Accredited testing-laboratory

DAR registration number: DGA-PL-176/94-D1

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

Recognized by the Federal Communications Commission
Anechoic chamber registration no.: 90462 (FCC)
Anechoic chamber registration no.: 3462C-1 (IC)
Certification ID: DE 0001
Accreditation ID: DE 0002

Accredited Bluetooth® Test Facility (BQTF)

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Test report no.	**:**	**1-1954-03-04/10**
Type identification	**:**	**AAD-3880063-BV**
Applicant	**:**	**Sony Ericsson Mobile Communications AB**
FCC ID	**:**	**PY7A3880063**
IC Certification No	**:**	**4170B-A3880063**
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 EUT operating modes 8
3.1.4 Extreme conditions testing values 8

4 Summary of Measurement Results and list of all performed test cases 9

5 RF measurement testing 10

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) 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) 41
5.15 Spurious Emissions > 30 MHz- radiated (Transmitter) § 15.247 (c)(1) 47
5.16 Spurious Emissions - radiated (Receiver) § 15.109 57
5.17 Spurious Emissions < 30 MHz - Transmitter radiated § 15.209 61
5.18 Conducted Emissions <30 MHz § 15.107/207 63

6 Test equipment and ancillaries used for tests 65

7 Photographs of the Test Set-up 68

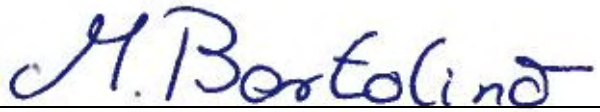
8 Photographs of the EUT 70

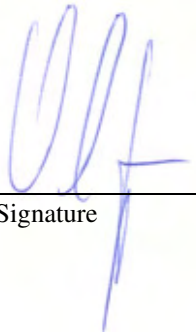
1 General information

1.1 Notes

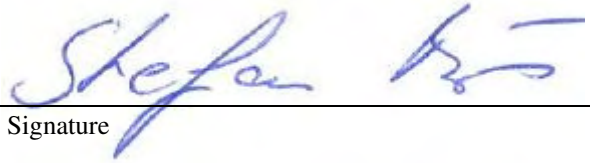
The test results of this test report relate exclusively to the test item specified in 3.1.1. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented 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:

2010-02-05	**Marco Bertolino**	
Date	Name	Signature

2010-02-05	**Joerg Warken**	
Date	Name	Signature

Technical responsibility for area of testing:

2010-02-05	**Stefan Bös**	
Date	Name	Signature

1.2 Testing laboratory

CETECOM ICT Services GmbH

Address:	**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: DGA-PL-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:	**Nya Vattentornet**
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:	**2010-02-01**
Date of receipt of test item:	**2010-02-01**
Date of start test:	**2010-02-01**
Date of end test:	**2010-02-05**
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:	**Nya Vattentornet**
Town:	**22188 Lund**
Country:	**Sweden**

3.1.1 Test item

Kind of test item	:	**Mobile Phone GSM 850/900/1800/1900/UMTS FDD1/FDD8/ HSDPA / HSUPA / WLAN BT2.1+EDR, A-GPS, FM Rx**
Type identification	:	**AAD-3880063-BV**
S/N serial number	:	**BT / WLAN radiated units: BX901721R5** **BX90176ZL3** **BT / WLAN conducted units: BX90176ZMB** **BX901755RR**
HW hardware status	:	**AP1.1**
SW software status	:	**R7BA037** **ITP**
Frequency Band [MHz]	:	**ISM band 2400,0 – 2483,5 MHz** **(channel 00 - 2402 MHz; channel 78 - 2480 MHz)**
Type of Modulation	:	**FHSS – GFSK, Pi/4 DQPSK, 8 DPSK**
Number of channels	:	**79**
Antenna	:	**Integrated PCB antenna – for more information, please take a look at sub-clause 8 → Photos of the EUT**
Power Supply	:	**4.0 V DC by power supply / Li-polymer battery** BST-43
Temperature Range	:	**-20°C to +55°C**

Max. power radiated: **6.51 dBm (GFSK modulation)**

Max. power conducted: **5.63 dBm (GFSK modulation)**

FCC ID: **PY7A3880063**

IC: **4170B-A3880063**

3.1.2 Additional EUT information For IC Canada (appendix 2)

IC Registration Number:	**4170B-A3880063**
Model Name:	**AAD-3880063-BV**
Manufacturer (complete Address):	**Sony Ericsson Mobile Communications AB Nya Vattentornet 22188 Lund Sweden**
Tested to Radio Standards Specification (RSS) No.:	**RSS-210 Issue 7**
Open Area Test Site Industry Canada Number:	**IC 3462C-1**
Frequency Range (or fixed frequency) [MHz]:	**ISM band 2400,0 – 2483,5 MHz (channel 00 - 2402 MHz; channel 78 - 2480 MHz)**
RF: Power [W] (max):	**GFSK modulation: Rad. EIRP: 4.48 mW Conducted : 3.66 mW Pi/4 DQPSK modulation: Rad. EIRP: 2.43 mW Conducted : 1.91 mW 8 DPSK modulation: Rad. EIRP: 2.43 mW Conducted : 1.99 mW**
Antenna Type:	**Integrated PCB antenna – for more information, please take a look at sub-clause 9 → Photos of the EUT**
Occupied Bandwidth (99% BW) [kHz]:	**GFSK modulation: 926 Pi/4 DQPSK modulation: 1311 8 DPSK modulation: 1263**
Type of Modulation:	**GFSK, Pi/4 DQPSK, 8 DPSK**
Emission Designator (TRC-43):	**GFSK modulation: 926KFXD Pi/4 DQPSK modulation: 1M31GXD 8 DPSK modulation: 1M26GXD**
Transmitter Spurious (worst case) [dBµV/m in 3m]:	**46.42**
Receiver Spurious (worst case) [dBµV/m in 3m]:	**45.97**

