



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. : 2-4883-63-06/08
Type identification : AAD-3880006-BV
Applicant : Sony Ericsson Mobile Communications AB
FCC ID : PY7A3880006
IC Certification No : 4170B-A3880006
Test standards : 47 CFR Part 15
RSS - 210 Issue 7

Table of contents

1	General information.....	3
1.1	Notes	3
1.2	Testing laboratory	4
1.3	Details of applicant	4
1.4	Application details	4
2	Test standard/s:.....	5
3	Technical tests	6
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	RF Technical Brief Cover Sheet acc. To RSS-102	8
3.1.4	EUT operating modes.....	9
3.1.5	Extreme conditions testing values	9
4	Summary of Measurement Results and list of all performed test cases	10
5	RF measurement testing	11
5.1	Description of test set-up.....	11
5.1.1	Radiated measurements.....	11
5.1.2	Conducted measurements.....	11
5.2	Referenced documents	12
5.3	Additional comments	12
5.4	Antenna gain	12
5.5	Carrier frequency separation §15.247(a)(1)	13
5.6	Number of hopping channels §15.247(a)(1)	14
5.7	Time of occupancy (dwell time) §15.247(a)(1)(iii).....	15
5.8	Power Spectral density (Hybrid system in Inquiry mode/Page scan) §15.247(e)	16
5.9	Spectrum Bandwidth of a FHSS System / 20dB Bandwidth §15.247(a)(1).....	17
5.10	Maximum output power (conducted) § 15.247 (b)(1).....	22
5.11	Max. peak output power (radiated) § 15.247 (b)(1)	27
5.12	Band-edge compliance of conducted emissions §15.247 (d)	28
5.13	Band-edge compliance of radiated emissions §15.205	35
5.14	Spurious Emissions - conducted (Transmitter) § 15.247 (c)(1)	44
5.15	Spurious Emissions > 30 MHz- radiated (Transmitter) § 15.247 (c)(1).....	50
5.16	Spurious Emissions - radiated (Receiver) § 15.109	59
5.17	Spurious Emissions < 30 MHz - Transmitter radiated § 15.209	63
5.18	Conducted Emissions <30 MHz § 15.107/207.....	64
6	Test equipment and ancillaries used for tests.....	65
7	Photographs of the Test Set-up.....	67
8	Photographs of the EUT	69

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:

2008-11-07

Jakob Reschke



Date

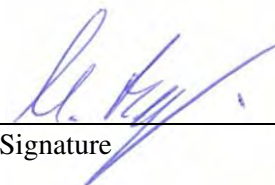
Name

Signature

Technical responsibility for area of testing:

2008-11-07

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

Name:	Sony Ericsson Mobile Communications AB
Street:	Mobilvägen 10
Town:	22188 Lund
Country:	Sweden
Telephone:	+46-46-19-3000
Fax:	+46-10-800-2441
Contact:	Peter Lindeborg
E-mail:	peter.lindeborg@sonyericsson.com
Telephone:	+46-10-802-43 68

1.4 Application details

Date of receipt of order:	2008-10-29
Date of receipt of test item:	2008-11-06
Date of start test:	2008-11-06
Date of end test	2008-11-07
Persons(s) who have been present during the test:	-/-

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:	Sony Ericsson Mobile Communications AB
Street:	Mobilvägen 10
Town:	22188 Lund
Country:	Sweden

3.1.1 Test item

Kind of test item	:	GSM Mobile 850/900/1800/1900; EDGE; UMTS, WLAN; BT
Type identification	:	AAD-3880006-BV
S/N serial number	:	Rad. CB5114ZYNS Cond. CB5114ZERG
HW hardware status	:	A
SW software status	:	-/-
Frequency Band [MHz]	:	ISM 2.400 - 2.483,5
Type of Modulation	:	GFSK, Pi/4 DQPSK, 8 DPSK
Number of channels	:	79
Antenna	:	Integrated antenna
Power Supply	:	3.60 V DC by Li-Polymer Battery (BST-33) and Power Supply
Temperature Range	:	-20 °C to 55 °C

Max. power radiated: 1.00 dBm

Max. power conducted: 3.59 dBm

FCC ID: PY7A3880006

IC: 4170B-A3880006

3.1.2 Additional EUT information For IC Canada (appendix 2)

IC Registration Number:	4170B-A3880006
Model Name:	AAD-3880006-BV
Manufacturer (complete Address):	Sony Ericsson Mobile Communications AB Mobilvägen 10 22188 Lund Sweden
Tested to Radio Standards Specification (RSS) No.:	RSS-210 Issue 7
Open Area Test Site Industry Canada Number:	IC 3463A-1
Frequency Range (or fixed frequency) [MHz]:	2400 – 2483.5 MHz
RF: Power [W] (max):	<u>GFSK</u> Rad. EIRP: 1.26 mW Conducted : 2.29 mW <u>Pi/4 DQPSK</u> Rad. EIRP: 1.21 mW Conducted : 2.19 mW <u>8 DPSK</u> Rad. EIRP: 1.33 mW Conducted : 2.41 mW
Antenna Type:	Integrated antenna
Field Strength [dBμV/m in 3m]:	93.40
Occupied Bandwidth (99% BW) [kHz]:	GFSK: 932 Pi/4 DQPSK: 1335 8 DPSK: 1269
Type of Modulation:	GFSK, Pi/4 DQPSK, 8 DPSK
Emission Designator (TRC-43):	GFSK: 932KFXD Pi/4 DQPSK: 1M34GXD 8 DPSK: 1M27GXD
Transmitter Spurious (worst case) [μV/m in 3m]:	96 (noise floor)
Receiver Spurious (worst case) [μV/m in 3m]:	103 (noise floor)

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: 2008-11-07

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: **4170 B**
2. MODEL NUMBER: **AAD-3880006-BV**
3. MANUFACTURER: **Sony Ericsson Mobile Communications AB**
4. TYPE OF EVALUATION: **(c) RF Evaluation**

- Evaluated against exposure limits: General Public Use ☒ Controlled Use ☐
- Duty cycle used in evaluation: 99 %
- Standard used for evaluation: RSS-102 Issue 2 (2005-11)
- Measurement distance: 0.20 m
- RF value: 0.0026 V/m ☐ A/m ☐ W/m² ☒

Measured ☐ Computed ☐ Calculated ☒

Declaration of RF Exposure Compliance

ATTESTATION:

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

Name: 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 _{nom}	°C	21
Nominal Humidity	H _{nom}	%	55
Nominal Power Source	V _{nom}	V	3.60

Type of power source: **DC by Li-Polymer Battery (BST-33) and 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	2008-11-07	-/-

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 Pi/4 DQPSK 8 DPSK	Yes Yes Yes			
§ 15.247 (d)	Band-edge compliance of conducted emissions	GFSK Pi/4 DQPSK 8 DPSK	Yes Yes Yes			
§ 15.205	Band-edge compliance of radiated emissions	GFSK Pi/4 DQPSK 8 DPSK	Yes Yes Yes			
§ 15.247 (d)	Spurious Emission - conducted (Transmitter)	GFSK Pi/4 DQPSK 8 DPSK	Yes Yes 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.

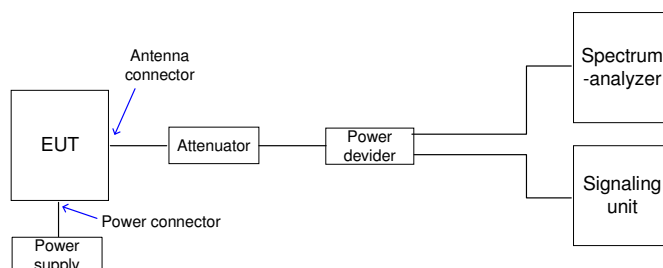
9 kHz - 150 kHz: Quasi Peak measurement, 200 Hz Bandwidth, passive loop antenna.
150 kHz - 30 MHz: Quasi Peak measurement, 9 kHz Bandwidth, passive loop antenna.
30 MHz - 200 MHz: Quasi Peak measurement, 120 kHz Bandwidth, bi-conical antenna
200MHz - 1GHz: Quasi Peak measurement, 120 kHz Bandwidth, log 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 paths is connected to the communication base Station (CMU200 or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm.



5.2 Referenced documents

None

5.3 Additional comments

None

5.4 Antenna gain

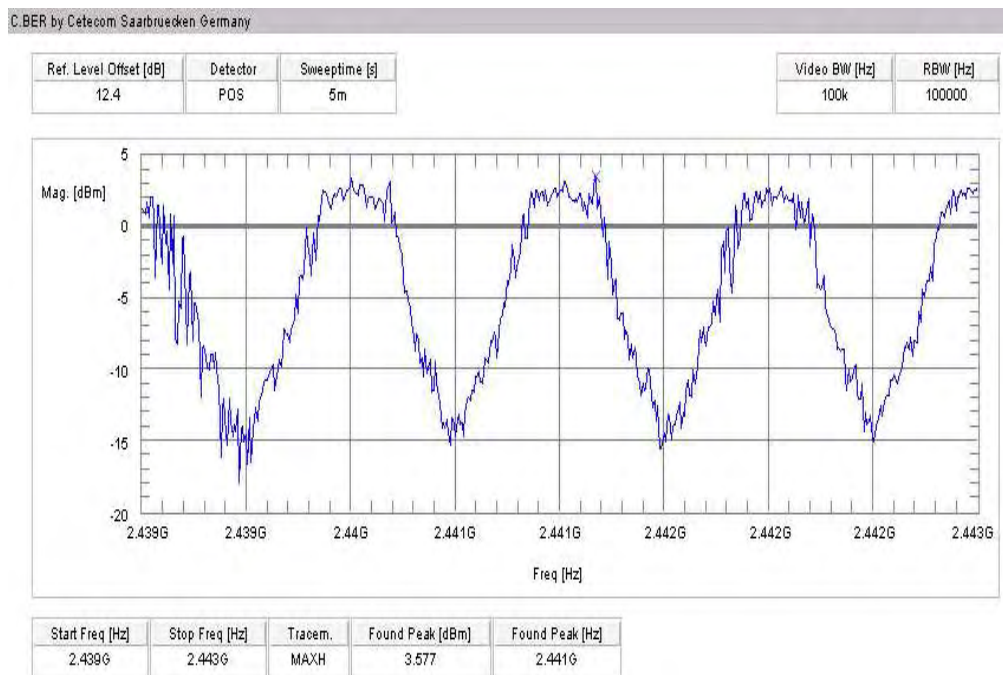
The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

	low channel 2402 MHz	mid channel 2441 MHz	high channel 2480 MHz
Conducted power [dBm] Measured, GFSK modulation	3.21	3.34	3.59
Radiated power [dBm] Measured, GFSK modulation	0.42	0.65	1.00
Gain [dBi] Calculated	-2.79	-2.69	-2.59

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

Modulation: GFSK

Plot 1 of 1:



Result: Channel separation is: ~ 1 MHz

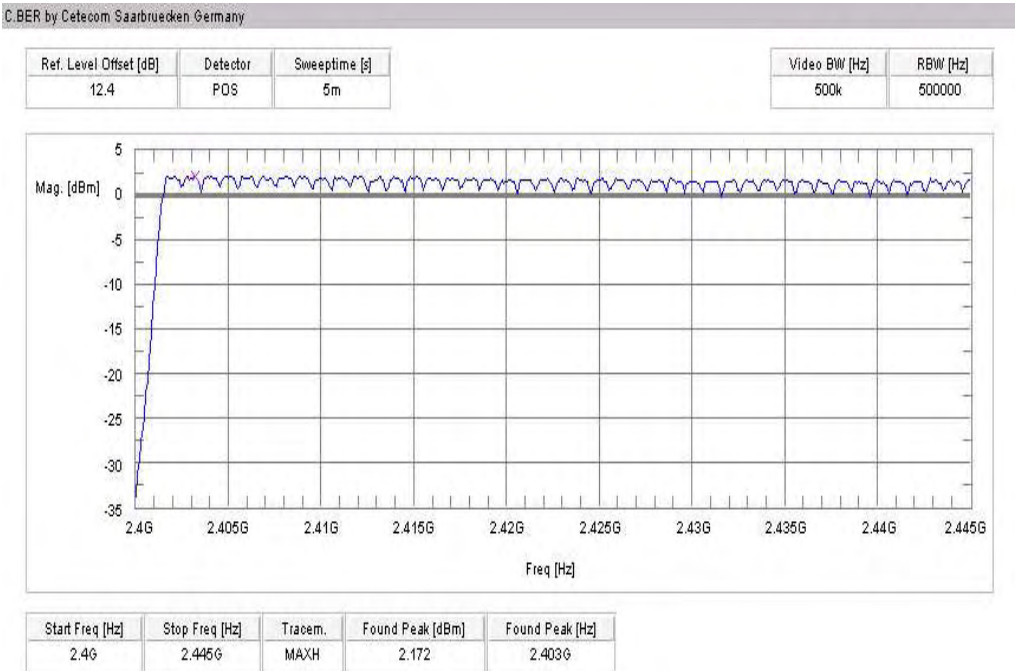
Limits:

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

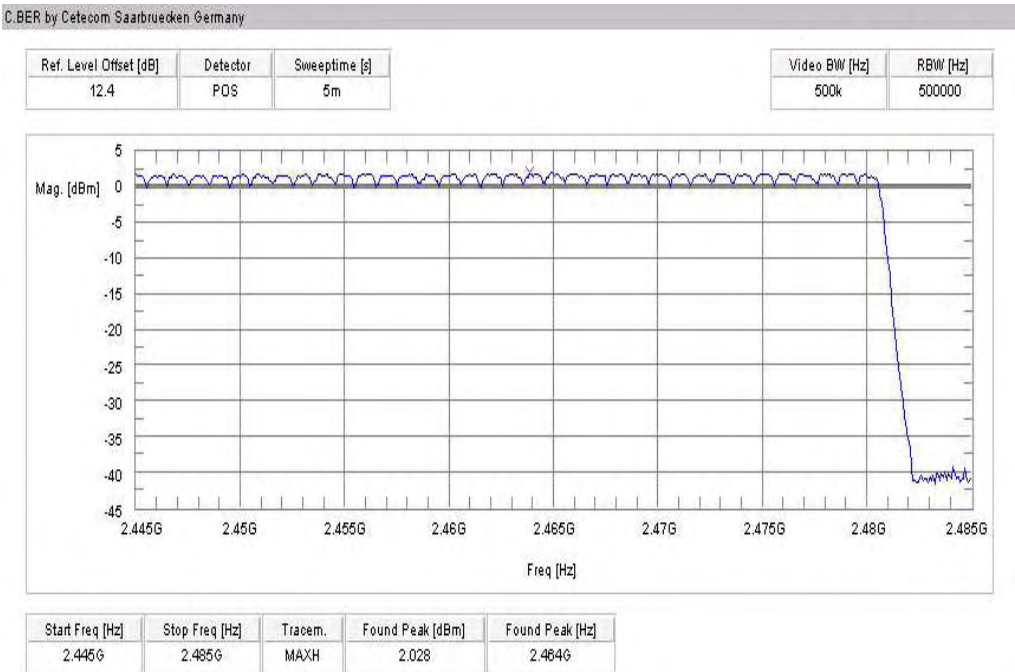
5.6 Number of hopping channels §15.247(a)(1)

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

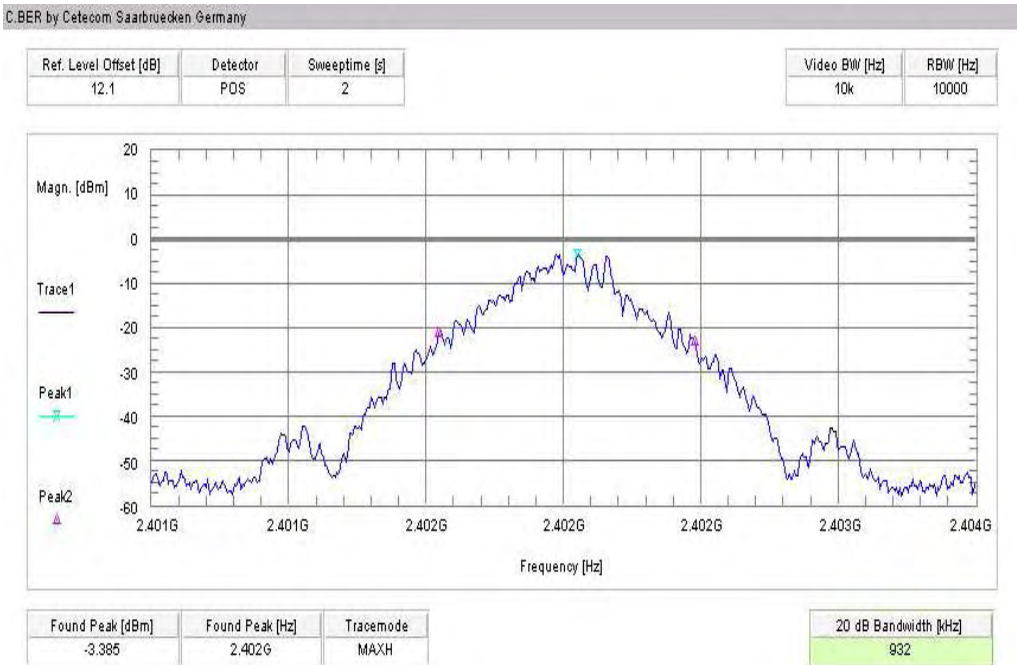
Result: Power density: - dBm/Hz = - dBm / 3 kHz
Correction factor from dBm/Hz to dBm / 3 kHz is +34,8 dB

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)

