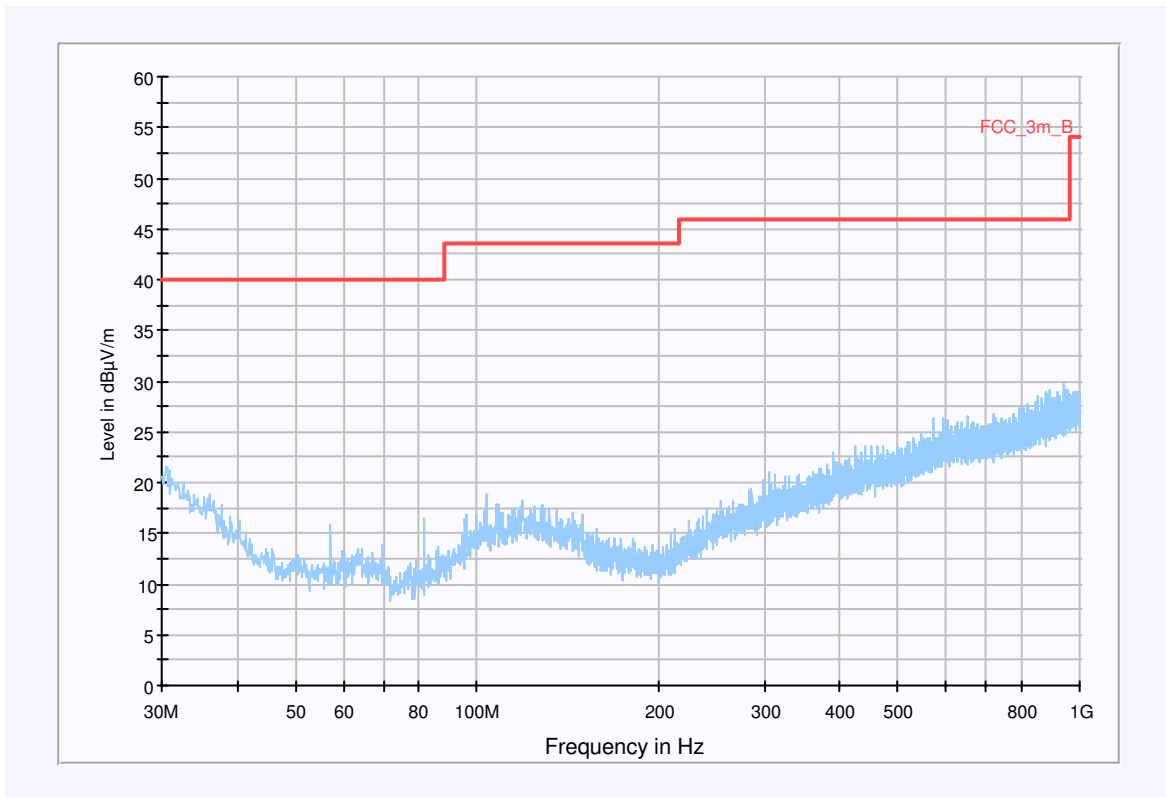
EUT:	HBH-PV712
Serial Number:	IBDA: 001813F2EC7F
Test Description:	FCC part 15 C @ 3 m
Operating Conditions:	BT connection channel 78
Operator Name:	Folz
Comment:	Powered with DC 4.1V

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

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

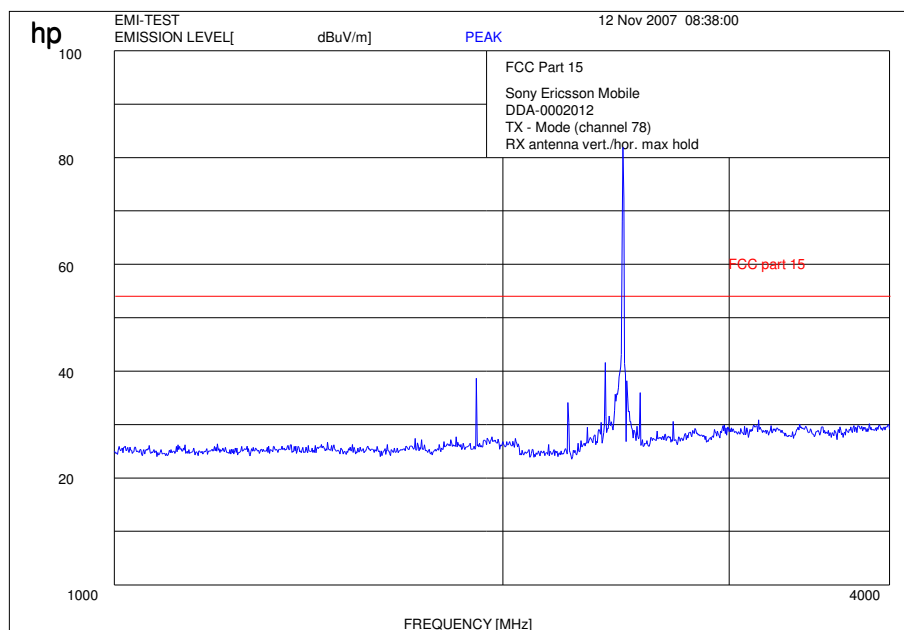
Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30MHz - 1GHz	QuasiPeak	120kHz	15s	Receiver