ATTESTATION:

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

Signature:

Test engineer: Marco Bertolino Date: 2010-02-05

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_{nom}	°C	**20**
Nominal Humidity	H_{nom}	%	**38**
Nominal Power Source	V_{nom}	V	**4.0**

Type of power source: 4.0 V DC by power supply / Li-polymer battery BST-43 4.0 V DC by power supply / Li-polymer battery BST-43

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	Passed	2010-02-05	-/-

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	Yes			
§ 15.247 (d)	Spurious Emission - radiated (Transmitter) >30 MHz	GFSK	Yes			
§ 15.109	Spurious Emissions - radiated (Receiver)	-/-	Yes			
§ 15.209	Spurious Emissions - radiated (Transmitter) <30 MHz	GFSK	Yes			
§ 15.107/207	Conducted Emissions <30 MHz	GFSK	Yes			

5 RF measurement testing

5.1 Description of test set-up

5.1.1 Radiated measurements

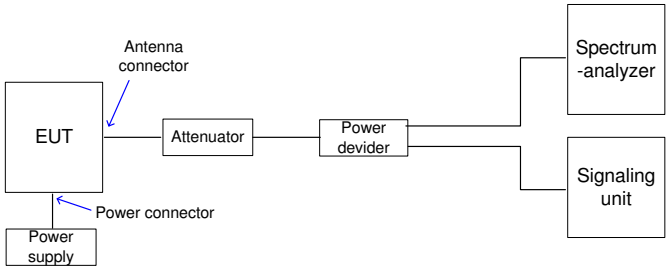
The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas 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.

Results: Peak values

TEST				
T_{nom}	V_{nom}	lowest frequency 2402 MHz	middle frequency 2441 MHz	highest frequency 2480 MHz
Conducted power [dBm] Measured, GFSK modulation		3.31	4.44	**5.63**
Radiated power [dBm] Measured, GFSK modulation		4.81	6.04	**6.51**
Gain [dBi] Calculated		**1.50**	1.60	0.88

Results: Average values

TEST				
T_{nom}	V_{nom}	lowest frequency 2402 MHz	middle frequency 2441 MHz	highest frequency 2480 MHz
Conducted power [dBm] Measured, GFSK modulation		0.49	1.62	**2.26**
Radiated power [dBm]* Measured, GFSK modulation		1.99	**3.22**	3.14

The measurement is performed with a power meter (R&S NRP – Average No. 1M).

Results: Average values

TEST				
T_{nom}	V_{nom}	lowest frequency 2402 MHz	middle frequency 2441 MHz	highest frequency 2480 MHz
Conducted power [dBm] Measured, Pi/4 DQPSK modulation		-4.22	-3.15	**-1.89**
Radiated power [dBm]* Measured, Pi/4 DQPSK modulation		-2.72	-1.55	**-1.01**

The measurement is performed with a power meter (R&S NRP – Average No. 1M).

Results: Average values

TEST				
T_{nom}	V_{nom}	lowest frequency 2402 MHz	middle frequency 2441 MHz	highest frequency 2480 MHz
Conducted power [dBm]* Measured, 8 DPSK modulation		-4.50	-3.94	**-2.15**
Radiated power [dBm] Measured, 8 DPSK modulation		-3.00	-2.34	**-1.27**

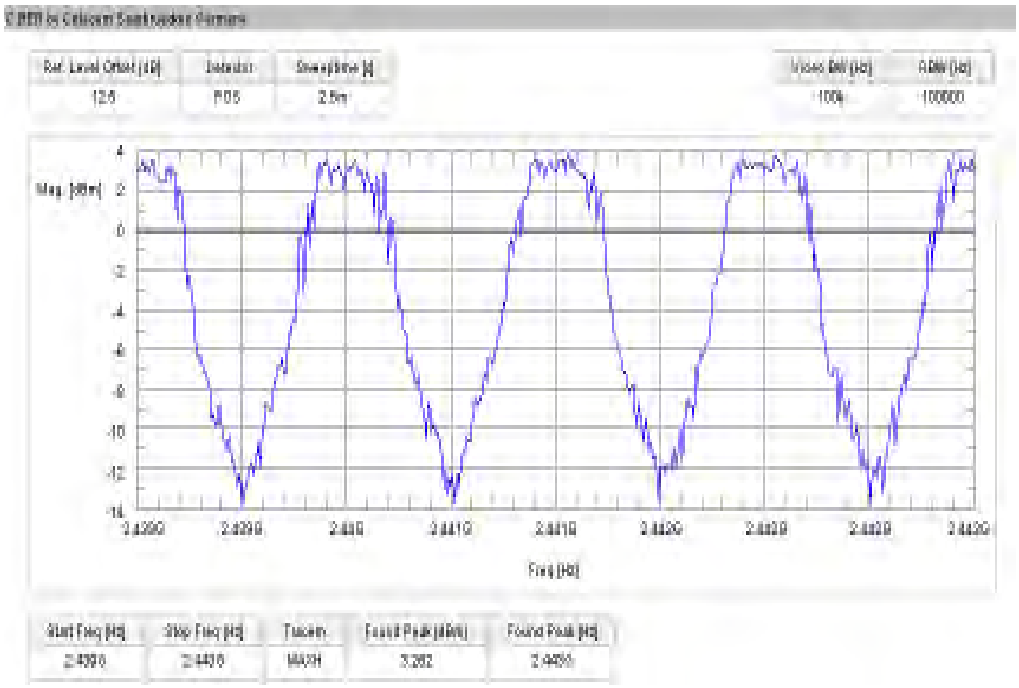
The measurement is performed with a power meter (R&S NRP – Average No. 1M).