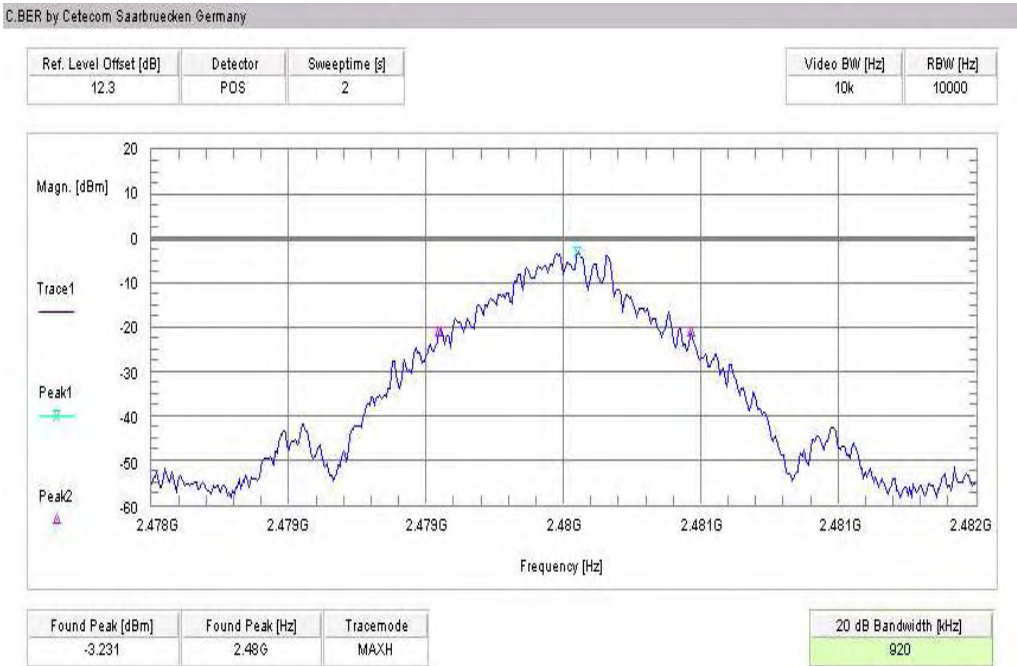
Plot 1: GFSK



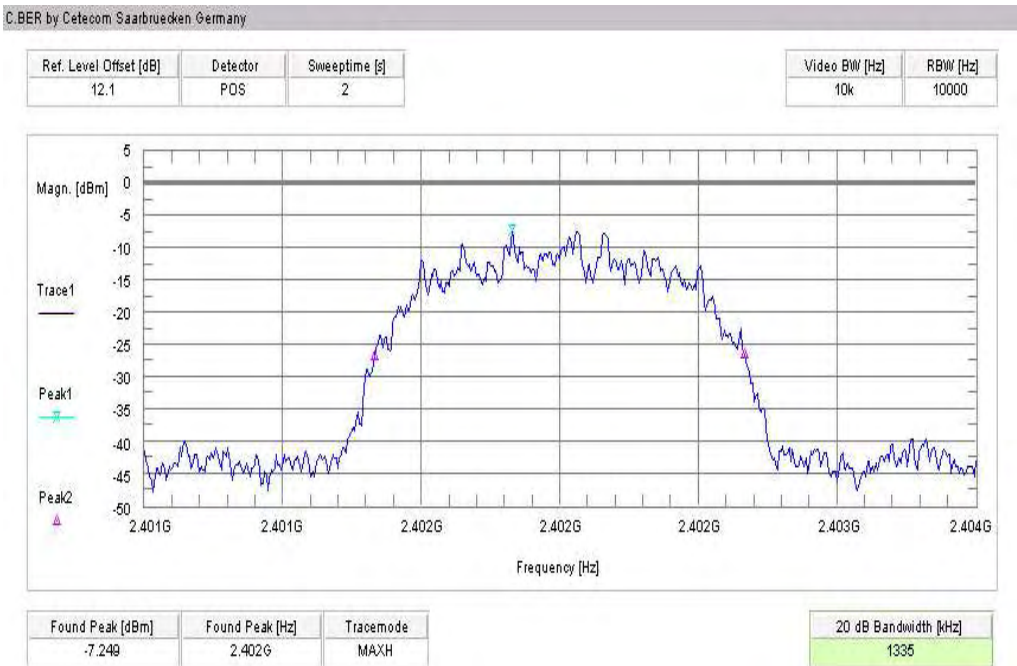
Plot 2: GFSK



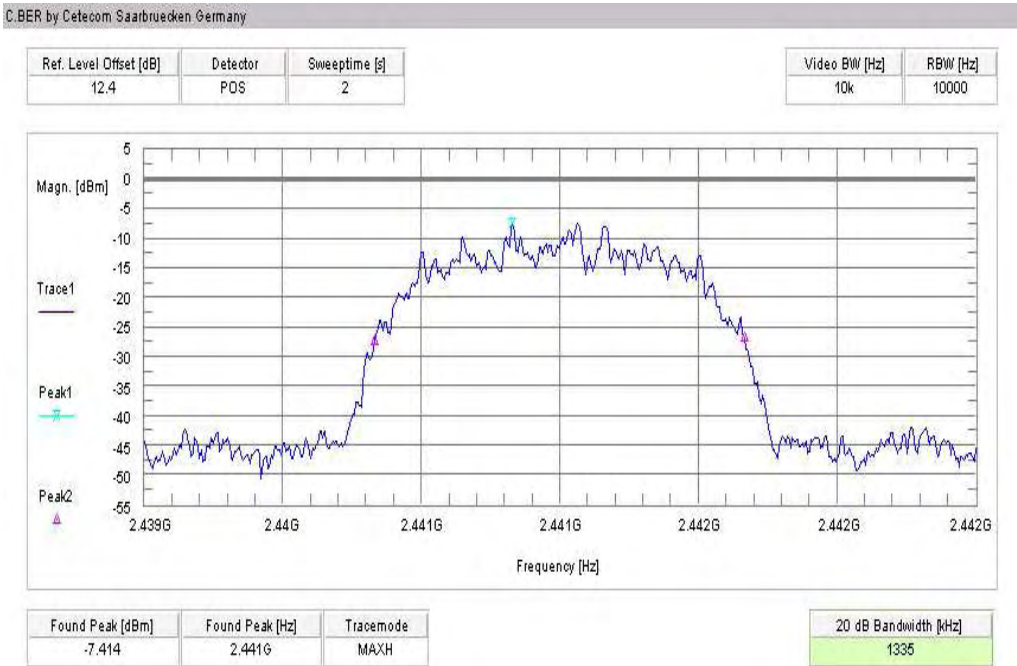
Plot 3: GFSK



Plot 4: Pi/4 DQPSK



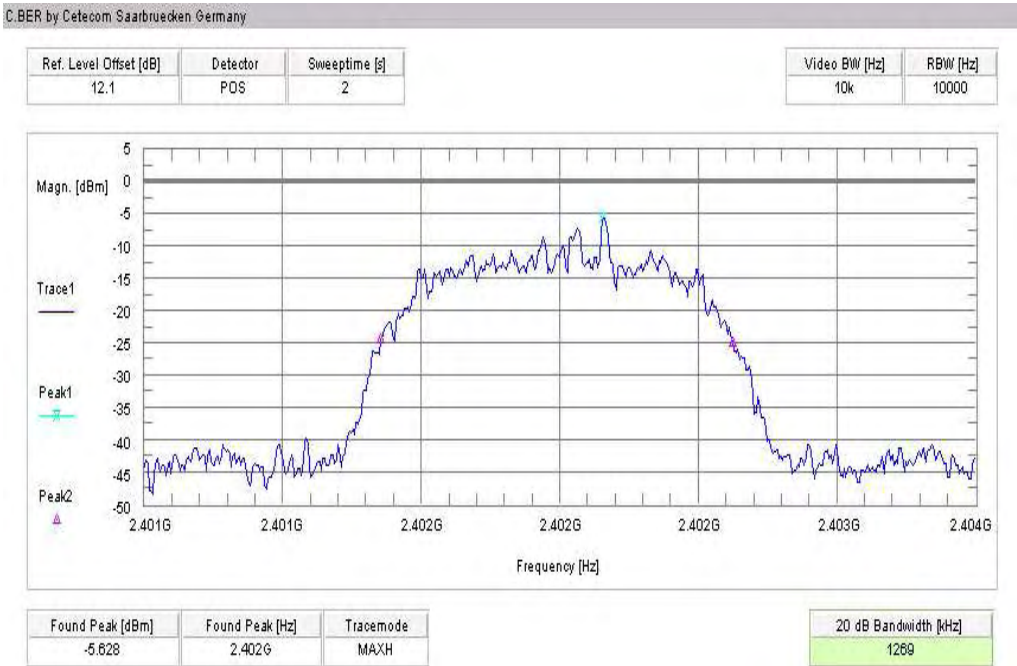
Plot 5: Pi/4 DQPSK



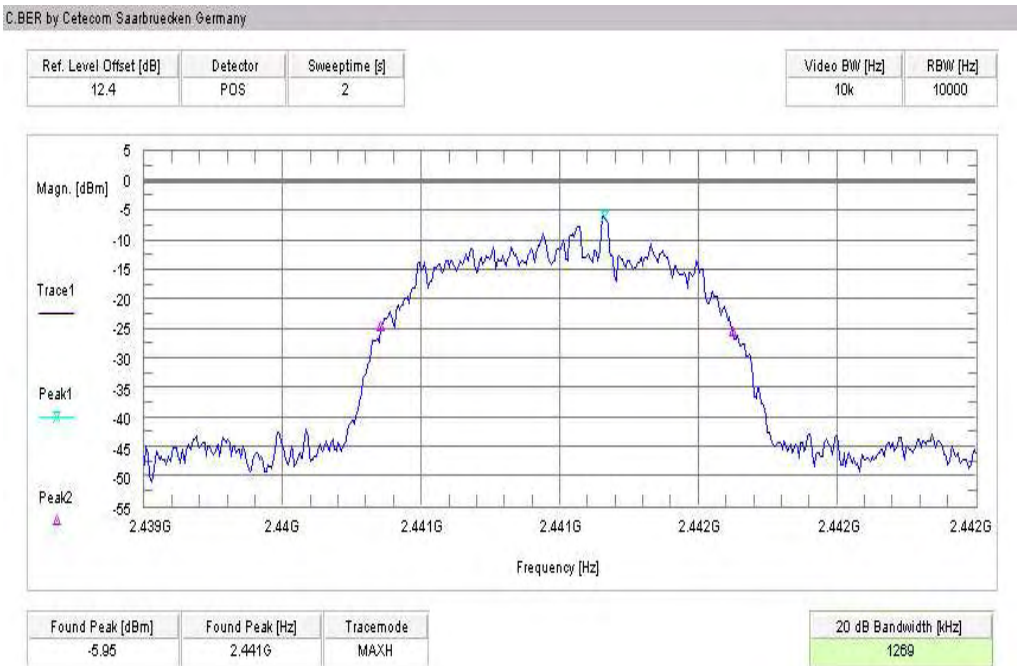
Plot 6: Pi/4 DQPSK



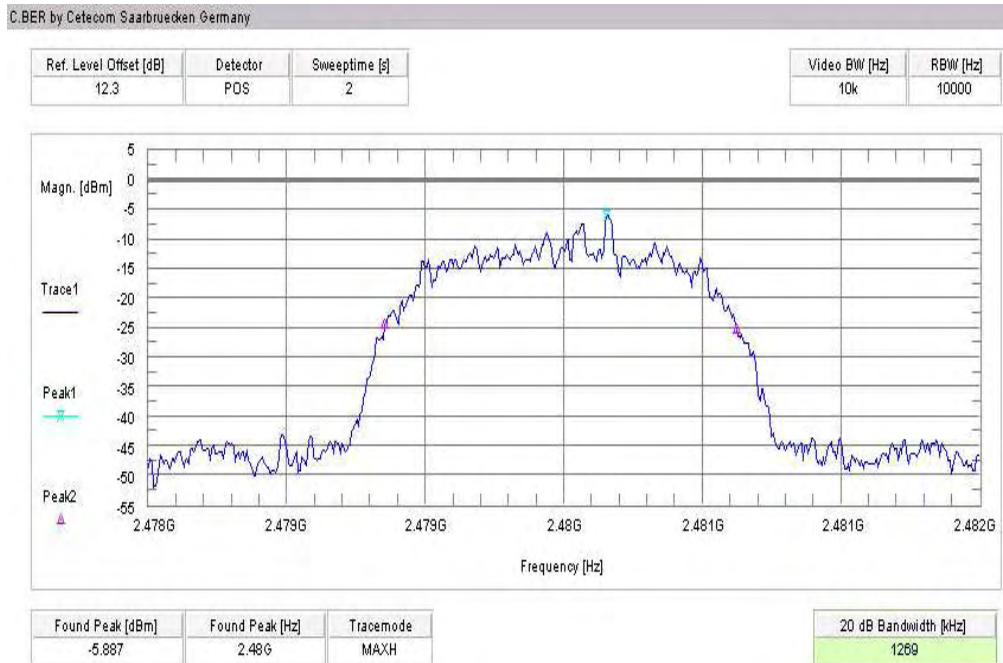
Plot 7: 8DPSK



Plot 8: 8DPSK



Plot 9: 8DPSK



Result:

Modulation Frequency [MHz]	20 dB BANDWIDTH [kHz]		
	2402	2441	2480
GFSK	932	920	920
Pi/4 DQPSK	1335	1335	1335
8DPSK	1269	1269	1269
Measurement uncertainty	± 10 kHz		

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

RBW: 10 kHz / VBW 10 kHz

Limits:

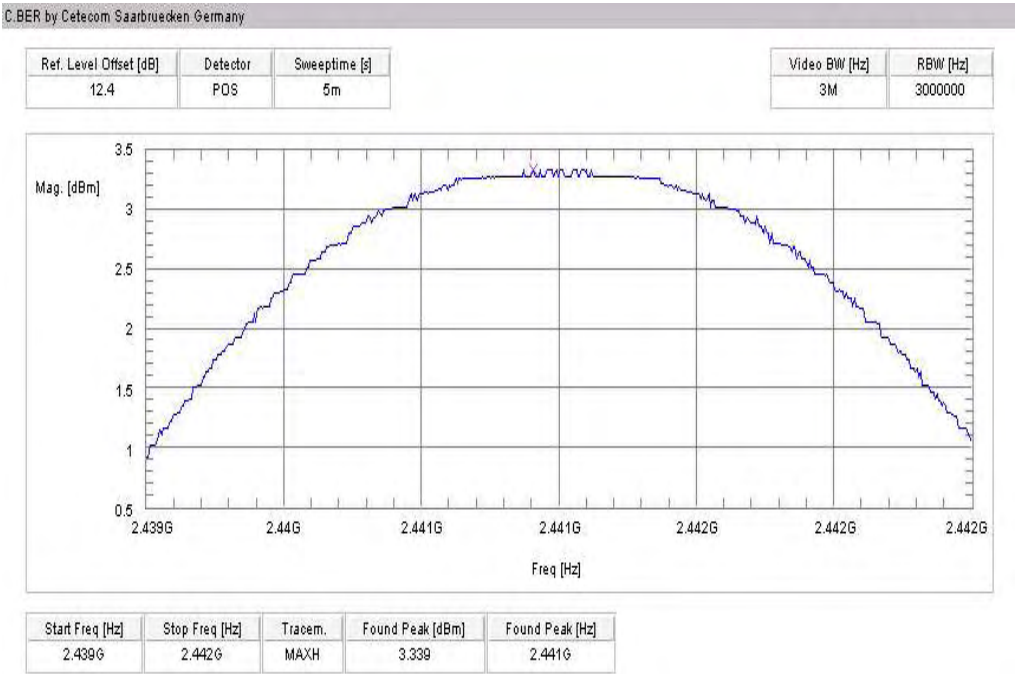
Under normal test conditions only	GFSK < 1000 kHz Pi/4 DQPSK < 1500 8DPSK < 1500
-----------------------------------	--