**FCC\_3m\_Fast\_1GHz (B)**

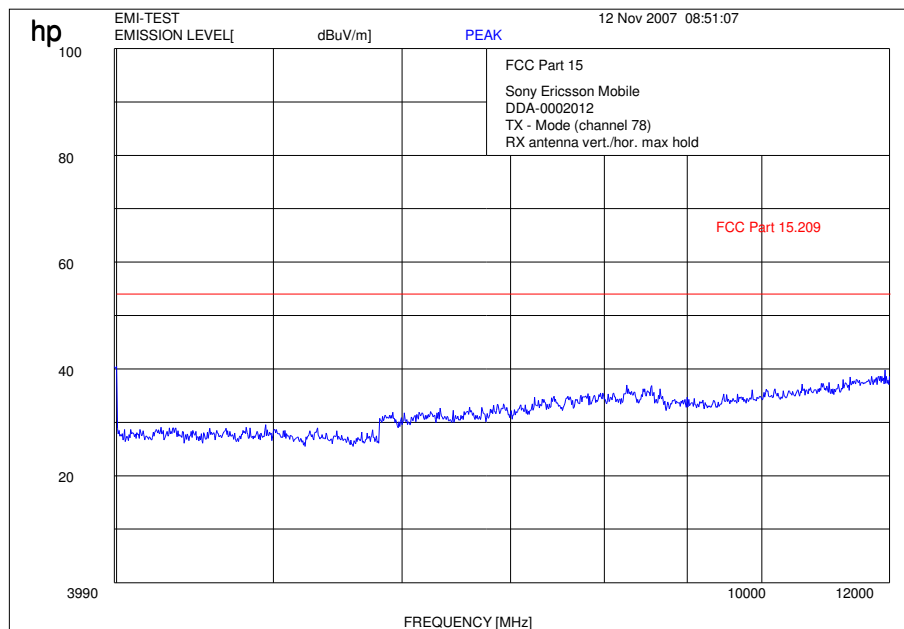




Plot 9: 1 - 4 GHz vertical/horizontal (highest channel)



Plot 10: 4 - 12 GHz vertical/horizontal (highest channel)



Results:

SPURIOUS EMISSIONS LEVEL (dB $\mu$ V/m)								
2402 MHz			2441 MHz			2480 MHz		
F [MHz]	Detector	Level [dB $\mu$ V/m]	F [MHz]	Detector	Level [dB $\mu$ V/m]	F [MHz]	Detector	Level [dB $\mu$ V/m]
1791.5	peak	47	1852	peak	44.2	1909.3	peak	38.7
2327.5	peak	34.4	2366.5	peak	41.5	2402.8	peak	41.6
			2412.8	peak	35.6	2497.8	peak	38.2
			2518.7	peak	35.6	2557.3	peak	36
			2673.2	peak	34.1	2248.3	peak	34.1
No critical peaks found.								
Measurement uncertainty			$\pm 3$ dB					

f < 1 GHz : RBW/VBW: 100 kHz

f  $\geq$  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 [ $\mu$ V/m]	Measurement distance (m)
30 - 88	100 (40 dB $\mu$ V/m)	3
88 - 216	150 (43.5 dB $\mu$ V/m)	3
216 - 960	200 (46 dB $\mu$ V/m)	3
above 960	500 (54 dB $\mu$ V/m)	3