*Note: Calculated value

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

Modulation: GFSK

Plot 1 of 1:



Result: Channel separation is: ~ 1 MHz

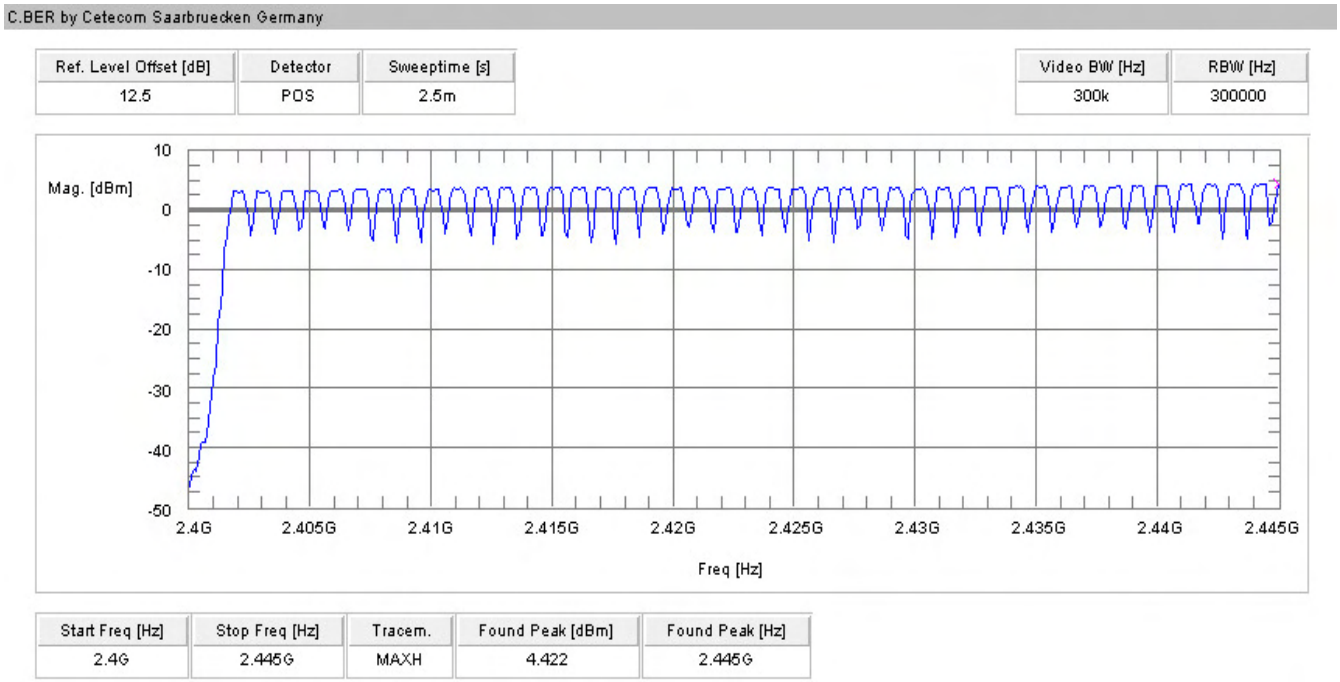
Limits:

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

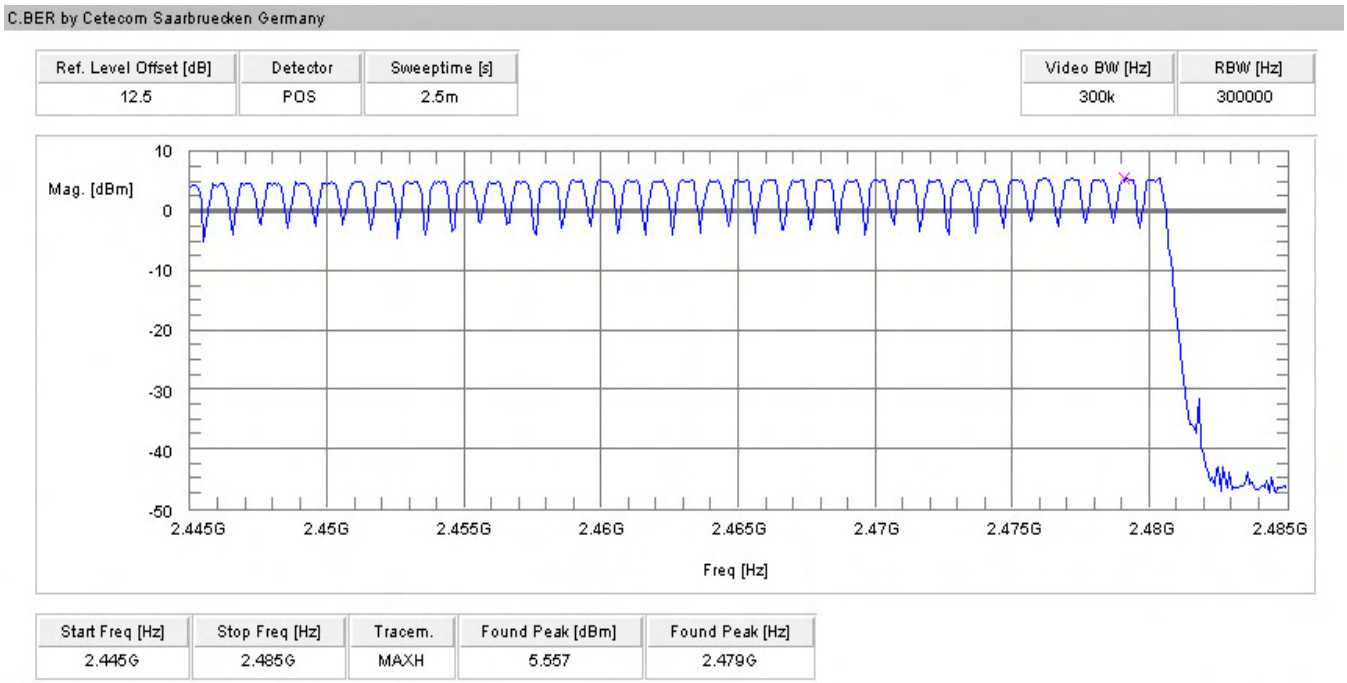
5.6 Number of hopping channels §15.247(a)(1)

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 a 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 µs * 1600 1/s / 79 * 31.6 s = 0.4 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 µs * 1600 * 1/5 *1/s / 79 * 31.6 s = 0.4 s (in a 31.6 s period)

This is according 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!

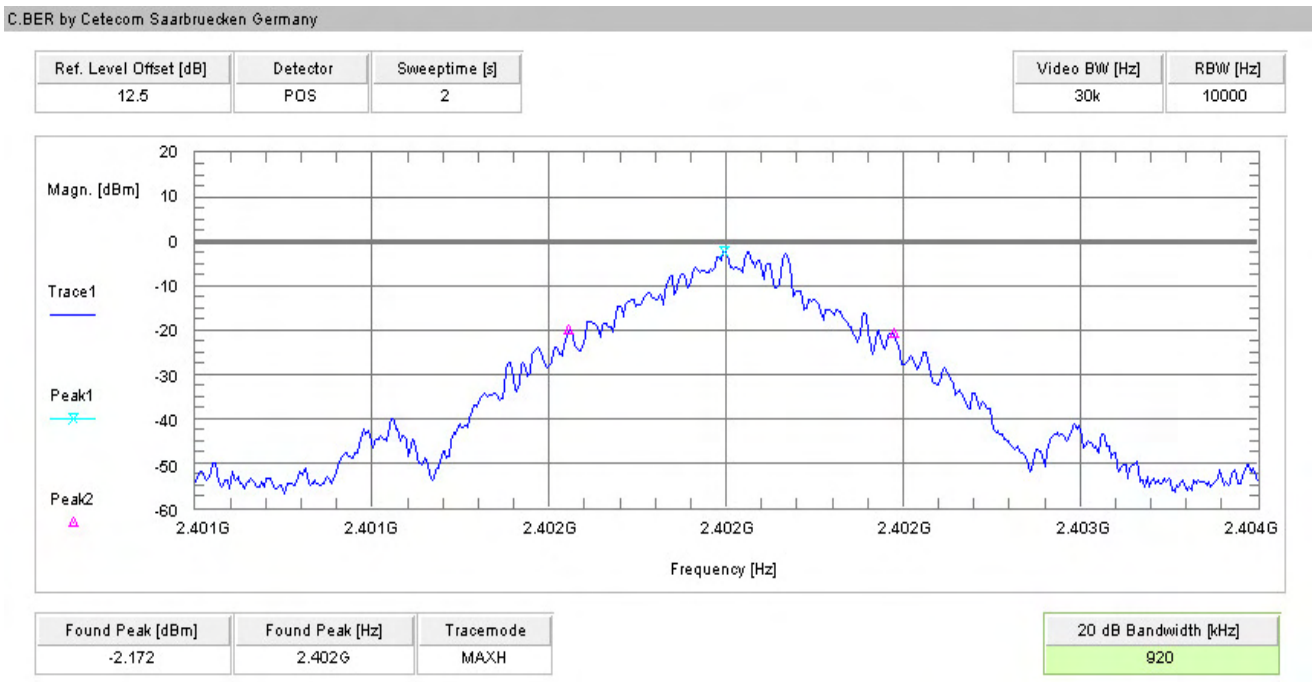
Result: Power density: - dBm/Hz = - dBm / 3 kHz
Correction factor from dBm/Hz to dBm / 3 kHz is +34,8 dB

Limits:

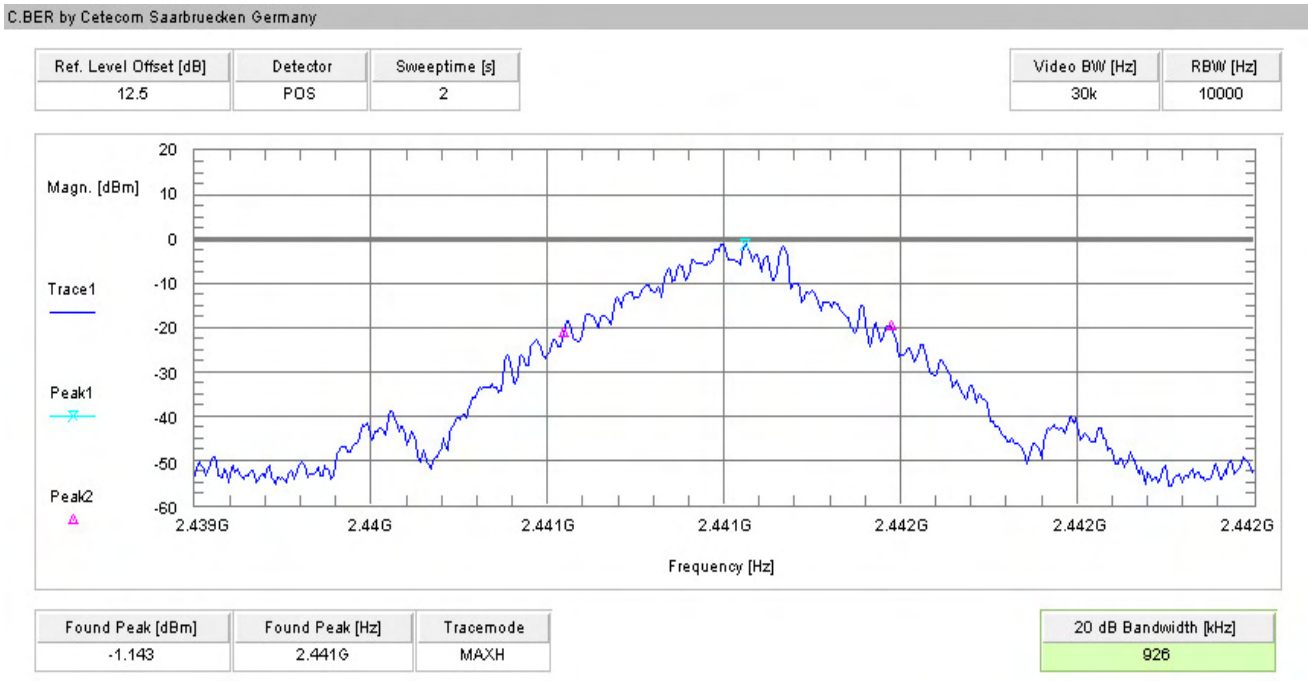
Under normal test conditions only	For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission