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

Plot 1: GFSK



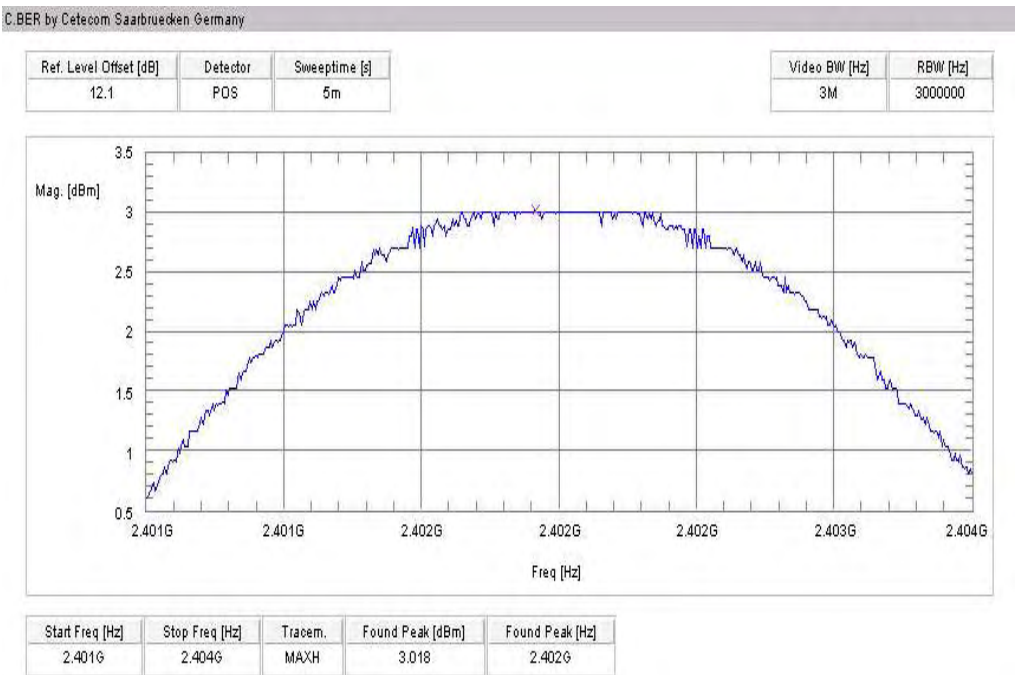
Plot 2: GFSK



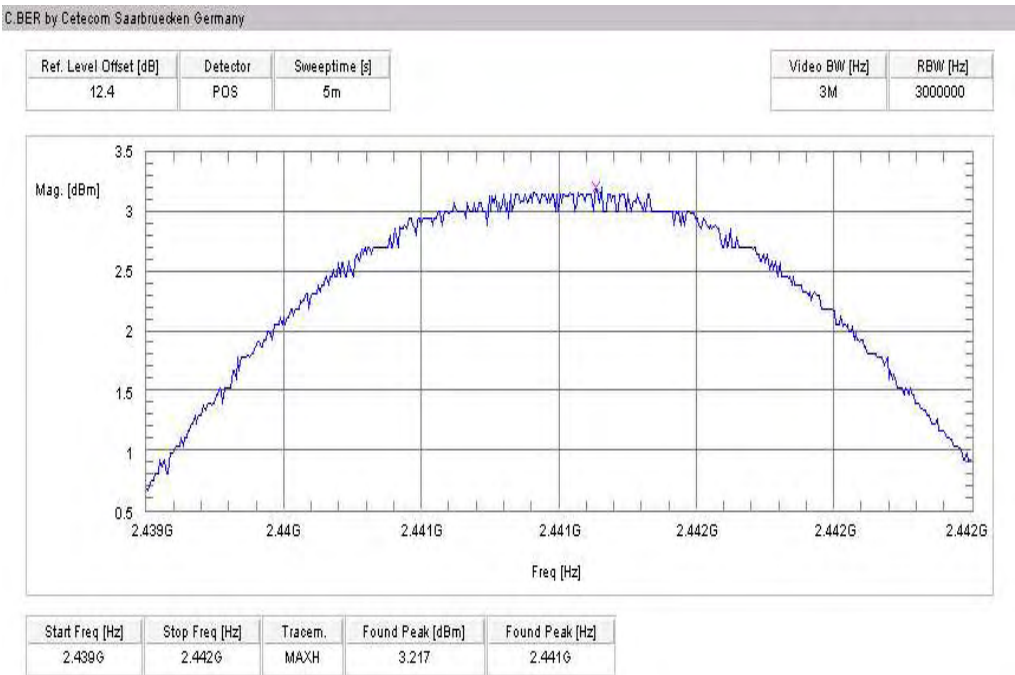
Plot 3: GFSK



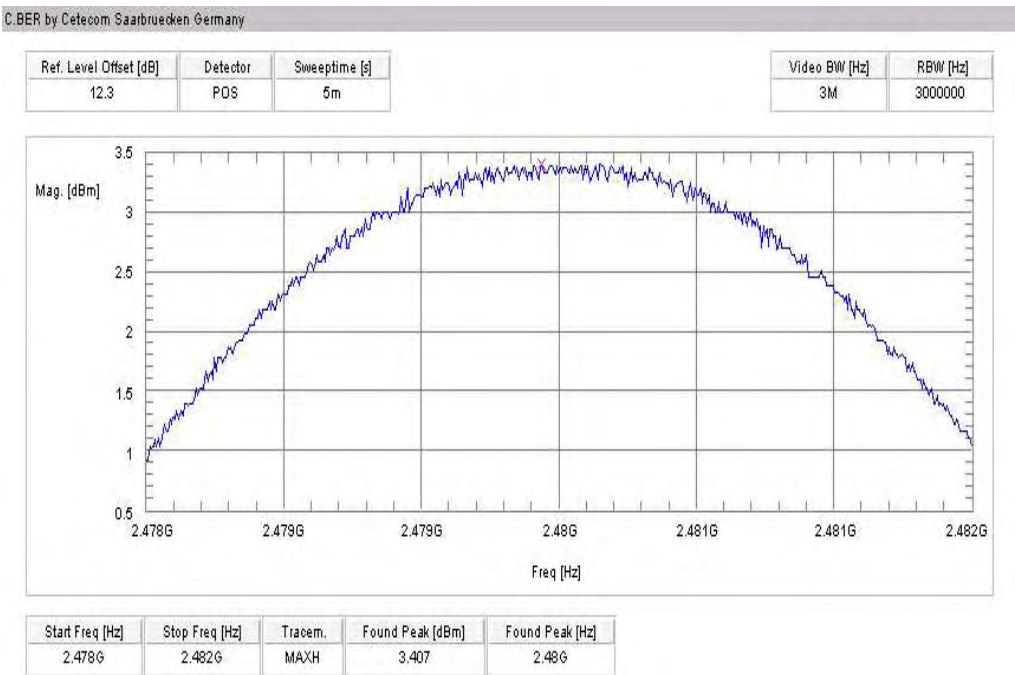
Plot 4: Pi/4 DQPSK



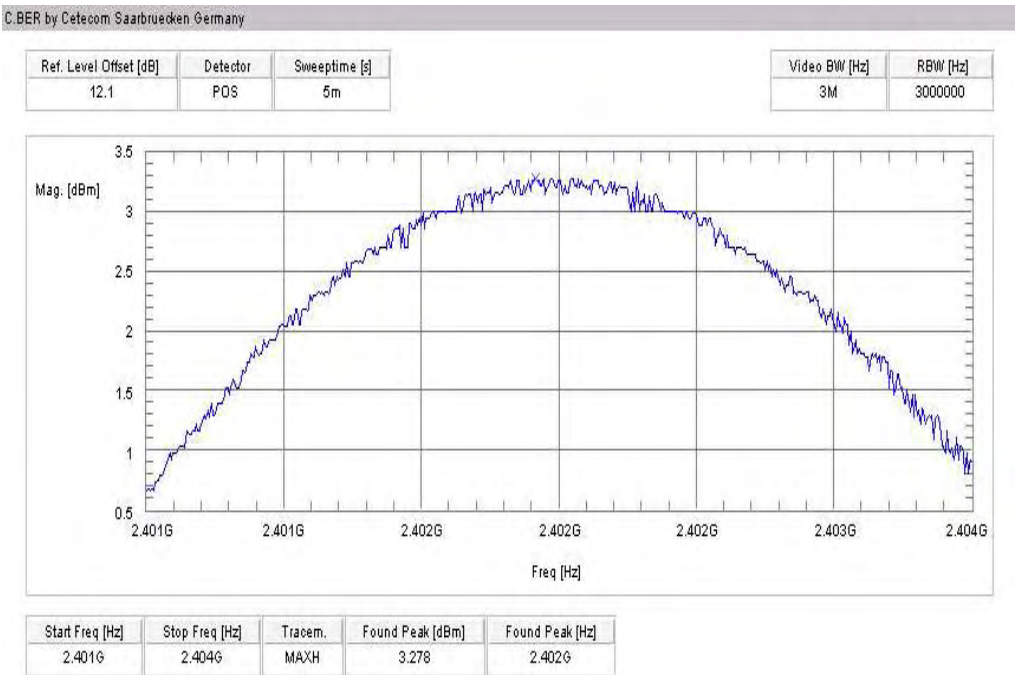
Plot 5: Pi/4 DQPSK



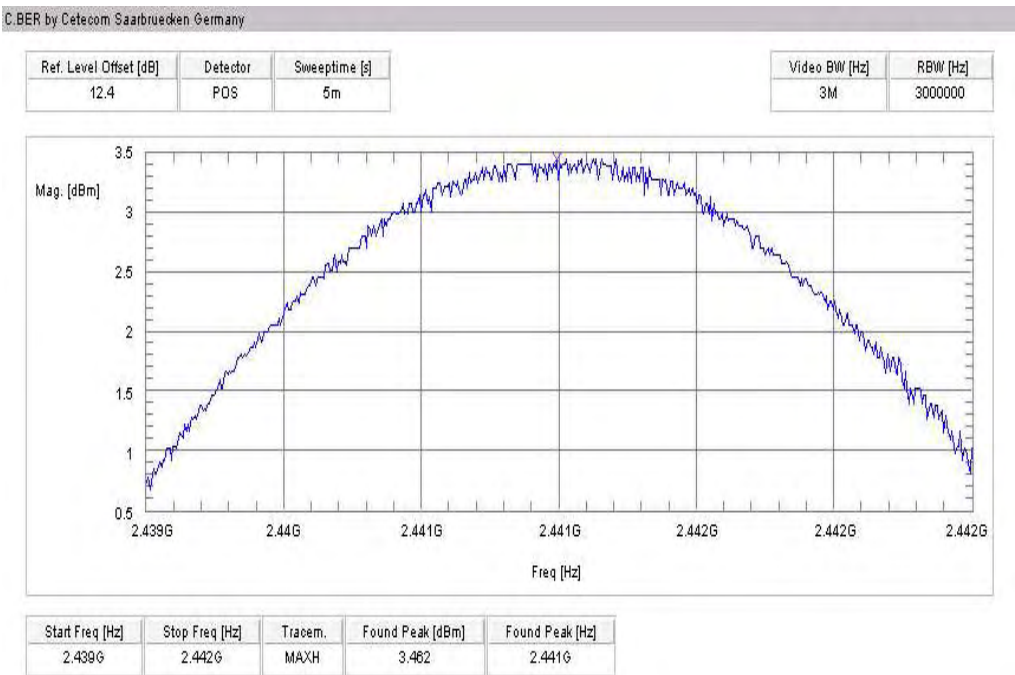
Plot 6: Pi/4 DQPSK



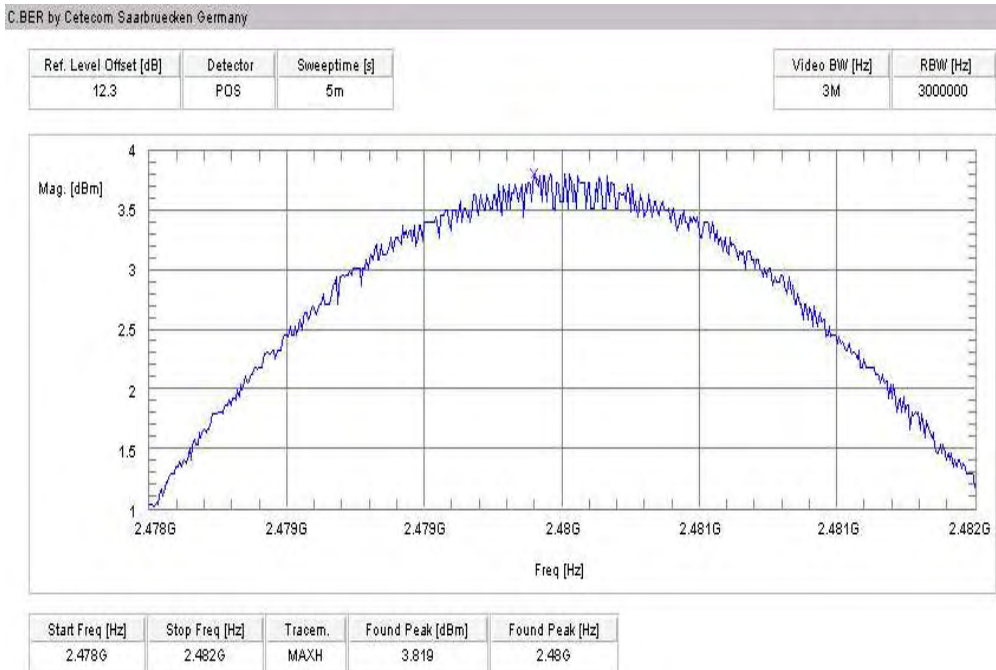
Plot 7: 8DPSK



Plot 8: 8DPSK



Plot 9: 8DPSK



Results:

Modulation Frequency [MHz]	Max. peak output power [dBm]		
	2402	2441	2480
GFSK	3.21	3.34	3.59
Pi/4 DQPSK	3.02	3.22	3.41
8DPSK	3.28	3.46	3.82
Measurement uncertainty	± 2 dB		

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 _{nom}	V _{nom}	0.42	0.65	1.00
Measurement uncertainty		± 3 dB		

Modulation: Pi/4 DQPSK

Results:

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T _{nom}	V _{nom}	0.23	0.53	0.82
Measurement uncertainty		± 3 dB		

Modulation: 8 DPSK

Results:

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T _{nom}	V _{nom}	0.49	0.77	1.23
Measurement uncertainty		± 3 dB		

RBW / VBW: 3 MHz

Measured at a distance of 3m

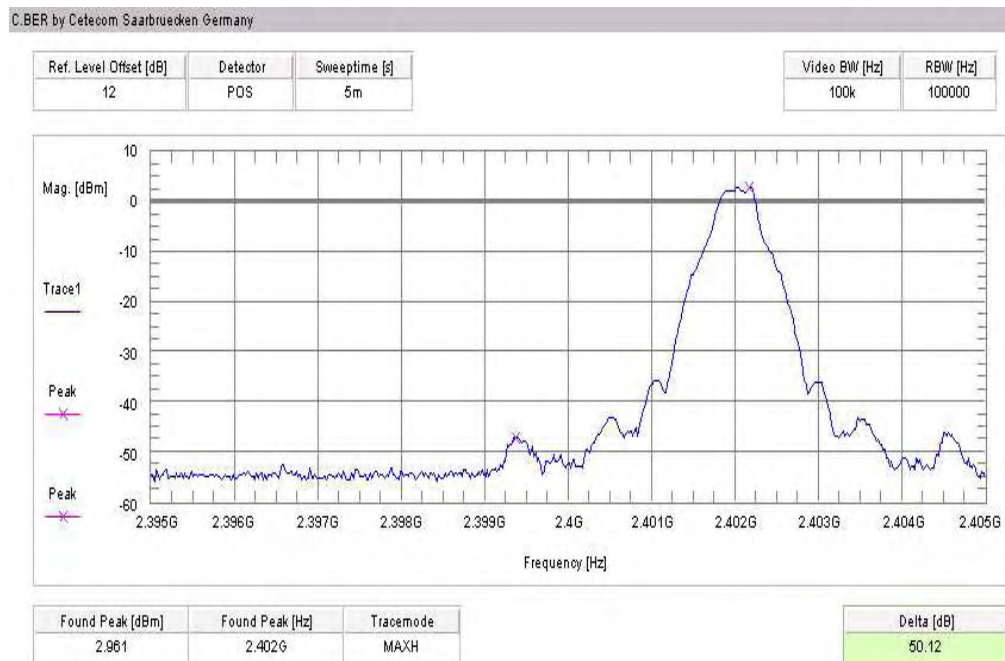
Limits:

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):

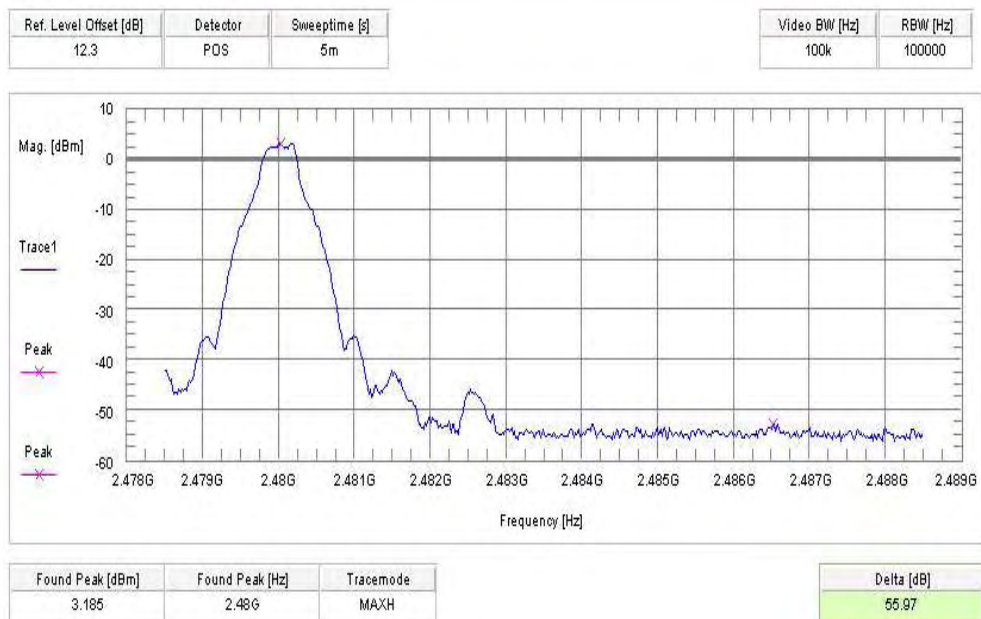


Plot 2 of 4 (hopping on, lowest frequency):



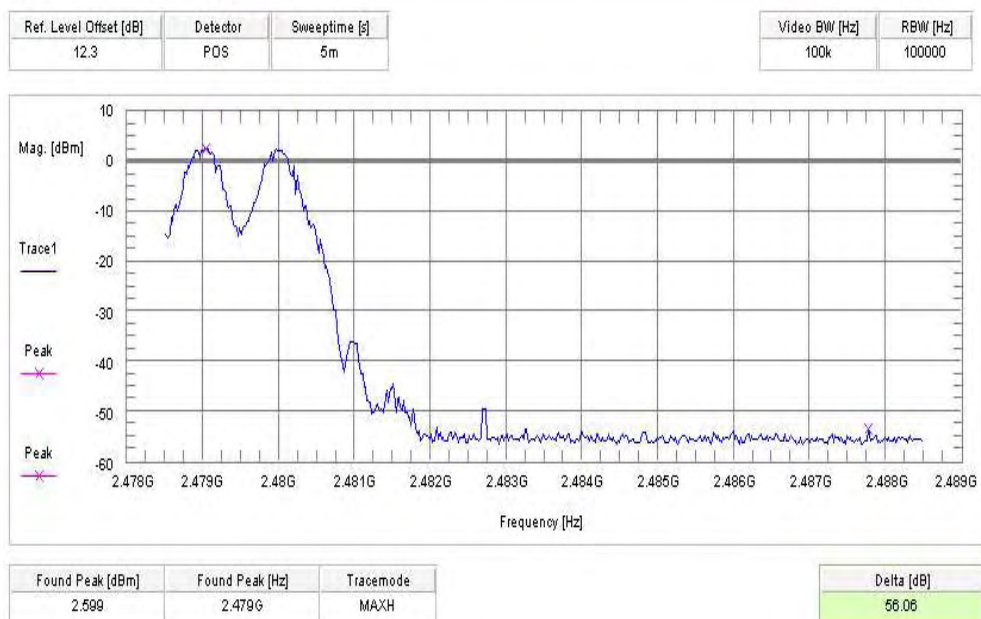
Plot 3 of 4 (hopping off, highest frequency):

C.BER by Cetecom Saarbruecken Germany



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

C.BER by Cetecom Saarbruecken Germany



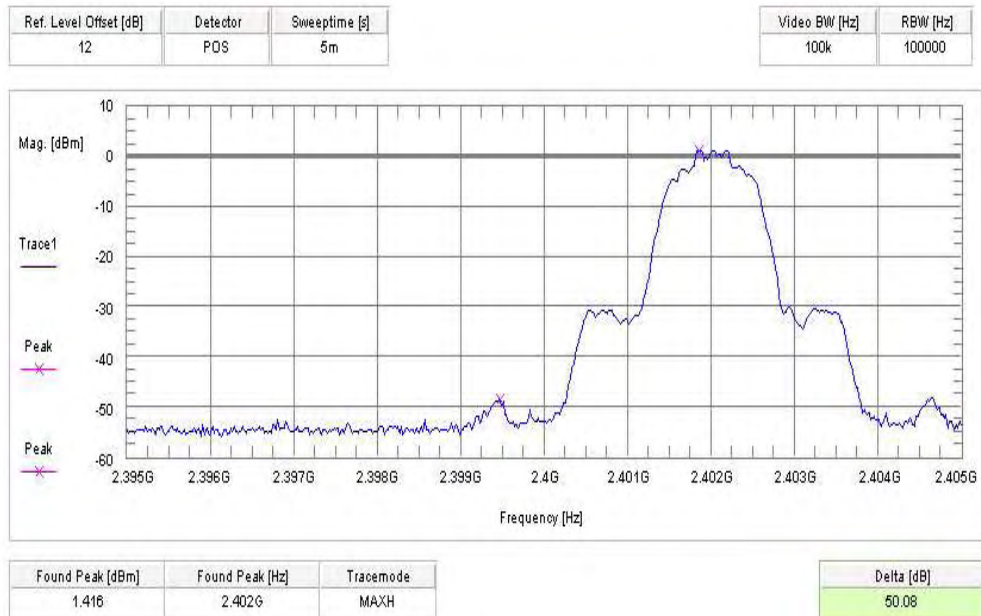
Results:

SZENARIO	DELTA VALUE [DB]
hopping off, lowest frequency	> 20 dB
hopping on, lowest frequency	> 20 dB
hopping off, highest frequency	> 20 dB
hopping on, highest frequency	> 20 dB
Measurement uncertainty	±1,5dB

Modulation: Pi/4 DQPSK

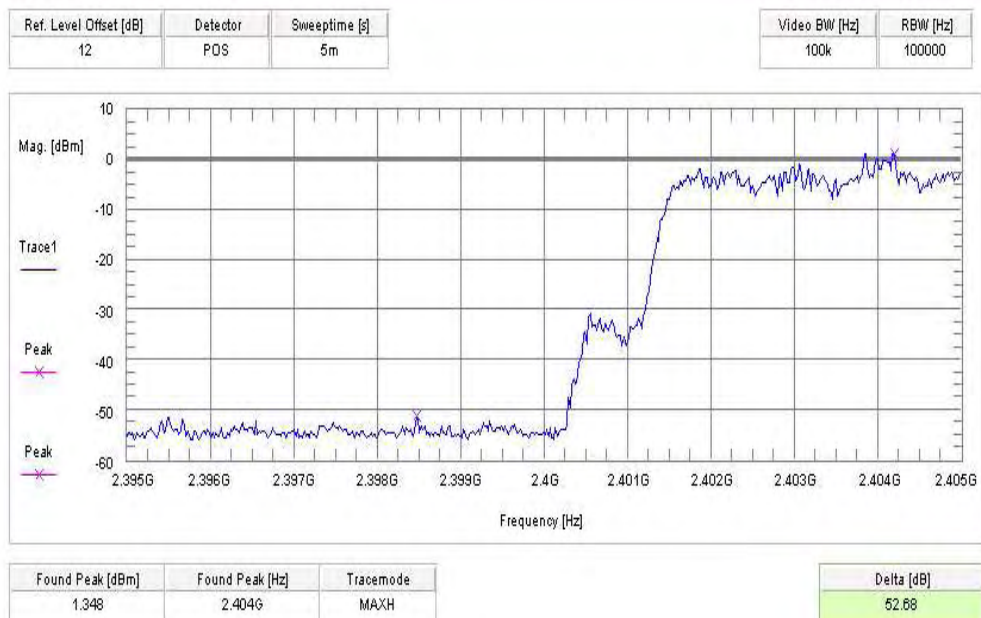
Plot 1 of 4 (hopping off, lowest frequency):