**5.16 Spurious Emissions - radiated (Receiver) § 15.109**

Modulation: GFSK

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

**CETECOM ICT Services GmbH**

**Information**

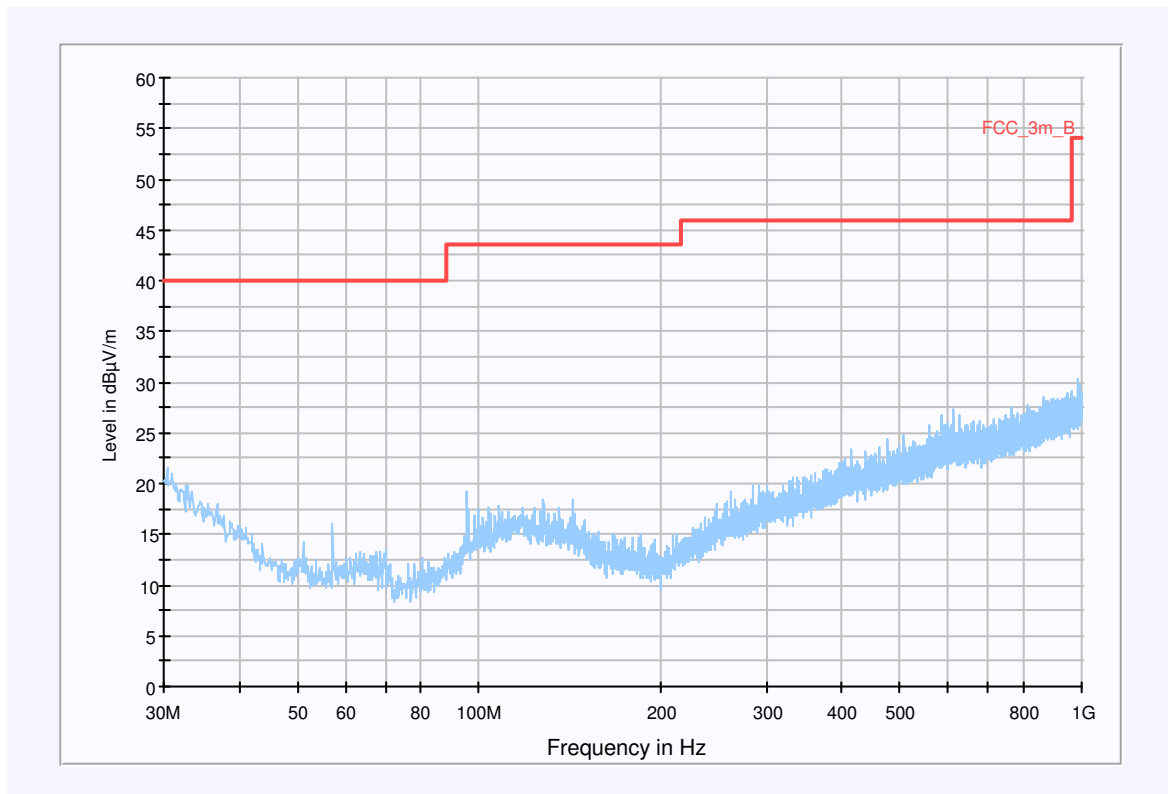
EUT:	HBH-PV712
Serial Number:	IBDA: 001813F2EC7F
Test Description:	FCC part 15 C @ 3 m
Operating Conditions:	BT connection standby
Operator Name:	Folz
Comment:	Powered with DC 4.1V