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

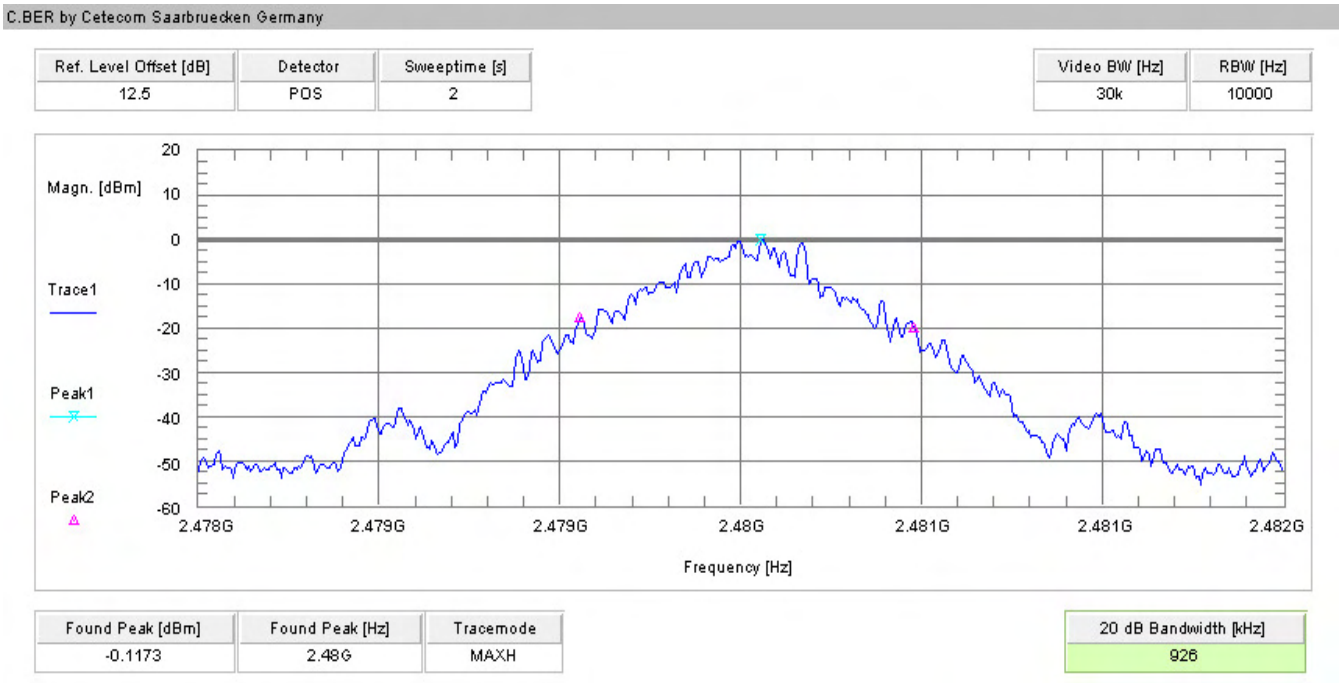
Plot 1: GFSK, lowest channel



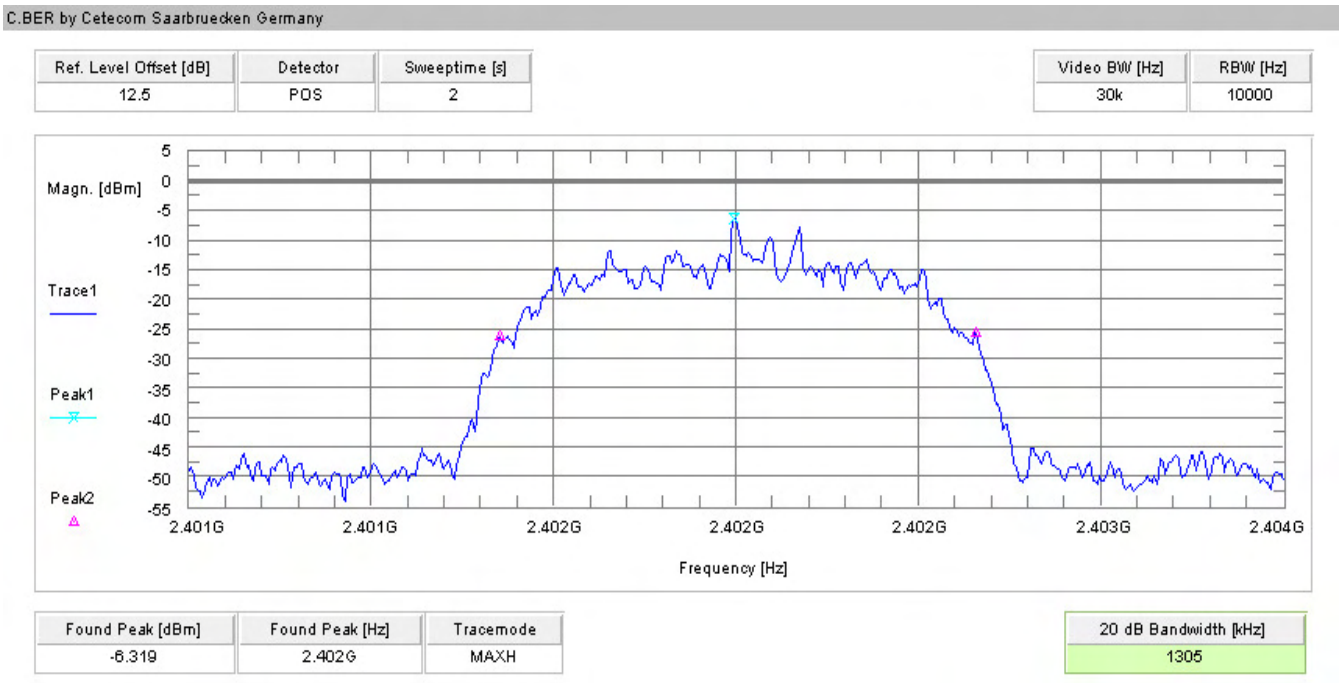