C.BER by Cetecom Saarbruecken Germany



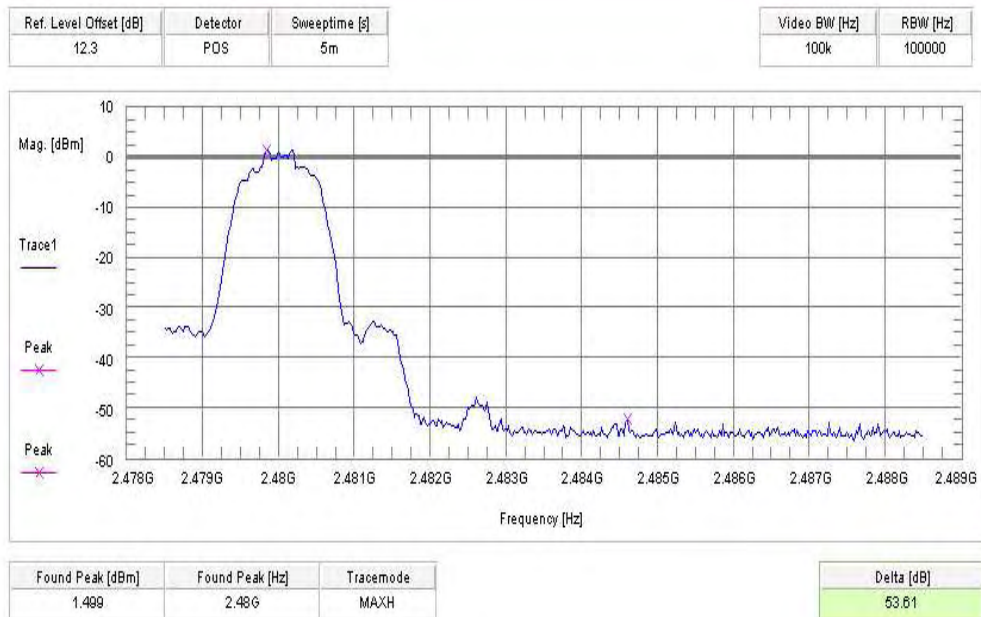
Plot 2 of 4 (hopping on, lowest frequency):

C.BER by Cetecom Saarbruecken Germany



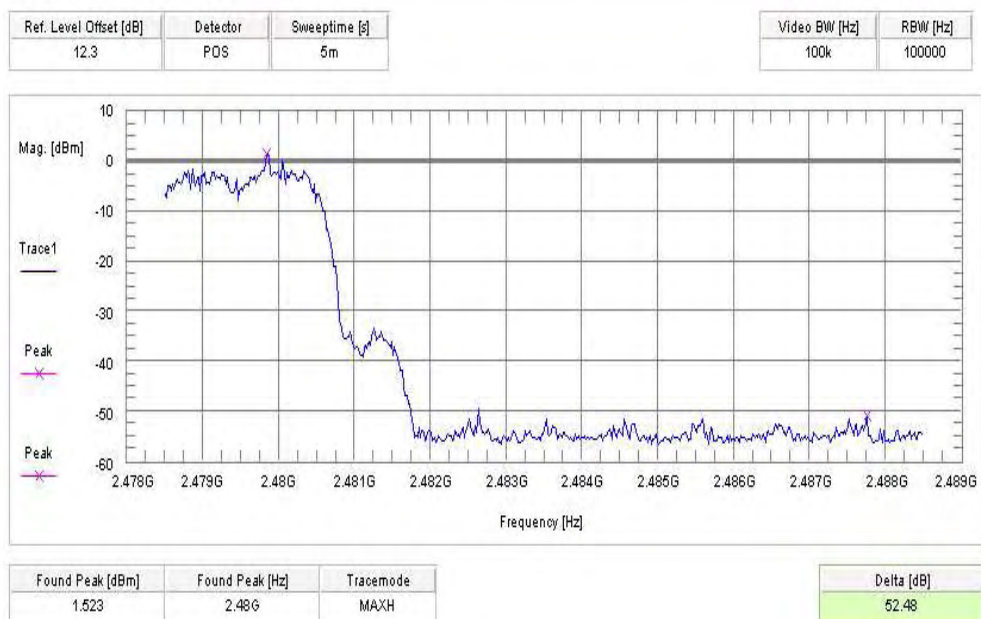
Plot 3 of 4 (hopping off, highest frequency):

C.BER by Cetecom Saarbruecken Germany



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

C.BER by Cetecom Saarbruecken Germany

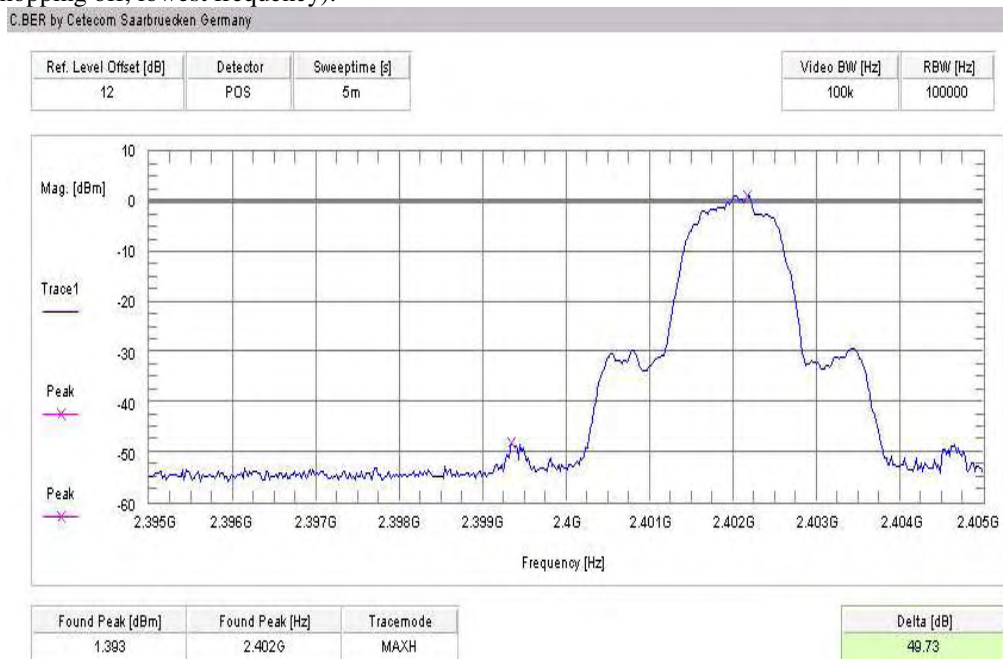


Results:

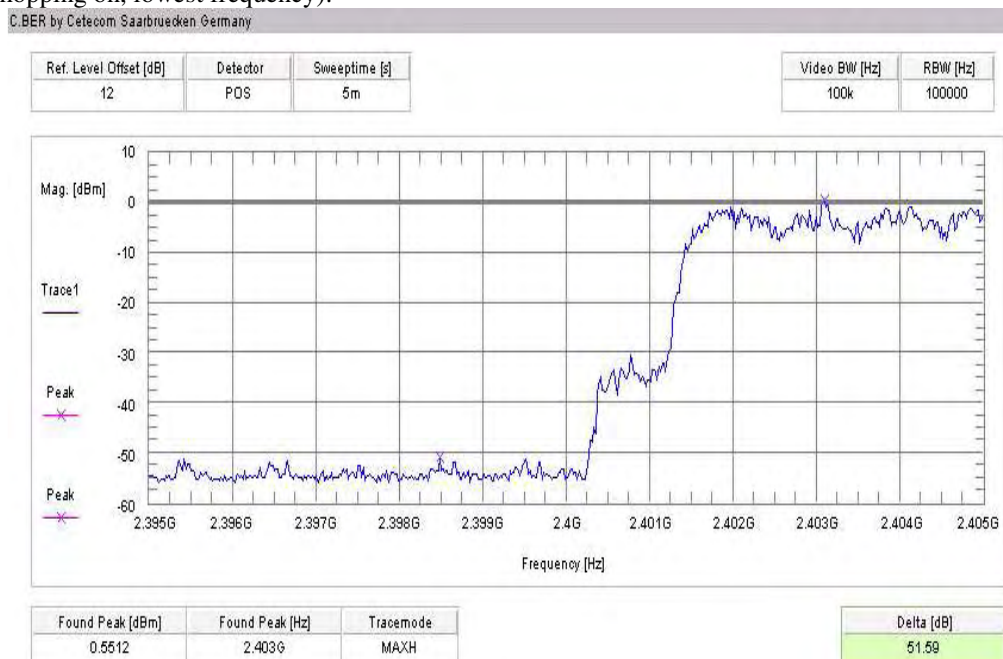
SZENARIO	DELTA VALUE [DB]
hopping off, lowest frequency	> 20 dB
hopping on, lowest frequency	> 20 dB
hopping off, highest frequency	> 20 dB
hopping on, highest frequency	> 20 dB
Measurement uncertainty	±1,5dB

Modulation: 8 DPSK

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

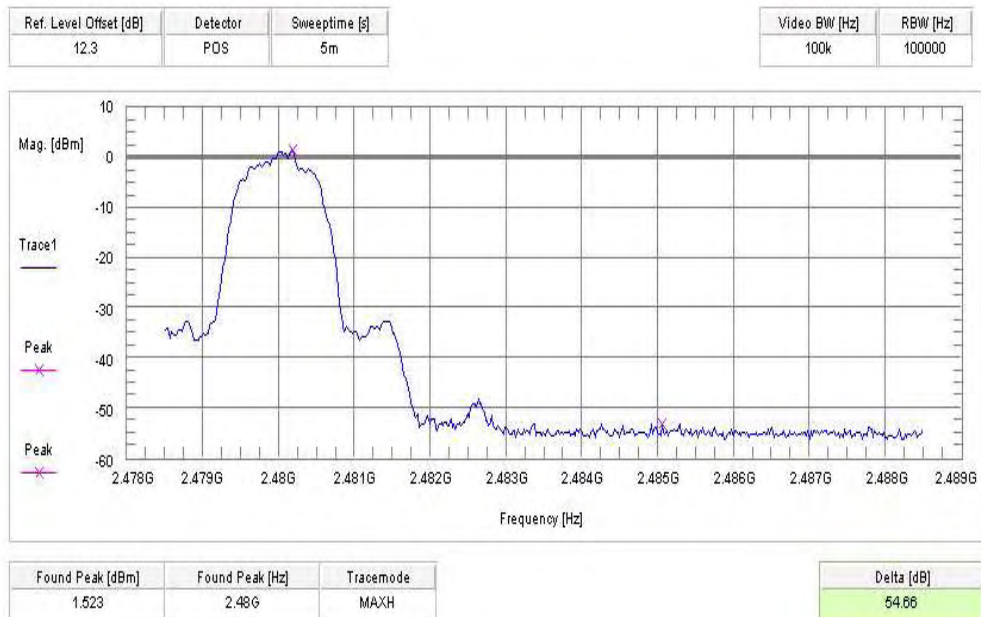


Plot 2 of 4 (hopping on, lowest frequency):



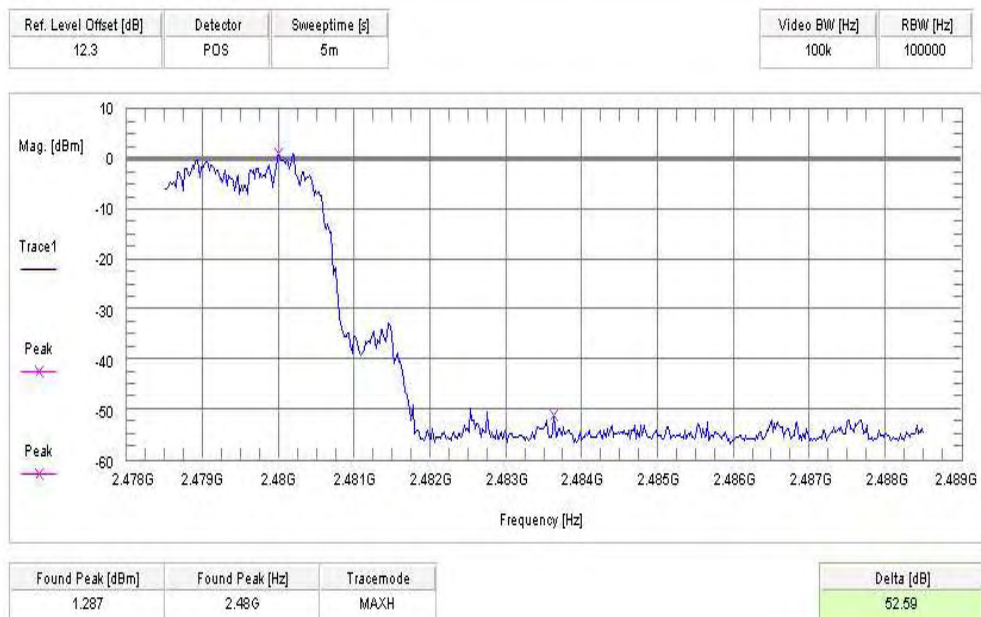
Plot 3 of 4 (hopping off, highest frequency):

C.BER by Cetecom Saarbruecken Germany



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

C.BER by Cetecom Saarbruecken Germany



Results:

SZENARIO	DELTA VALUE [DB]
hopping off, lowest frequency	> 20 dB
hopping on, lowest frequency	> 20 dB
hopping off, highest frequency	> 20 dB
hopping on, highest frequency	> 20 dB
Measurement uncertainty	±1,5dB

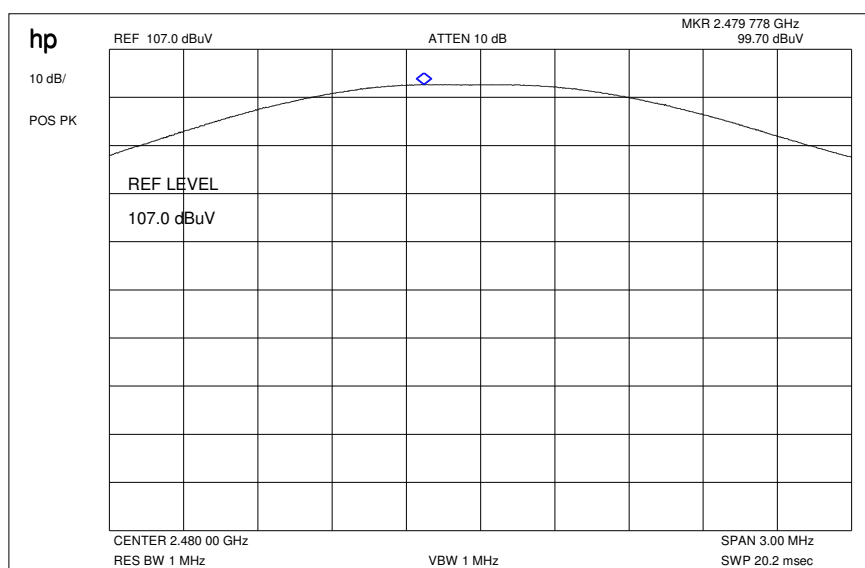
Limits:

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

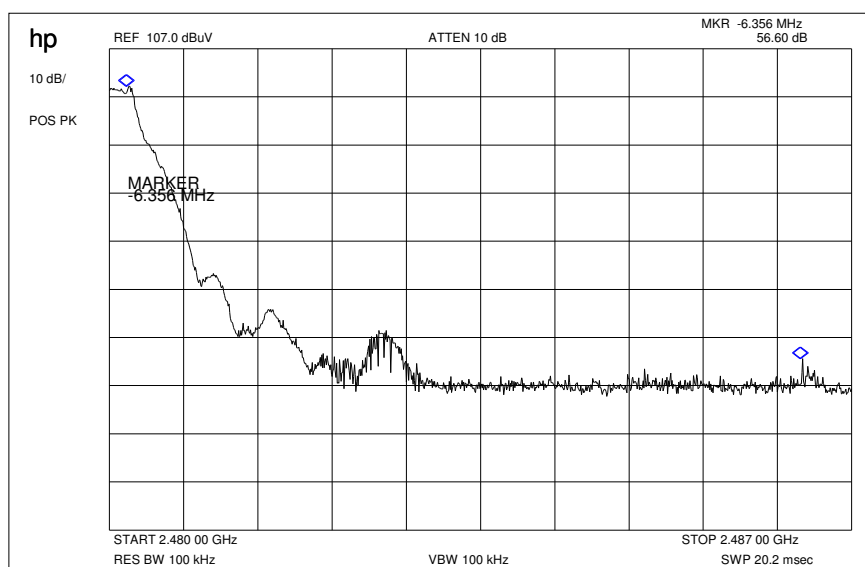
Modulation: GFSK

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



Result: 99.70 dB μ V/m

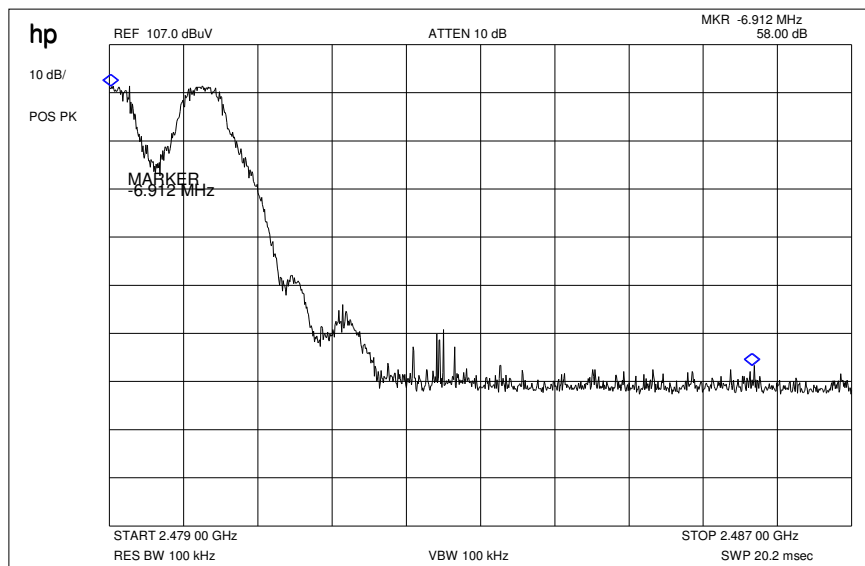
Plot 2: Marker-Delta Method (single carrier)