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

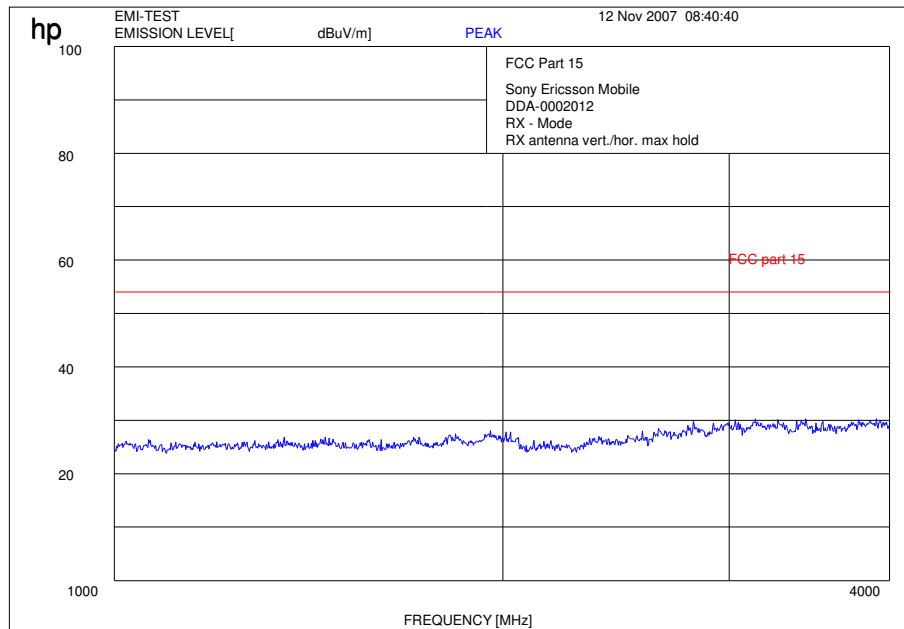
Hardware Setup:	EMI radiated\Electric Field (NOS)
Level Unit:	dBµV/m

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

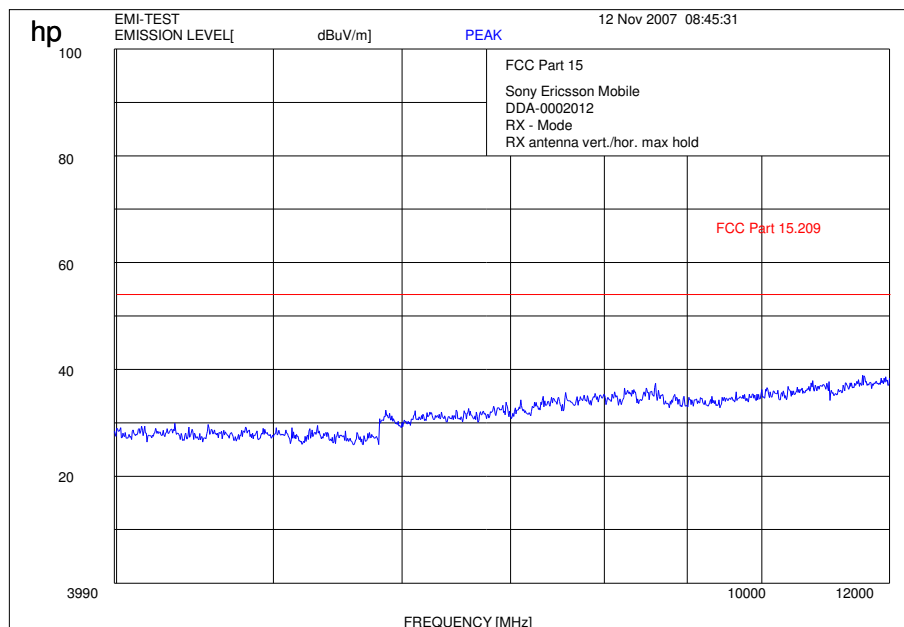
**FCC\_3m\_Fast\_1GHz (B)**



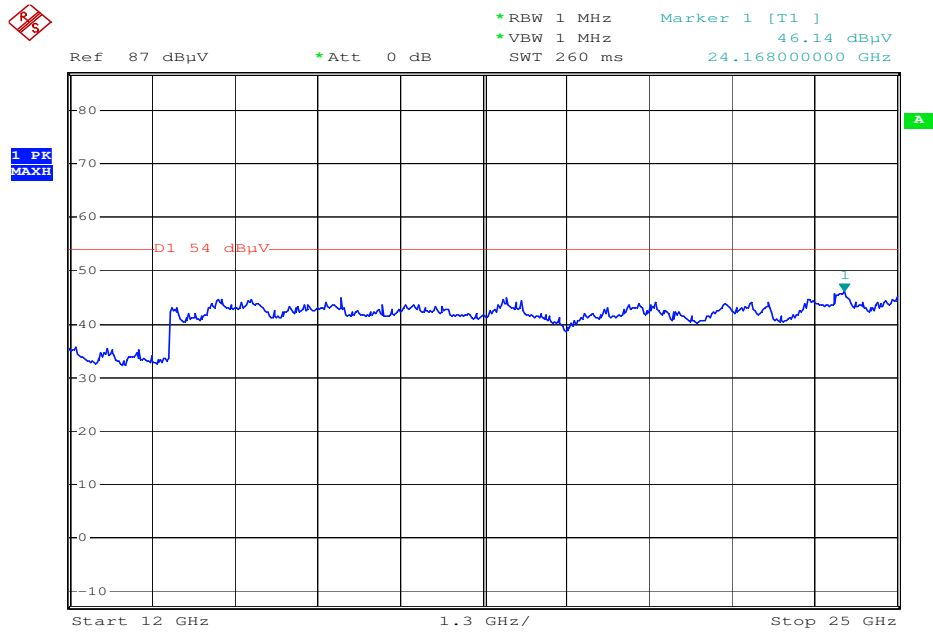
Plot 2: 1 - 4 GHz vertical/horizontal (receiver)