Plot 2: GFSK, middle channel



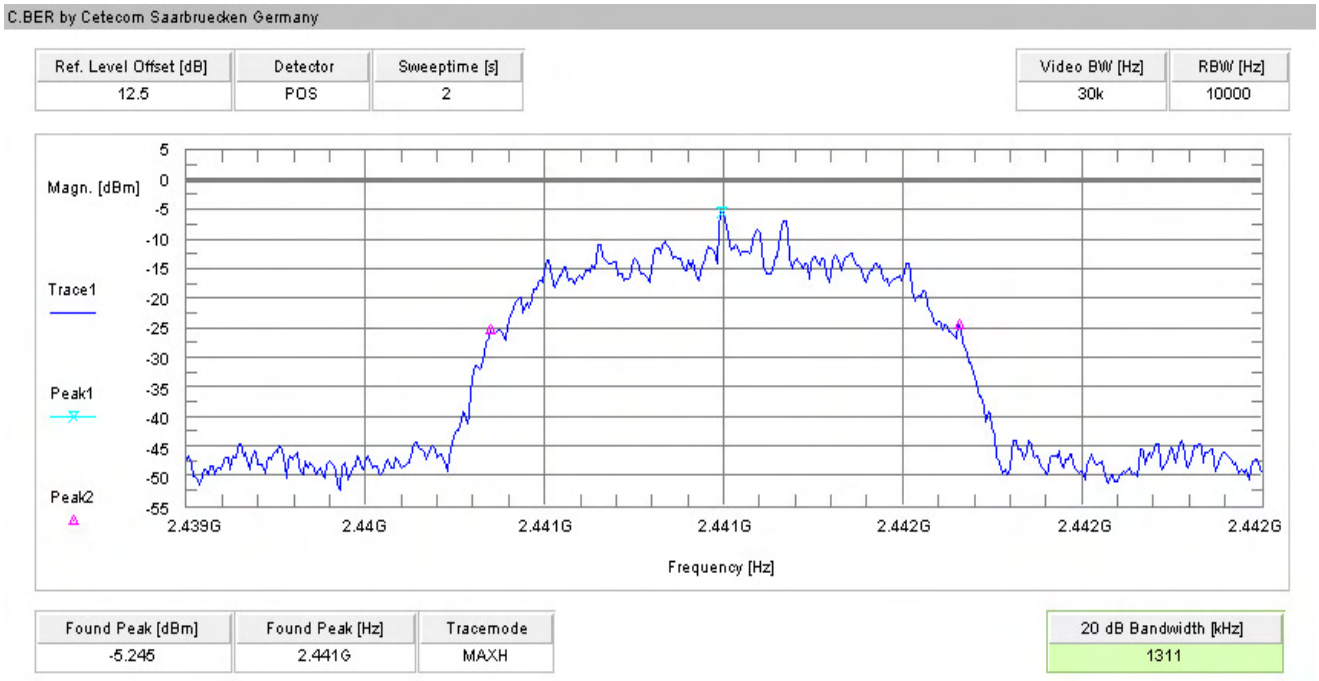
Plot 3: GFSK, highest channel



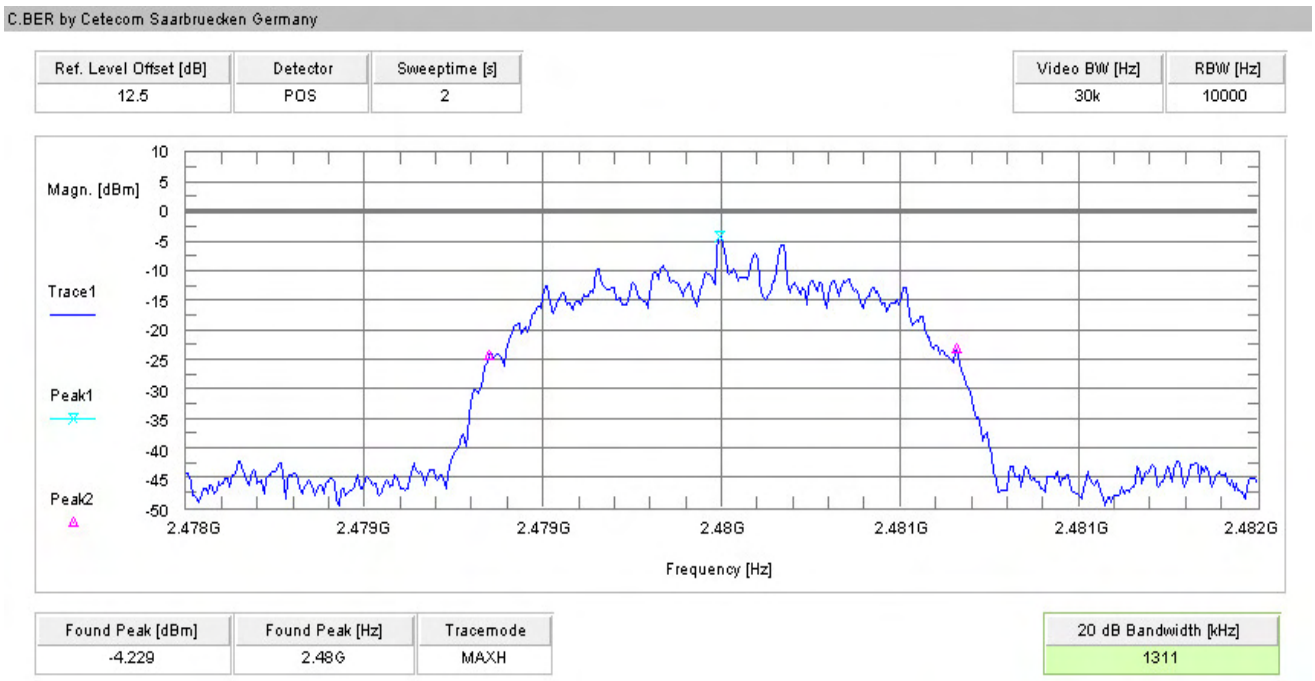
Plot 4: Pi/4 DQPSK, lowest channel