Marker-Delta-Value: 56.60 dB

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

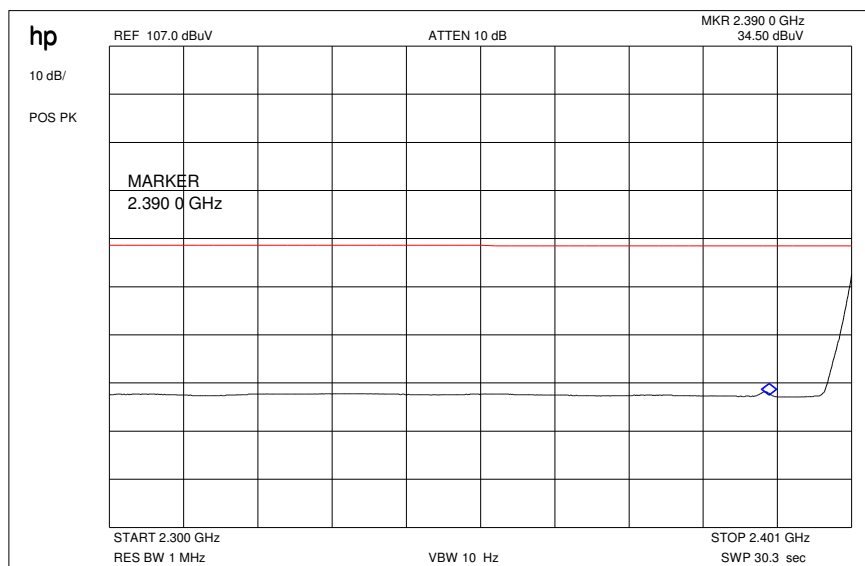
Plot 3: Marker-Delta Method (hopping)



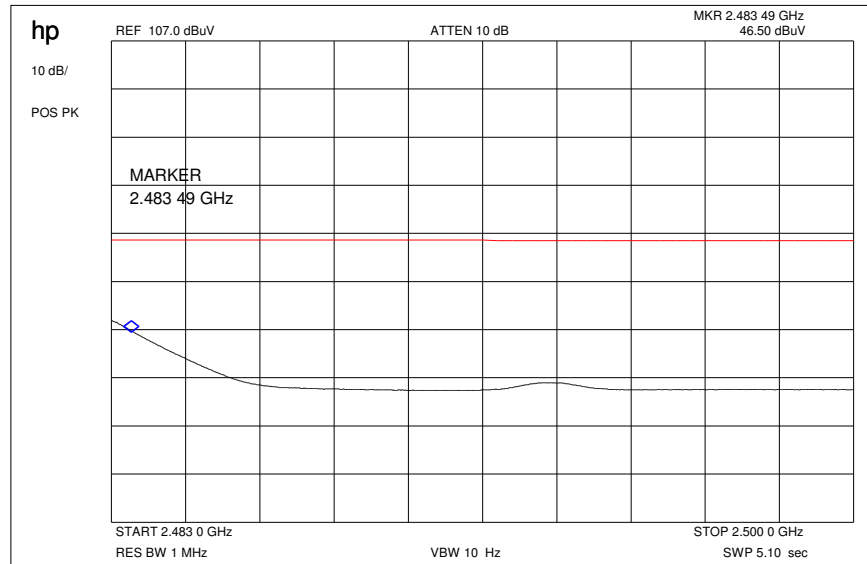
Marker-Delta-Value: 58.00 dB

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:

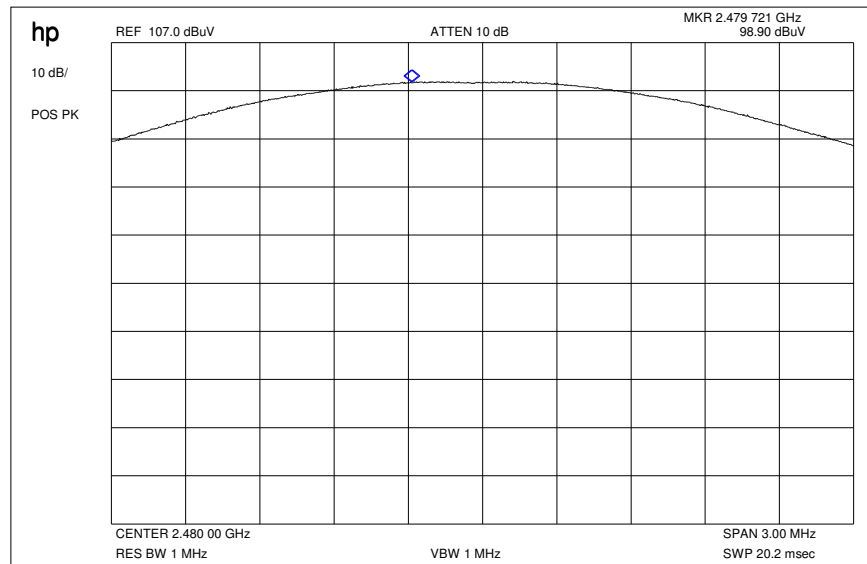
Radiated field strength

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	99.70 dBμV/m	-6.30	93.40 dBμV/m
Max. average value	Calculated with duty cycle correction factor	93.40 dBμV/m peak	-1,07dB duty cycle correction factor (worst case DH5)	92.33 dBμV/m
Delta value	Peak 100 kHz RBW/VBW	56.60 dB (single carrier) 58.00 dB (hopping mode)	-	-
Value at band edge	limit 54 dBμV/m			35.73 dBμV/m (single carrier) dBμV/m 34.33 (hopping mode)
Statement:				Complies

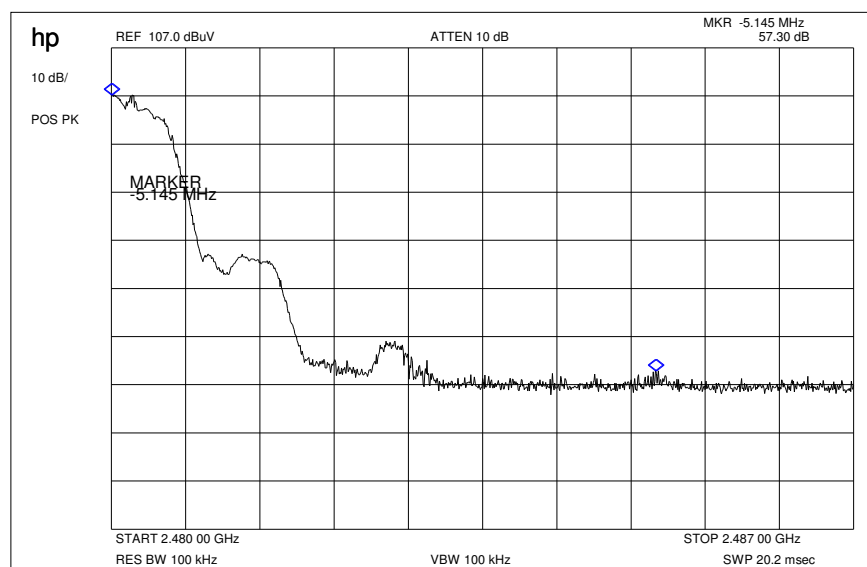
Modulation: Pi/4 DQPSK

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



Result: 98.90 dB μ V/m

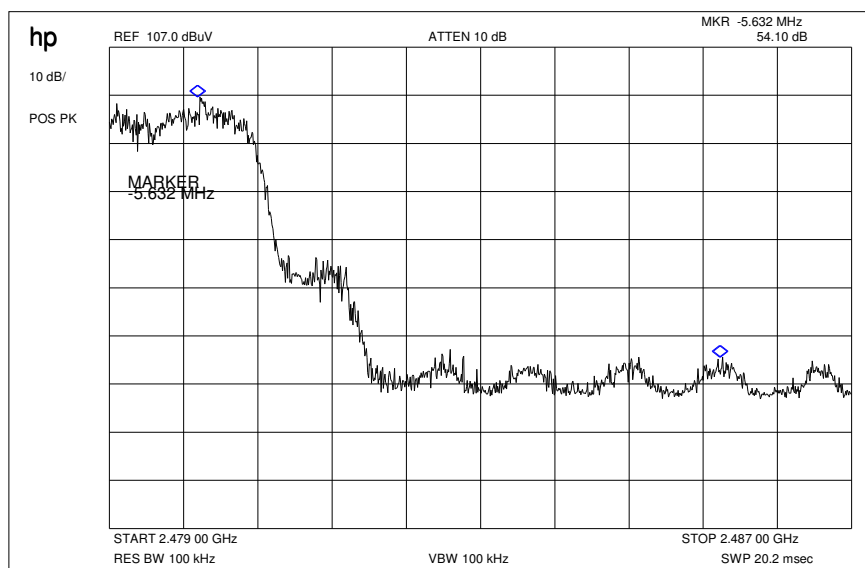
Plot 2: Marker-Delta Method (single carrier)



Marker-Delta-Value: 57.30 dB

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

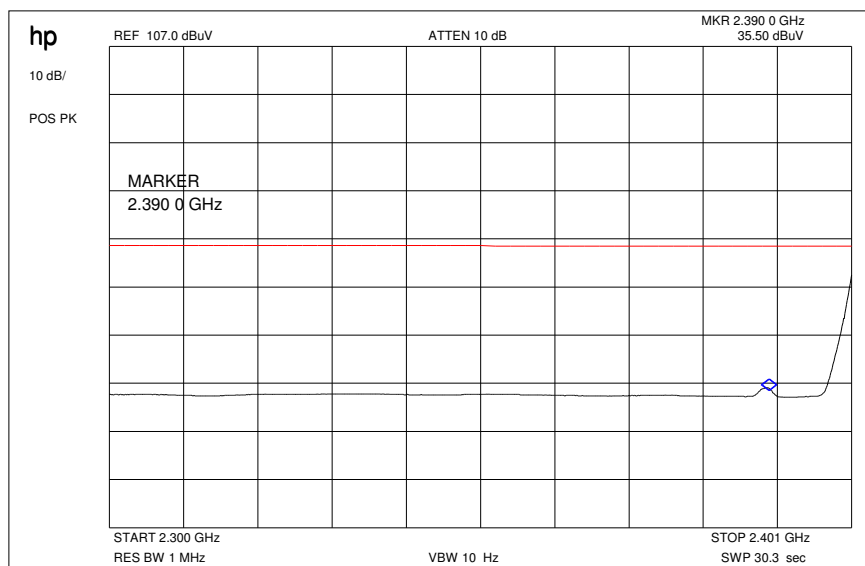
Plot 3: Marker-Delta Method (hopping)



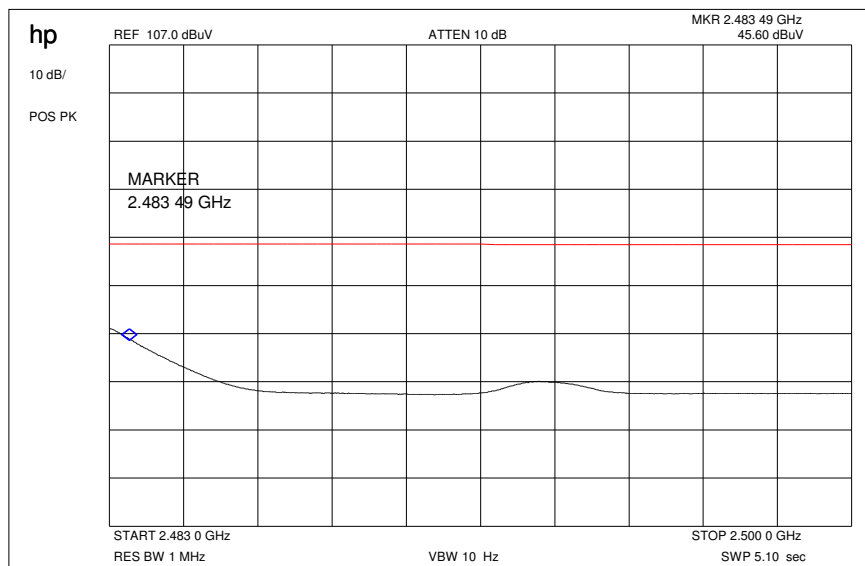
Marker-Delta-Value: 54.10 dB

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:

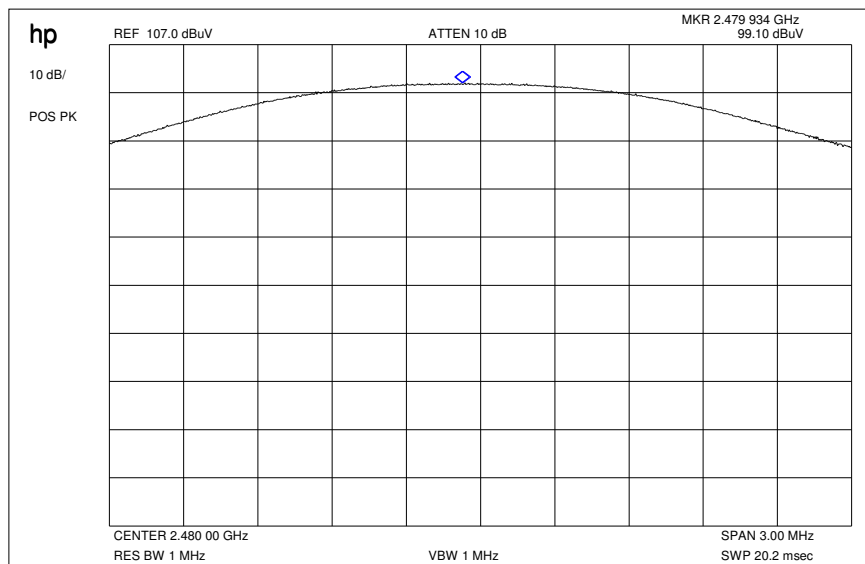
Radiated field strength

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	98.90 dBμV/m	-6.30	92.60 dBμV/m
Max. average value	Calculated with duty cycle correction factor	92.60 dBμV/m peak	-1,07dB duty cycle correction factor (worst case DH5)	91.53 dBμV/m
Delta value	Peak 100 kHz RBW/VBW	57.30 dB (single carrier) 54.10 dB (hopping mode)	-	-
Value at band edge	limit 54 dBμV/m			34.23 dBμV/m (single carrier) 37.43 dBμV/m (hopping mode)
Statement:				Complies

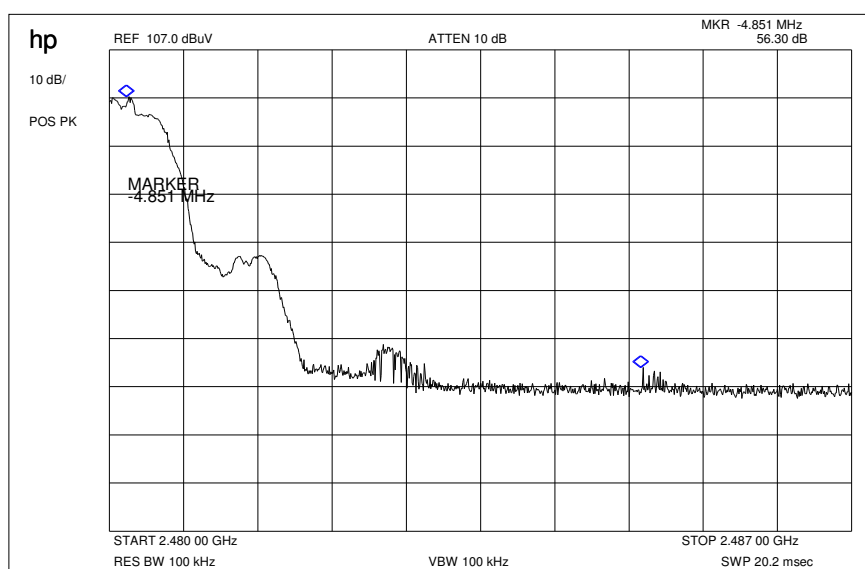
Modulation: 8 DPSK

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



Result: 99.10 dB μ V/m

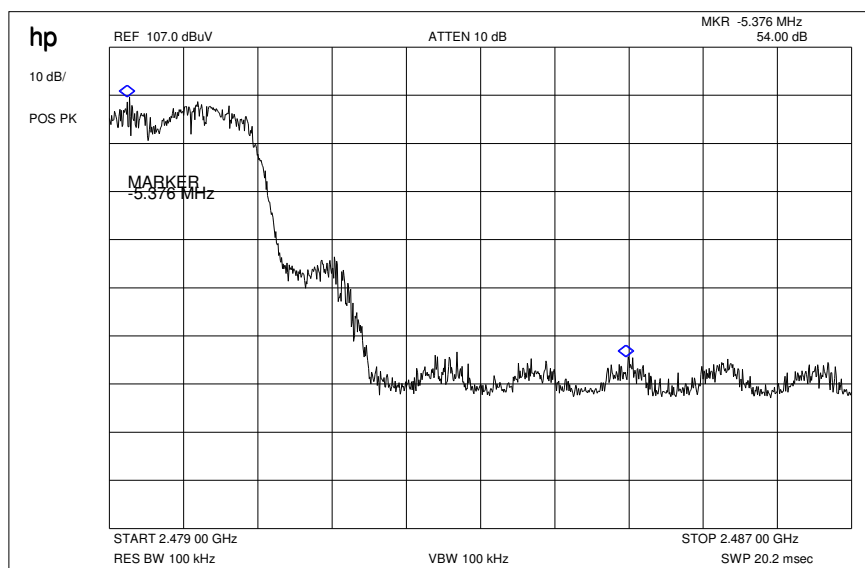
Plot 2: Marker-Delta Method (single carrier)



Marker-Delta-Value: 56.30 dB

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

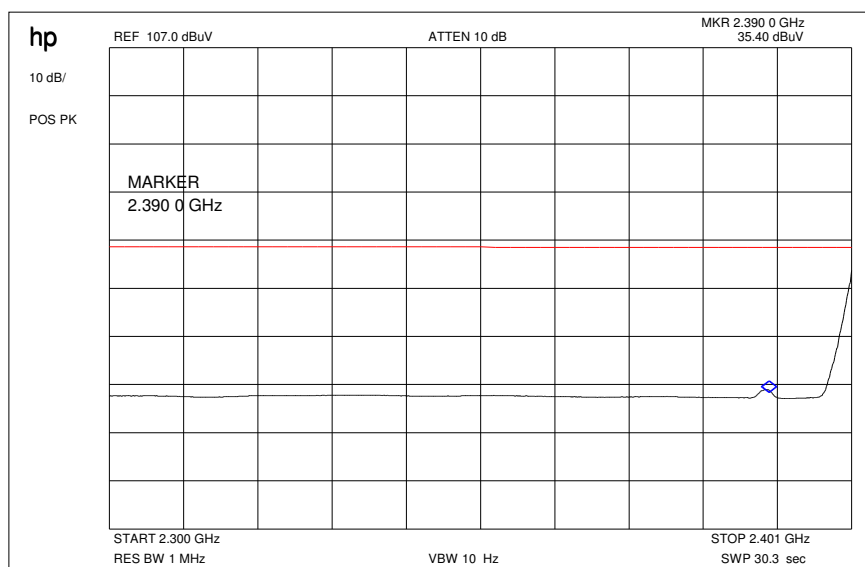
Plot 3: Marker-Delta Method (hopping)