Plot 3: 4 - 12 GHz vertical/horizontal (receiver)



Plot 4: 12 - 25 GHz vertical/horizontal (receiver)



Date: 12.NOV.2007 14:36:11

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 (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

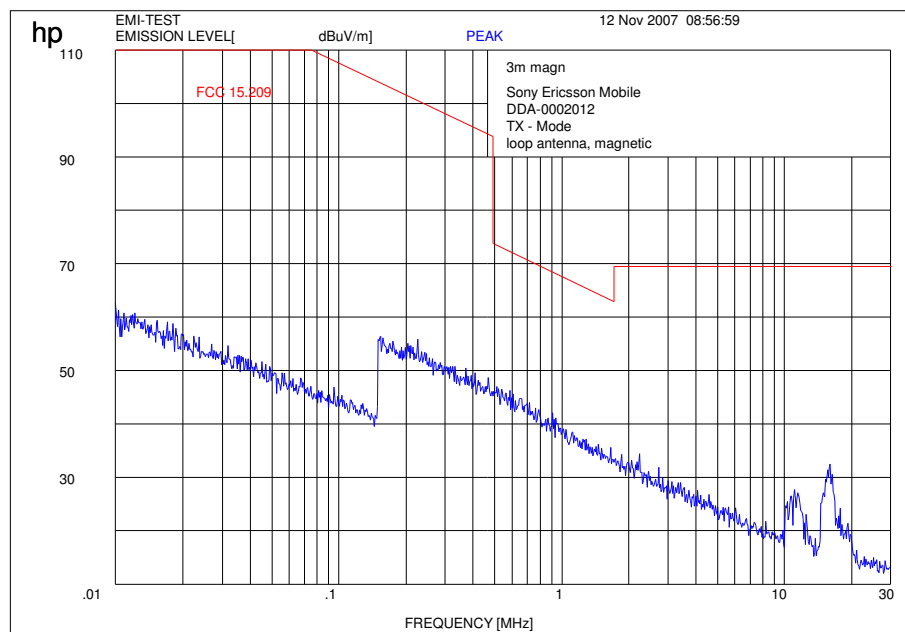
**5.17 Spurious Emissions < 30 MHz - Transmitter radiated § 15.209**

Modulation: 8 DPSK

Measured at 10 m distance.

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

Plot 1:



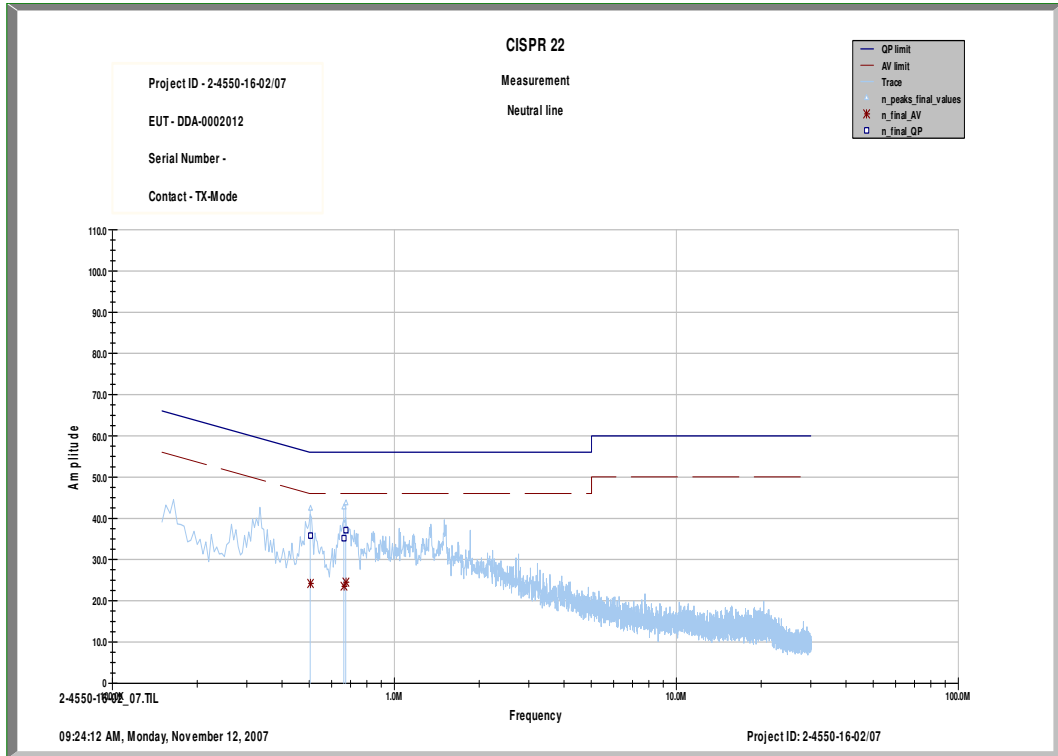
Limits:

Frequency (MHz)	Field strength ( $\mu\text{V/m}$ )	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 $\mu\text{V/m}$	30

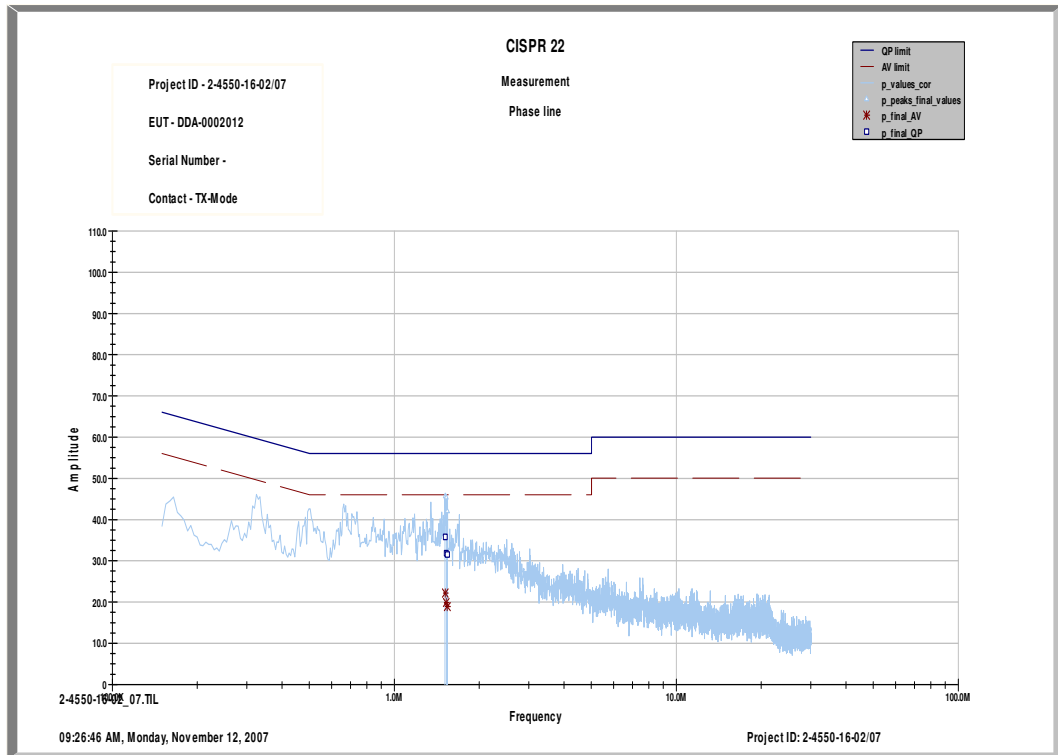
5.18 Conducted Emissions <30 MHz § 15.107/207

Modulation: 8 DPSK

Plot 1:



Plot 2:



Limits :

Under normal test conditions only	See plots
-----------------------------------	-----------

## 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	26.10.2007
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