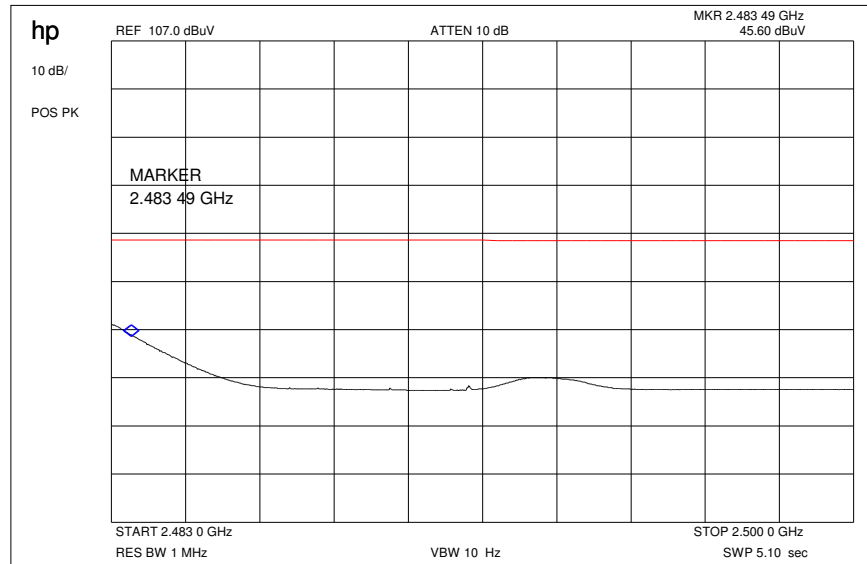
Marker-Delta-Value: 54.00 dB

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

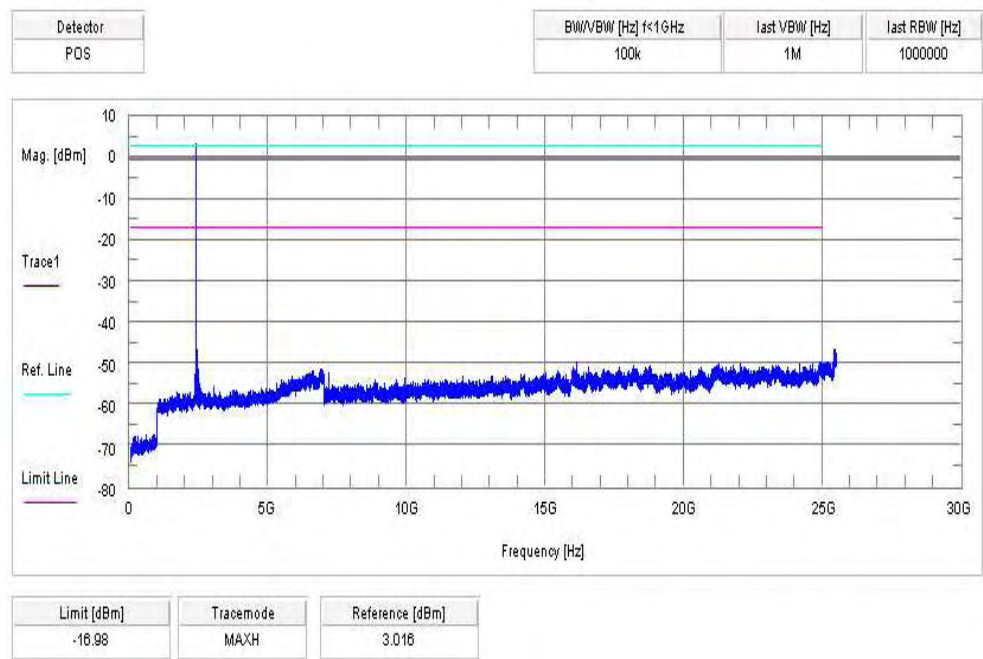
The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1 MHz RBW / 10 Hz VBW for average at a distance of 3m.

high channel	setup	measured value (3m)	correction factor (3m)	calculated value (3m)
Max. peak value	1 MHz RBW 1 MHz VBW	99.10 dB μ V/m	-6.30	92.80 dB μ V/m
Max. average value	Calculated with duty cycle correction factor	92.80 dB μ V/m peak	-1,07dB duty cycle correction factor (worst case DH5)	91.73 dB μ V/m
Delta value	Peak 100 kHz RBW/VBW	56.30 dB (single carrier) 54.00 dB (hopping mode)	-	-
Value at band edge	limit 54 dB μ V/m			35.43 dB μ V/m (single carrier) 37.73 dB μ V/m (hopping mode)
Statement:				Complies

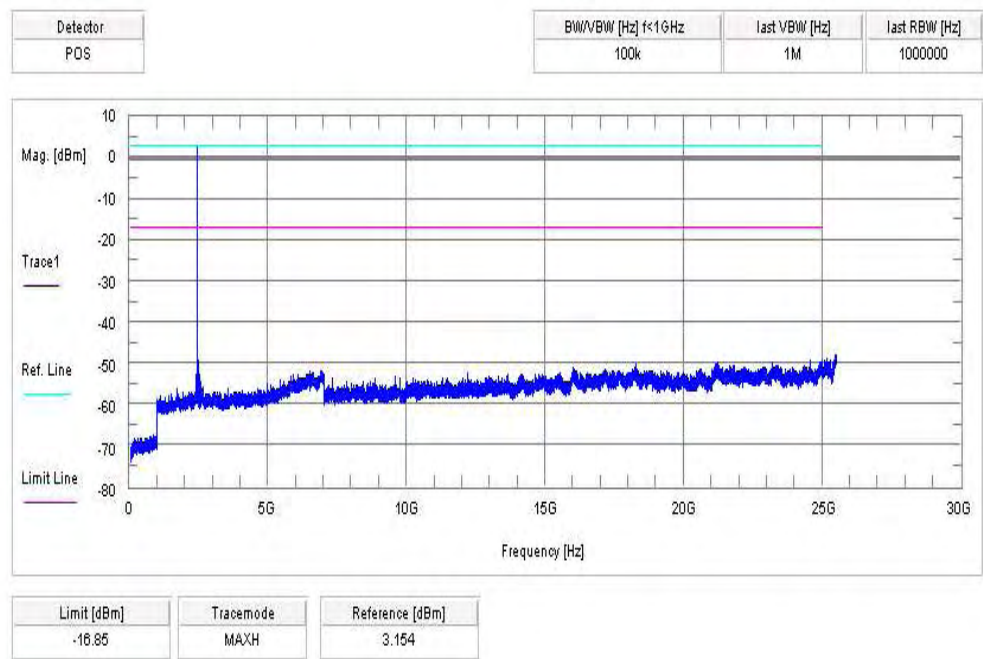
5.14 Spurious Emissions - conducted (Transmitter) § 15.247 (c)(1)

Modulation: GFSK

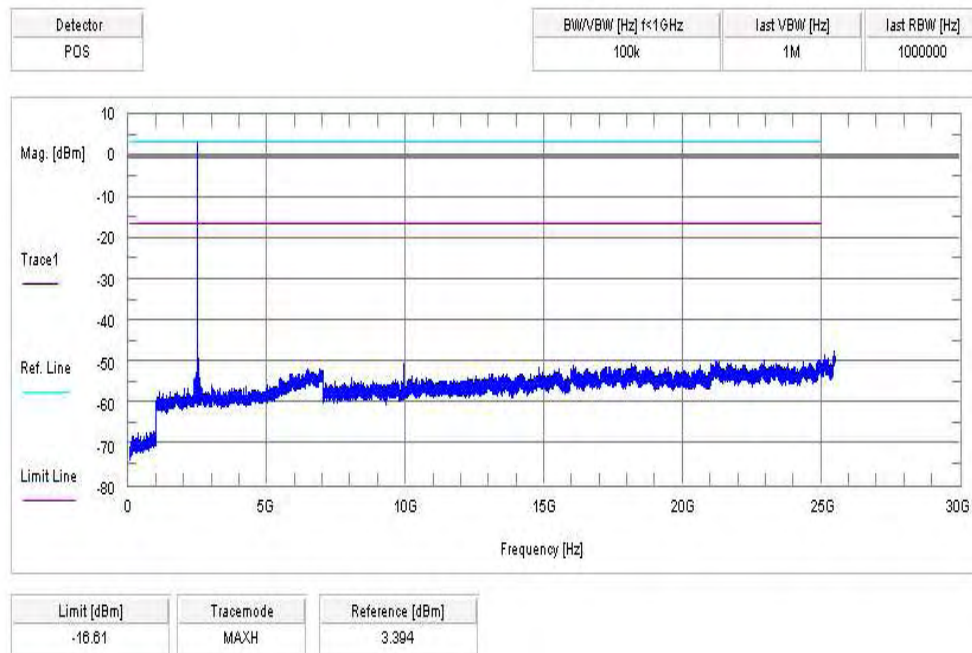
Plot 1 of 3: lowest channel



Plot 2 of 3: middle channel



Plot 3 of 3: highest channel



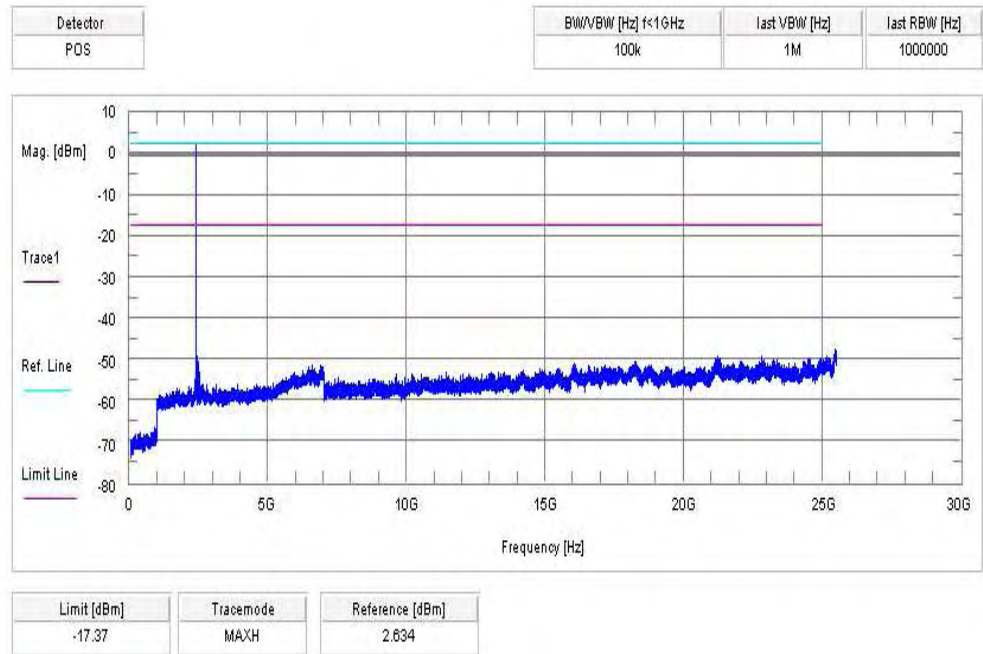
Result & Limits:

Emission Limitation					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		3.02	30 dBm		Operating frequency
<i>No critical peaks found</i>			-20 dBc		complies
2441		3.15	30 dBm		Operating frequency
<i>No critical peaks found</i>			-20 dBc		complies
2480		3.39	30 dBm		Operating frequency
<i>No critical peaks found</i>			-20 dBc		complies
Measurement uncertainty			± 3dB		

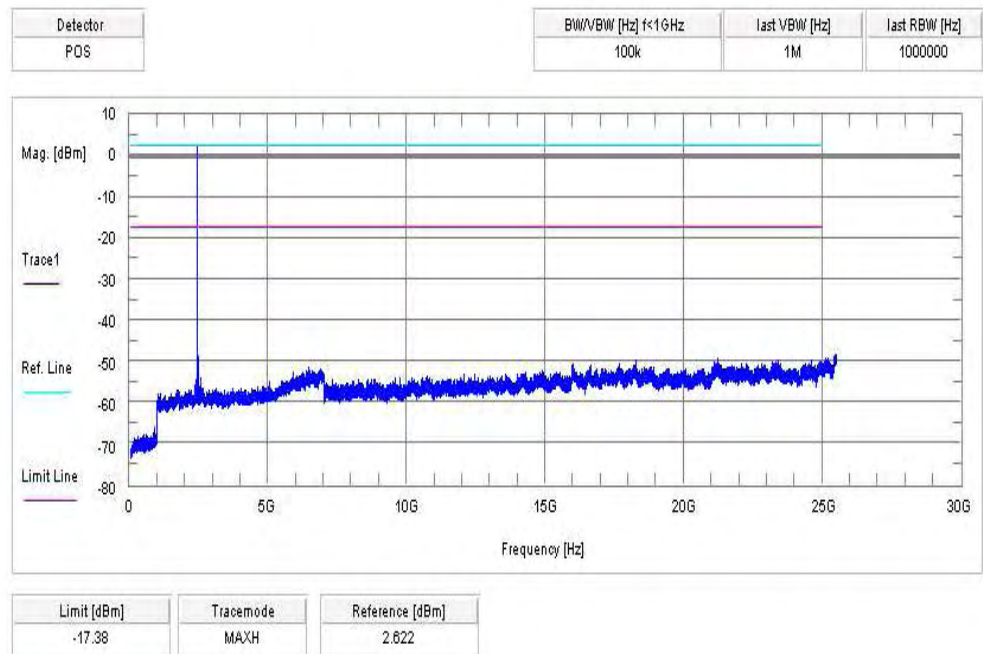
F < 1 GHz: RBW: 100 kHz VBW: 100 kHz
F > 1 GHz: RBW: 1 MHz VBW: 1 MHz

Modulation: Pi/4 DQPSK

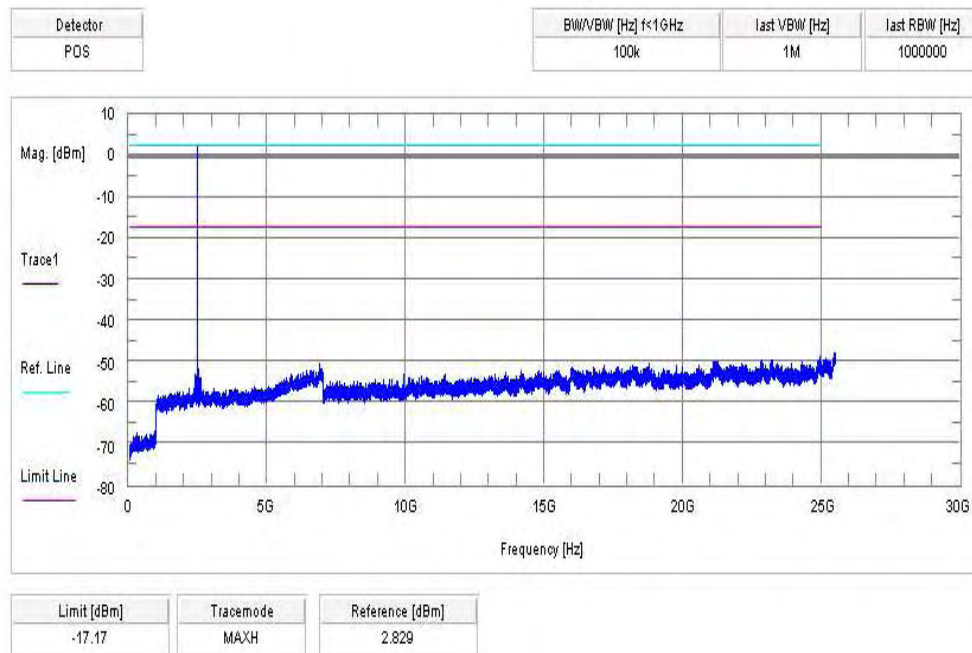
Plot 1 of 3: lowest channel



Plot 2 of 3: middle channel



Plot 3 of 3: highest channel



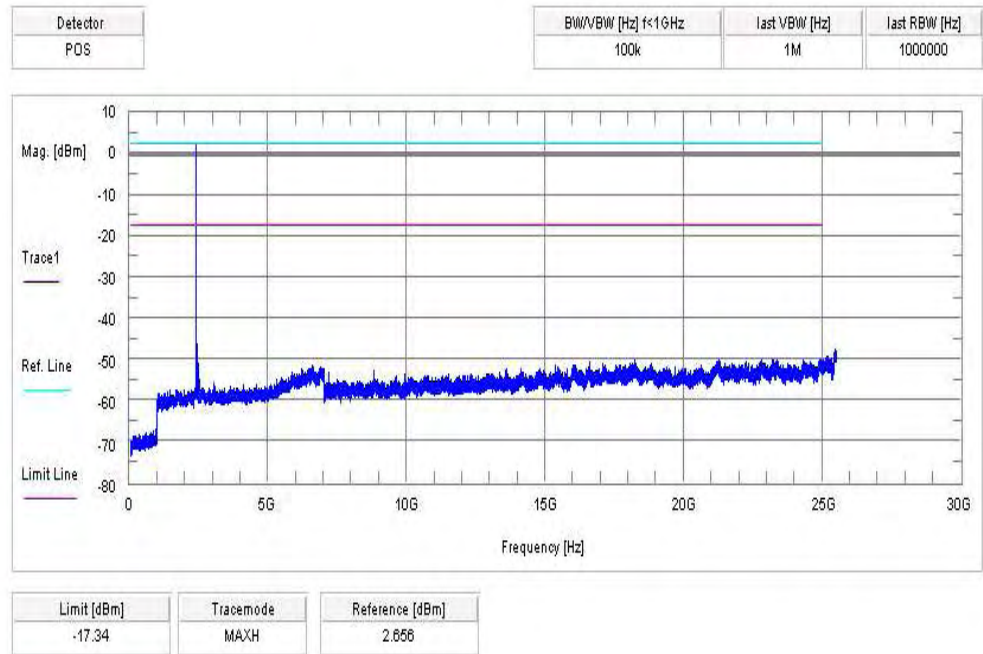
Result & Limits:

Emission Limitation					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		2.63	30 dBm		Operating frequency
<i>No critical peaks found</i>			-20 dBc		complies
2441		2.62	30 dBm		Operating frequency
<i>No critical peaks found</i>			-20 dBc		complies
2480		2.83	30 dBm		Operating frequency
<i>No critical peaks found</i>			-20 dBc		complies
Measurement uncertainty		± 3dB			

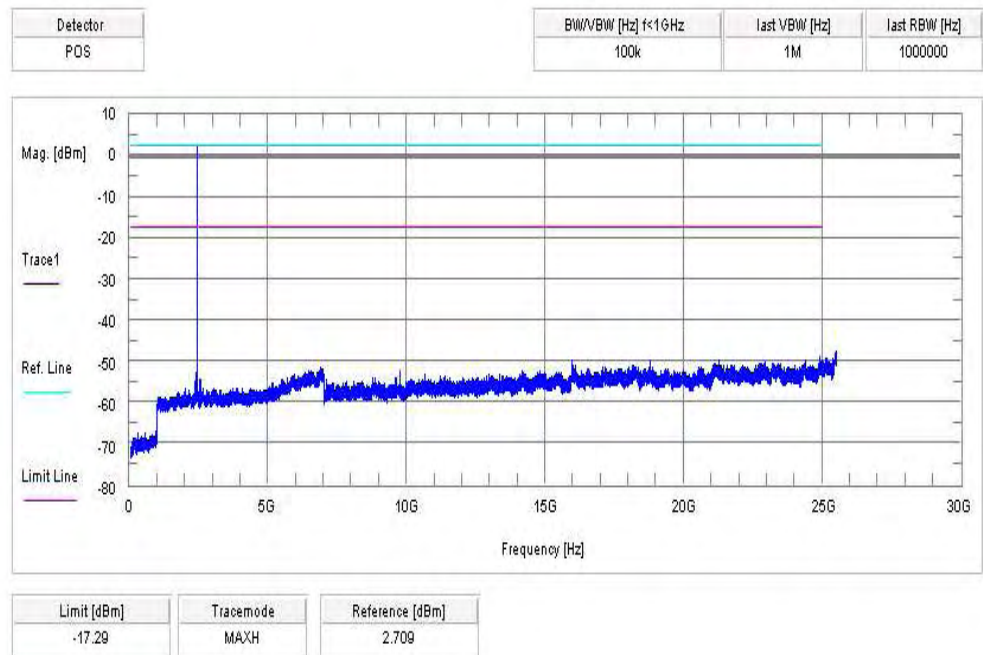
F < 1 GHz: RBW: 100 kHz VBW: 100 kHz
F > 1 GHz: RBW: 1 MHz VBW: 1 MHz

Modulation: 8 DPSK

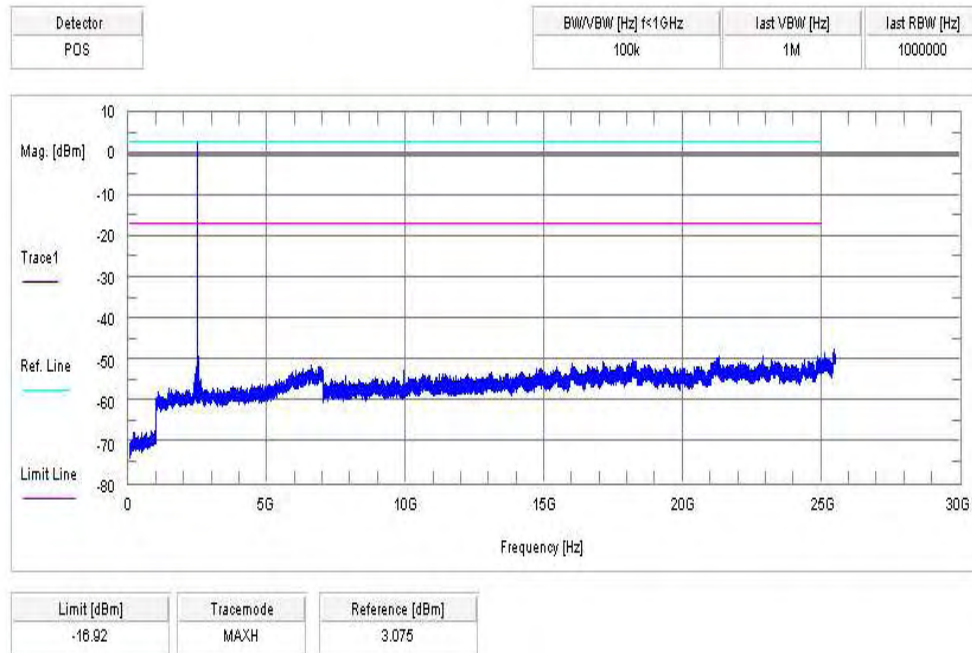
Plot 1 of 3: lowest channel



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		2.66	30 dBm		Operating frequency
<i>No critical peaks found</i>			-20 dBc		complies
2441		2.71	30 dBm		Operating frequency
<i>No critical peaks found</i>			-20 dBc		complies
2480		3.08	30 dBm		Operating frequency
<i>No critical peaks found</i>			-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.

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)

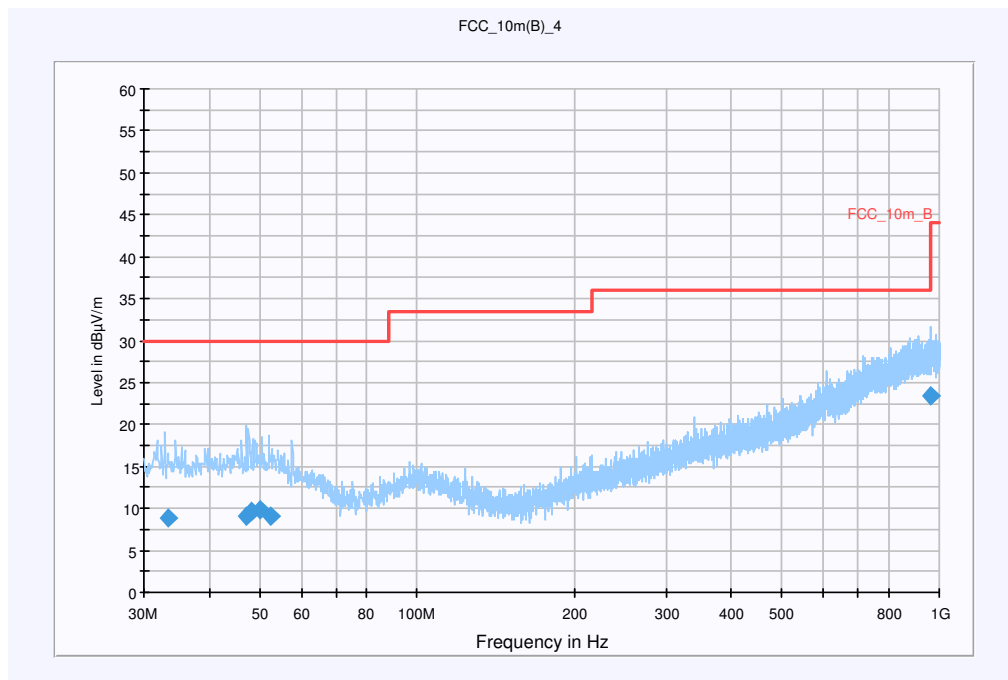
Common Information

EUT:	AAD-3880006-BV + CAA-0002001-BV
Serial Number:	CB5114ZLK5 + 758 B06W06
Test Description:	FCC @ 10 m
Operating Conditions:	BT channel 0
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



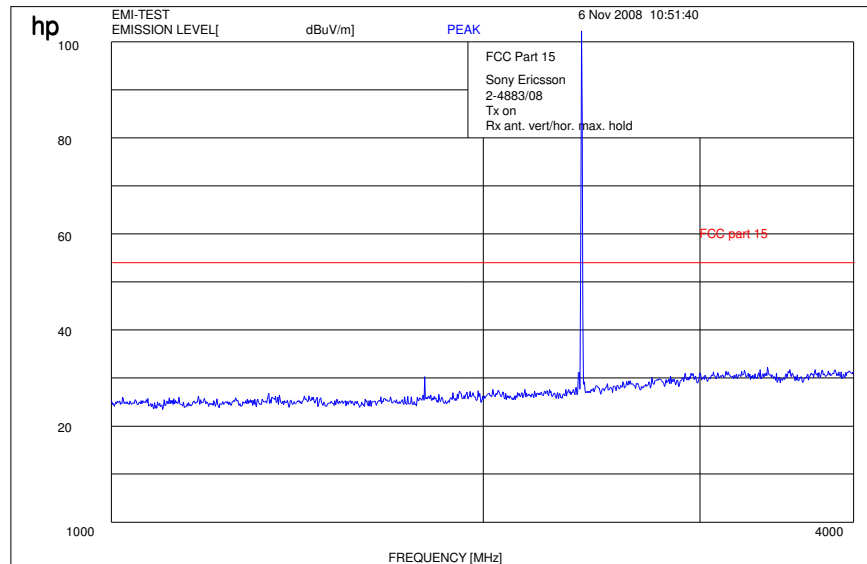
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
33.449850	8.9	15000.000	120.000	202.0	V	50.0	13.0	21.1	30.0	
47.266500	9.0	15000.000	120.000	124.0	V	9.0	13.5	21.0	30.0	
48.176300	9.7	15000.000	120.000	180.0	V	50.0	13.5	20.3	30.0	
50.291450	9.9	15000.000	120.000	133.0	V	43.0	13.5	20.1	30.0	
52.264000	9.0	15000.000	120.000	204.0	V	15.0	13.3	21.0	30.0	
959.406000	23.5	15000.000	120.000	220.0	H	258.0	26.0	12.5	36.0	

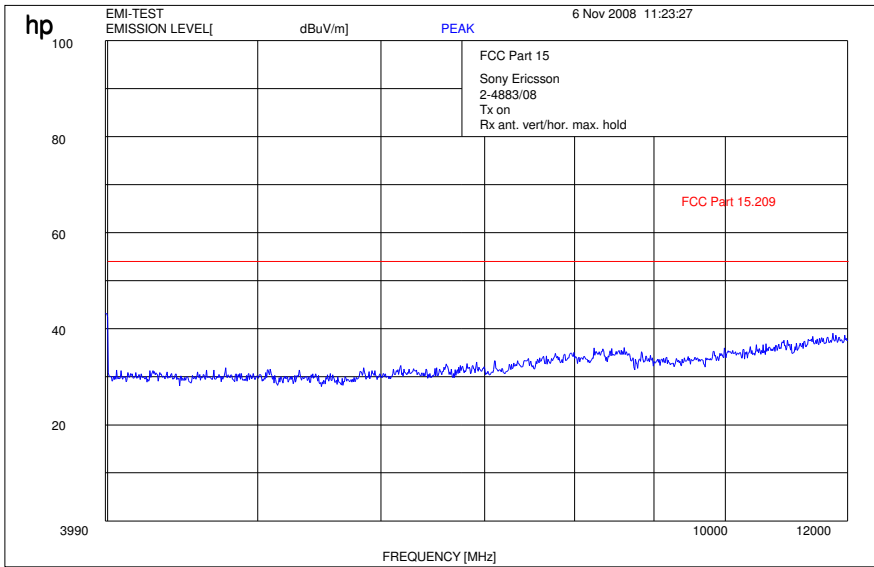
Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

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

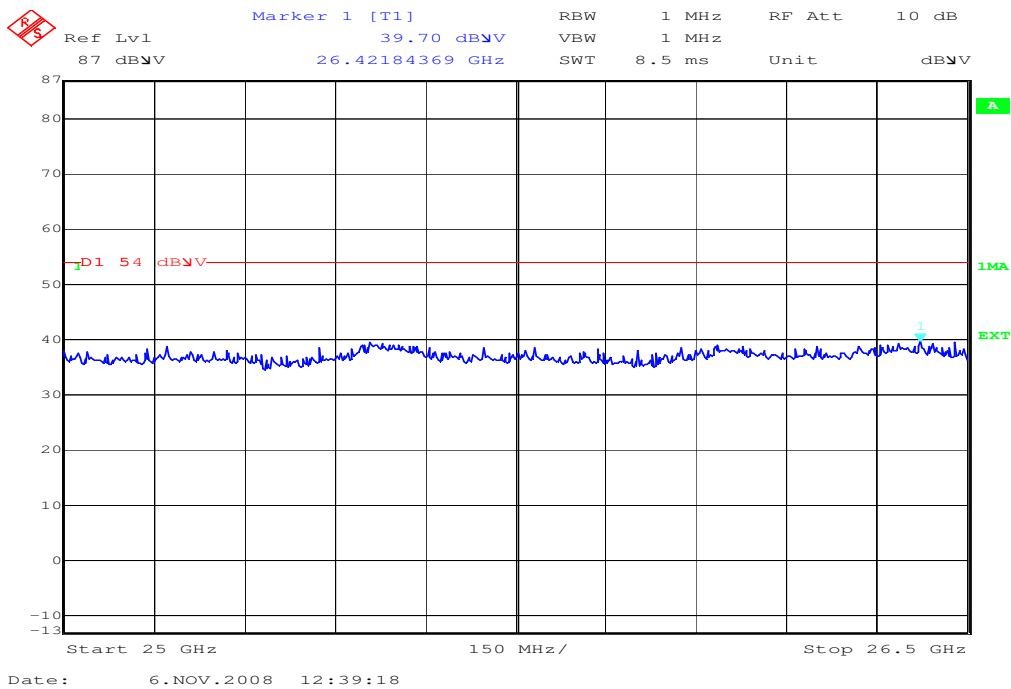
Plot 2: 1 - 4 GHz vertical/horizontal (lowest channel)



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



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



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

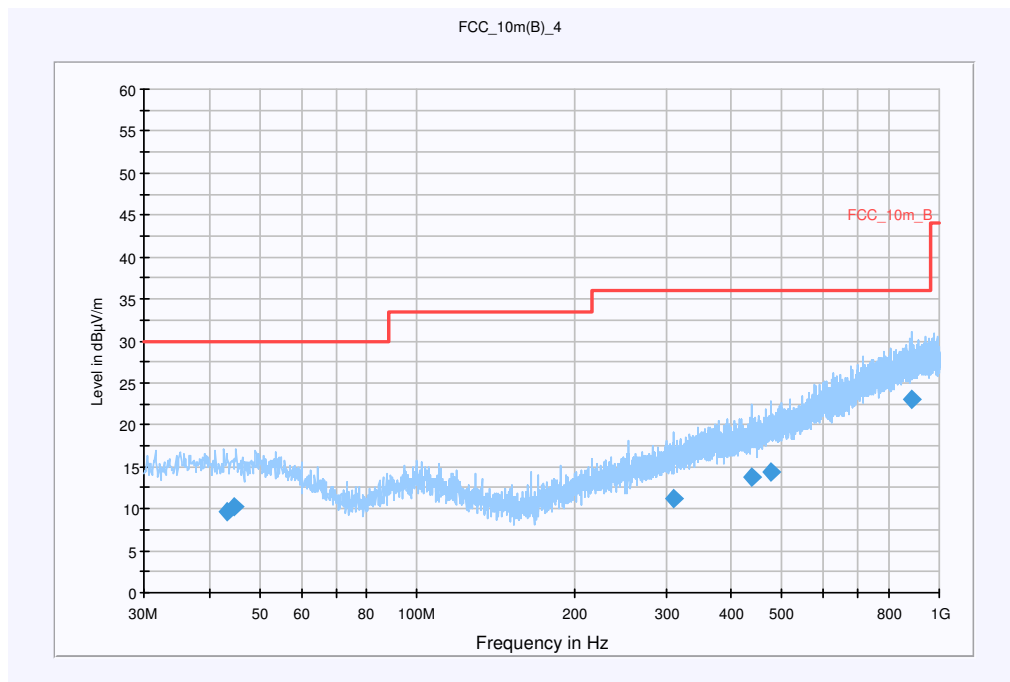
Common Information

EUT:	AAD-3880006-BV + CAA-0002001-BV
Serial Number:	CB5114ZLK5 + 758 B06W06
Test Description:	FCC @ 10 m
Operating Conditions:	BT channel 39
Operator Name:	Folz
Comment:	Powered with AC 115V/ 60 Hz

Scan Setup: FCC_Fin [EMI radiated]

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

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

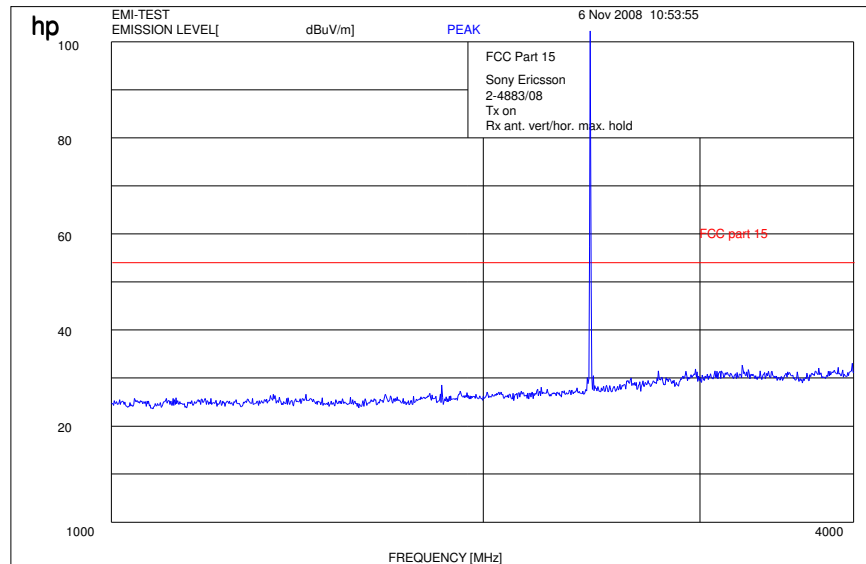
**Final Result 1**

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
43.195650	9.7	15000.000	120.000	138.0	V	131.0	13.5	20.3	30.0	
44.569900	10.2	15000.000	120.000	107.0	V	45.0	13.4	19.8	30.0	
309.765100	11.2	15000.000	120.000	220.0	H	8.0	15.0	24.8	36.0	
436.631450	13.7	15000.000	120.000	220.0	V	279.0	17.5	22.3	36.0	
474.964600	14.4	15000.000	120.000	151.0	V	150.0	18.2	21.6	36.0	
881.943400	23.0	15000.000	120.000	220.0	H	46.0	25.6	13.0	36.0	

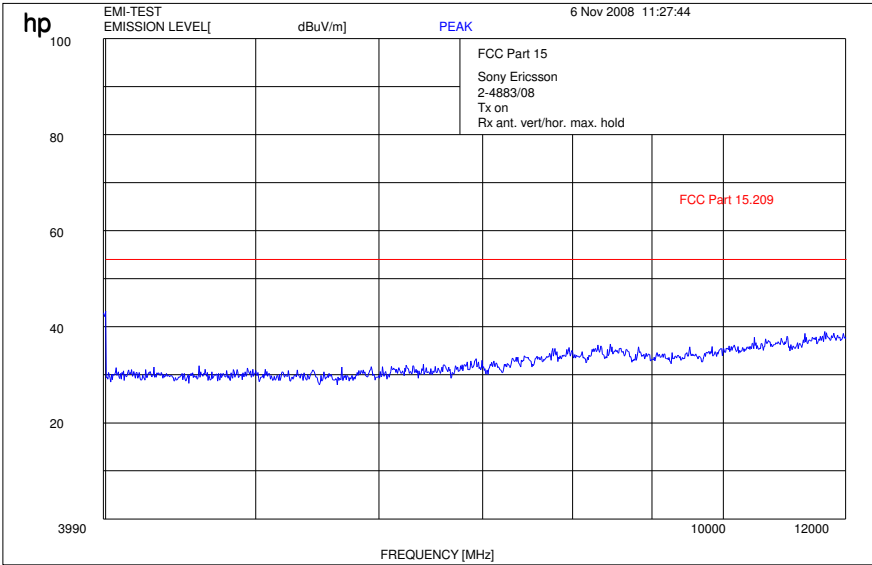
Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

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 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)

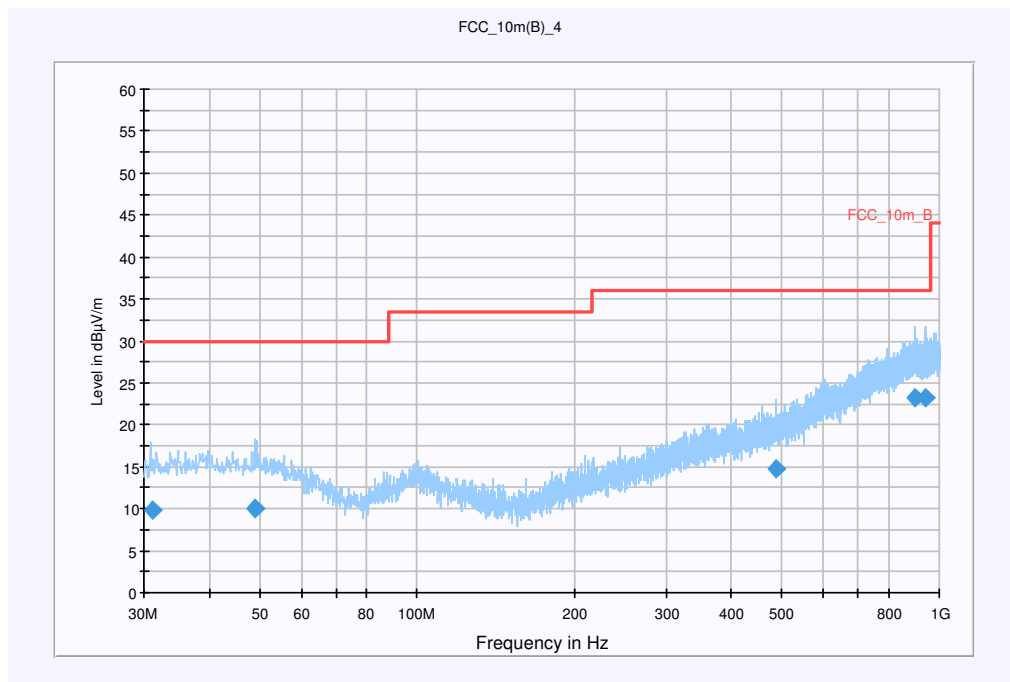
Common Information

EUT:	AAD-3880006-BV + CAA-0002001-BV
Serial Number:	CB5114ZLK5 + 758 B06W06
Test Description:	FCC @ 10 m
Operating Conditions:	BT channel 78
Operator Name:	Folz
Comment:	Powered with AC 115V/ 60 Hz

Scan Setup: FCC_Fin [EMI radiated]

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

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

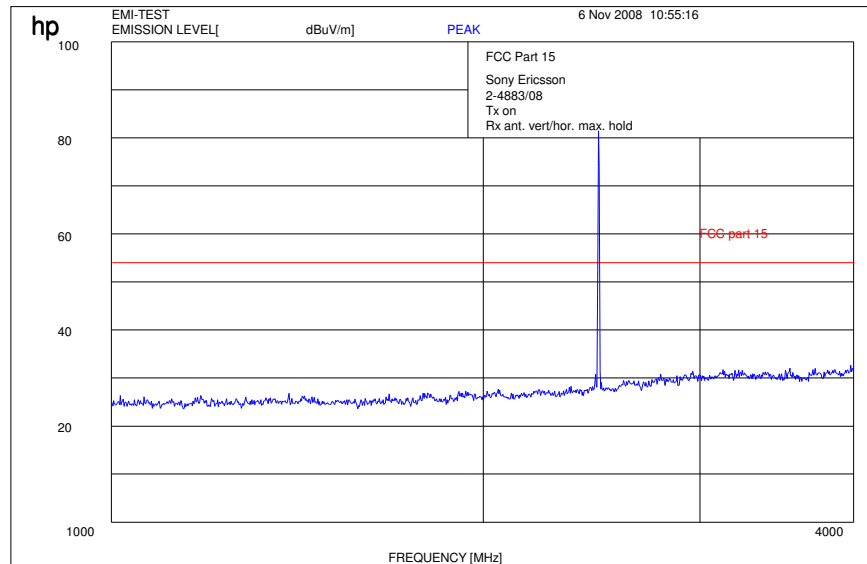
**Final Result 1**

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
31.200350	9.9	15000.000	120.000	154.0	H	308.0	12.7	20.1	30.0	
48.880250	10.0	15000.000	120.000	220.0	H	267.0	13.5	20.0	30.0	
49.147250	10.1	15000.000	120.000	220.0	H	50.0	13.5	19.9	30.0	
486.953300	14.7	15000.000	120.000	220.0	V	40.0	18.4	21.3	36.0	
898.967850	23.1	15000.000	120.000	220.0	V	231.0	25.8	12.9	36.0	
938.972100	23.2	15000.000	120.000	120.0	H	92.0	25.9	12.8	36.0	

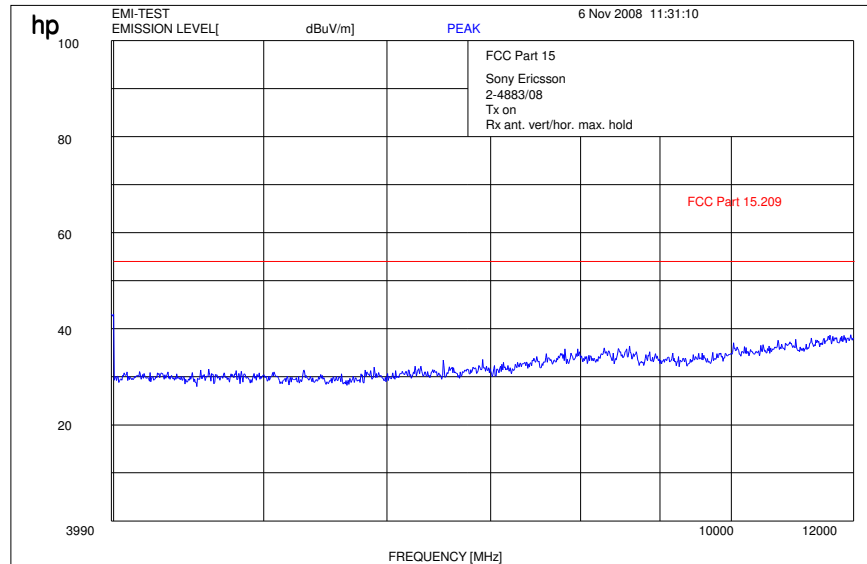
Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

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



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

Results:

SPURIOUS EMISSIONS LEVEL (dB μ V/m)								
2402 MHz			2441 MHz			2480 MHz		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]
No critical peaks found								
Measurement uncertainty			± 3 dB					

f < 1 GHz : RBW/VBW: 100 kHz

f $\geq$ 1GHz : RBW/VBW: 1 MHzLimits: § 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 (dB μ 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

5.16 Spurious Emissions - radiated (Receiver) § 15.109

Modulation: GFSK

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

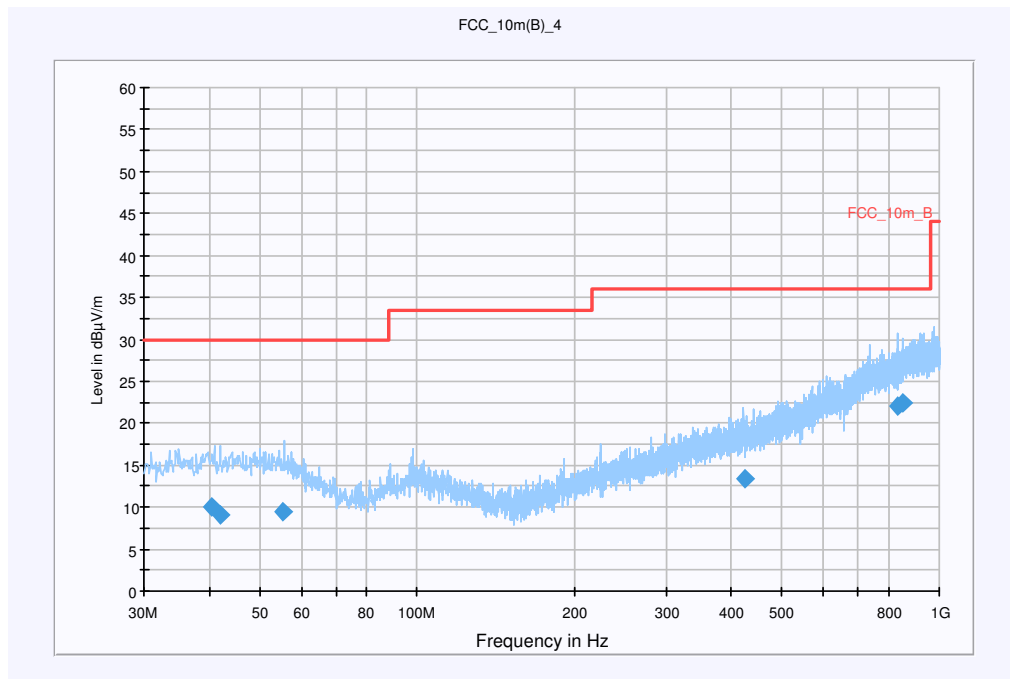
Common Information

EUT:	AAD-3880006-BV + CAA-0002001-BV
Serial Number:	CB5114ZLK5 + 758 B06W06
Test Description:	FCC @ 10 m
Operating Conditions:	Idle Mode
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

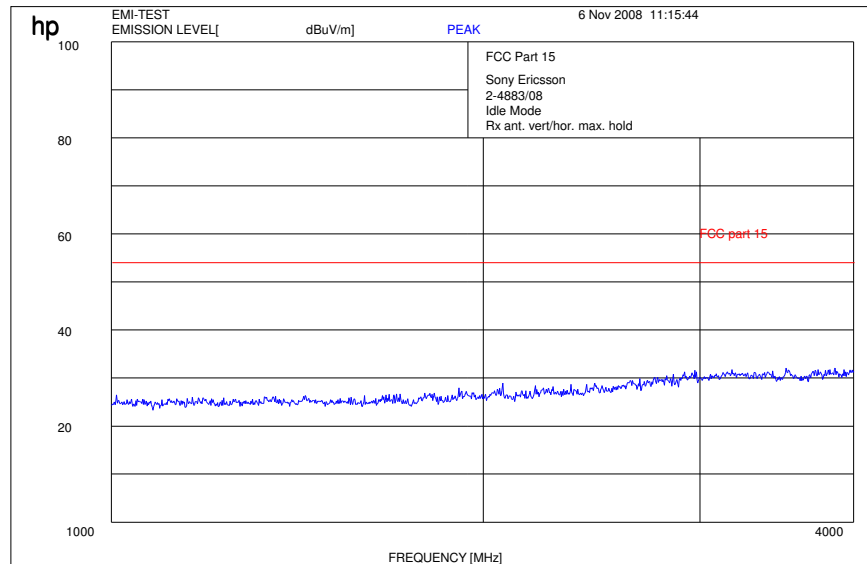
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
40.338000	10.0	15000.000	120.000	107.0	H	139.0	13.6	20.0	30.0	
41.917200	9.1	15000.000	120.000	220.0	V	236.0	13.5	20.9	30.0	
55.299450	9.4	15000.000	120.000	220.0	H	94.0	13.0	20.6	30.0	
422.943000	13.3	15000.000	120.000	220.0	H	158.0	17.3	22.7	36.0	
831.914400	22.1	15000.000	120.000	173.0	H	305.0	24.8	13.9	36.0	
851.407300	22.5	15000.000	120.000	115.0	V	8.0	25.1	13.5	36.0	

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

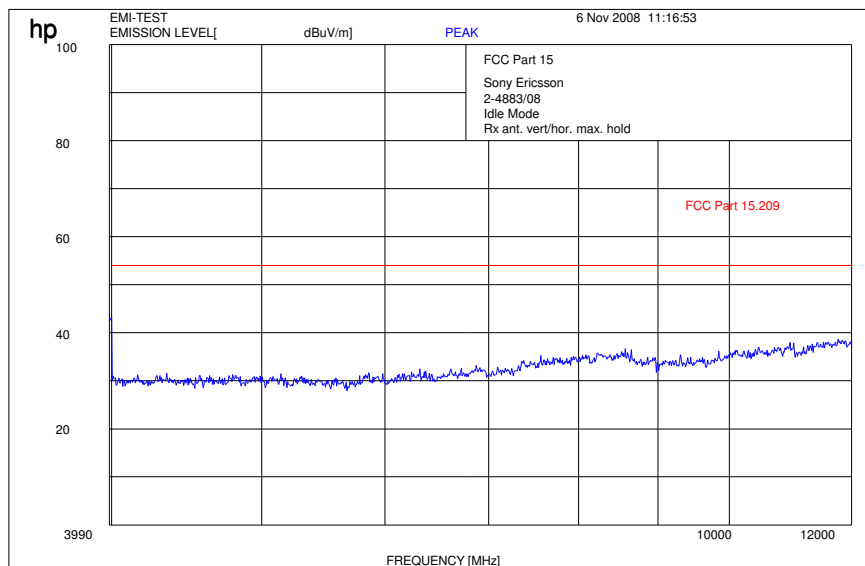
Subrange 1

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

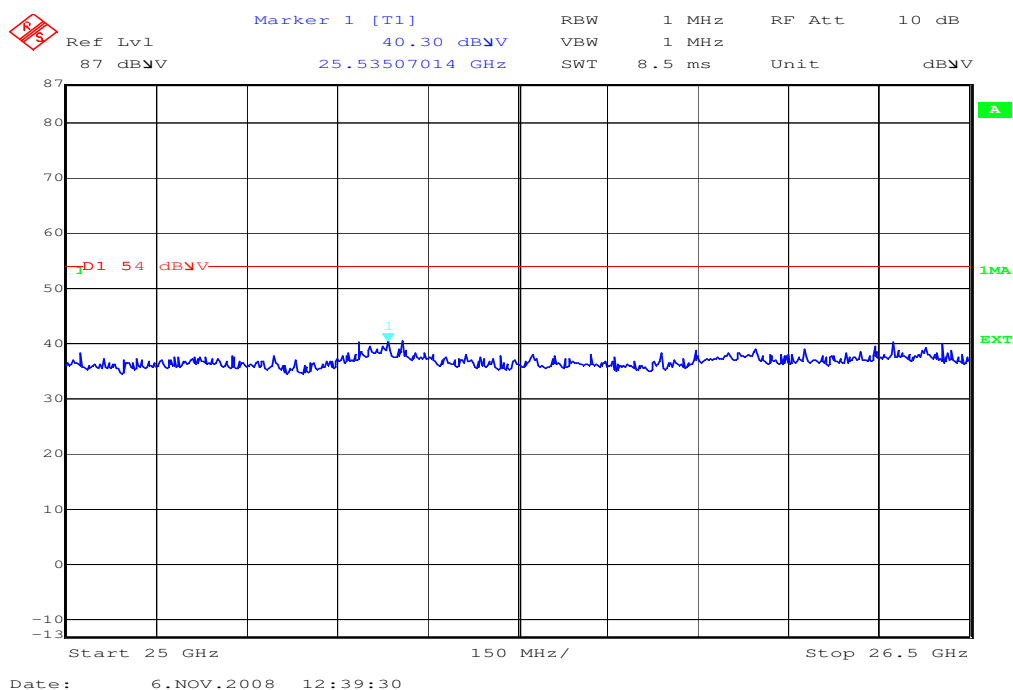
Plot 2: 1 - 4 GHz vertical/horizontal (receiver)



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



Plot 4: 12 - 25 GHz vertical/horizontal (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

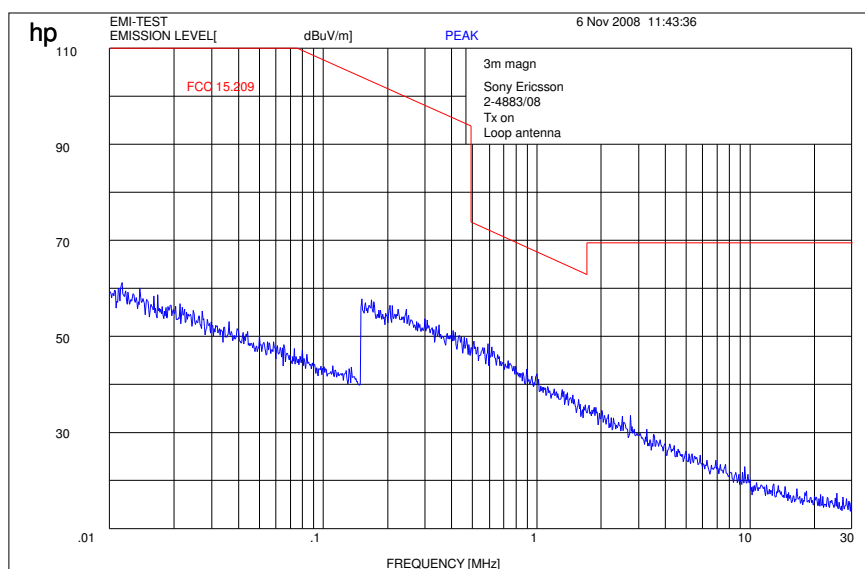
5.17 Spurious Emissions < 30 MHz - Transmitter radiated § 15.209

Modulation: 8 DPSK

Measured at 3 m distance.

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

Plot 1:



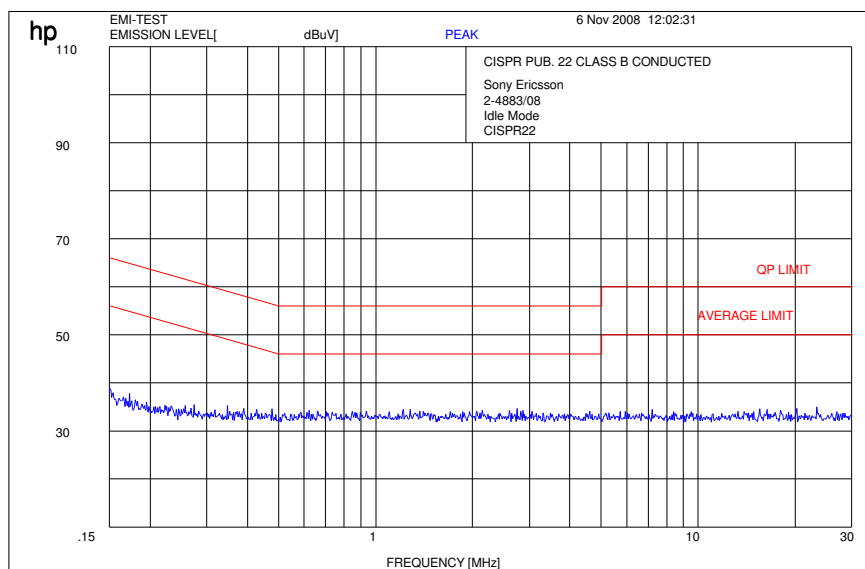
Limits:

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

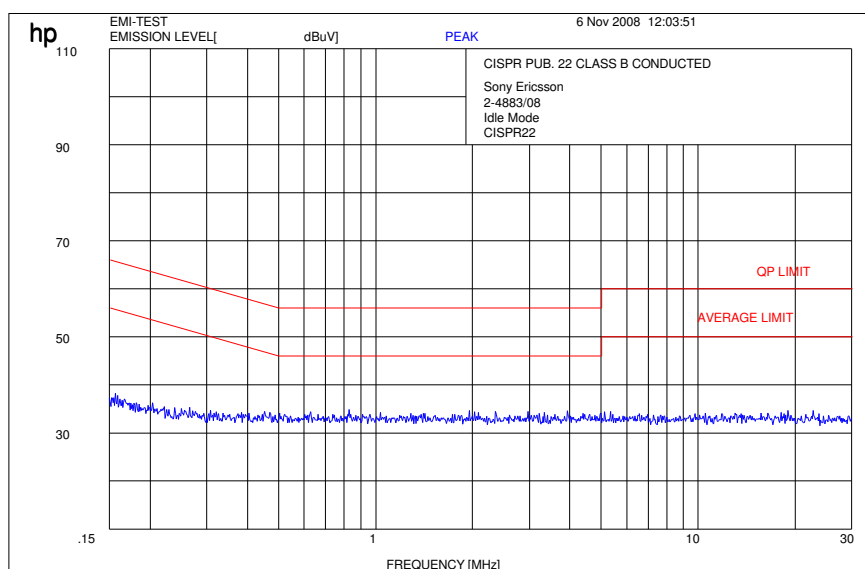
5.18 Conducted Emissions <30 MHz § 15.107/207

Modulation: 8 DPSK

Plot 1: Idle Mode



Plot 2: Tx Mode



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.

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 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.)		

System Rack Room 005 :

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	FSP 30	R&S	100886	300003575	25.08.2008	24	25.08.2010
2	CBT	R&S	100313	300003516	03.09.2008	24	03.09.2010
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

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 Micro-wave 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	-/-	-/-	-/-	-/-