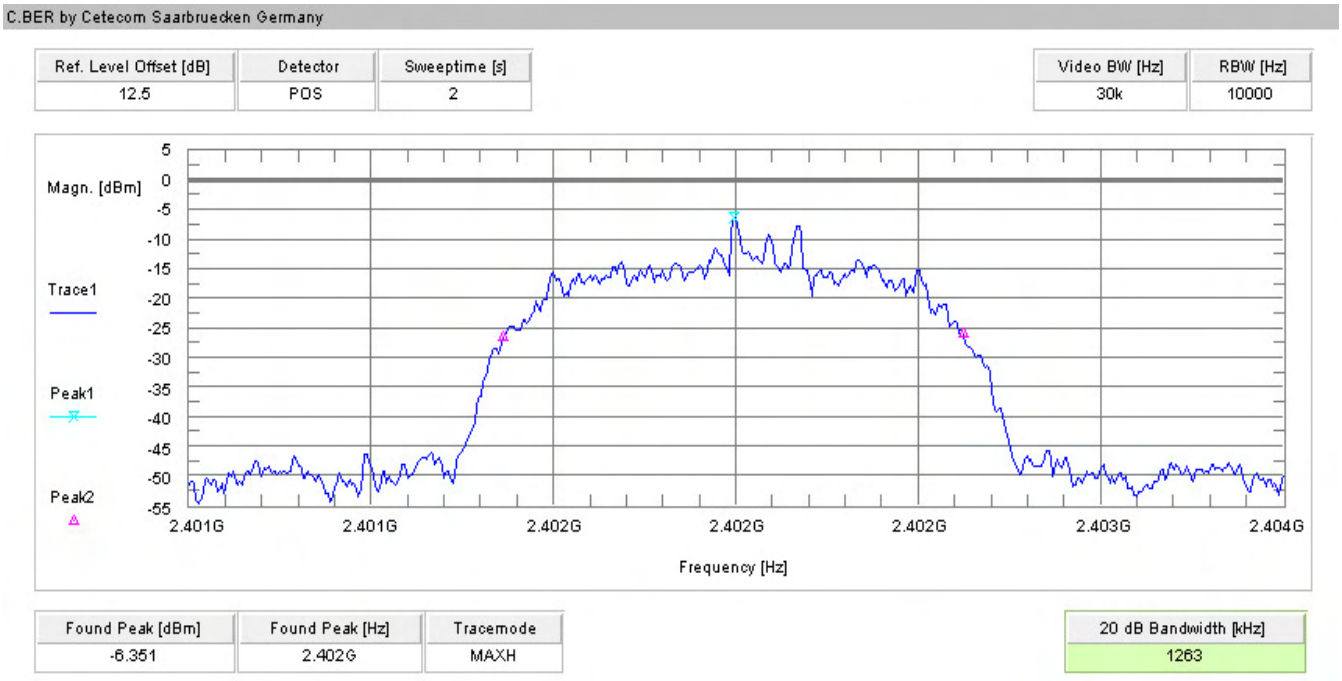
Plot 5: Pi/4 DQPSK, middle channel



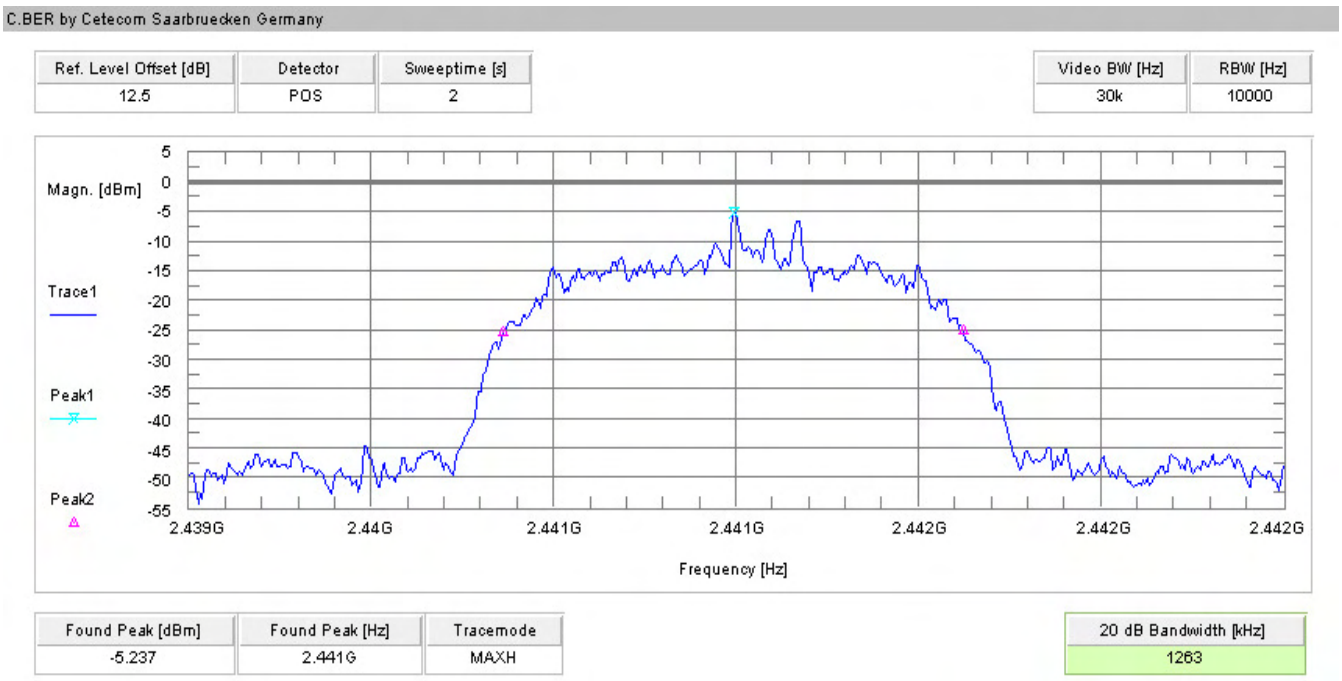
Plot 6: Pi/4 DQPSK, highest channel



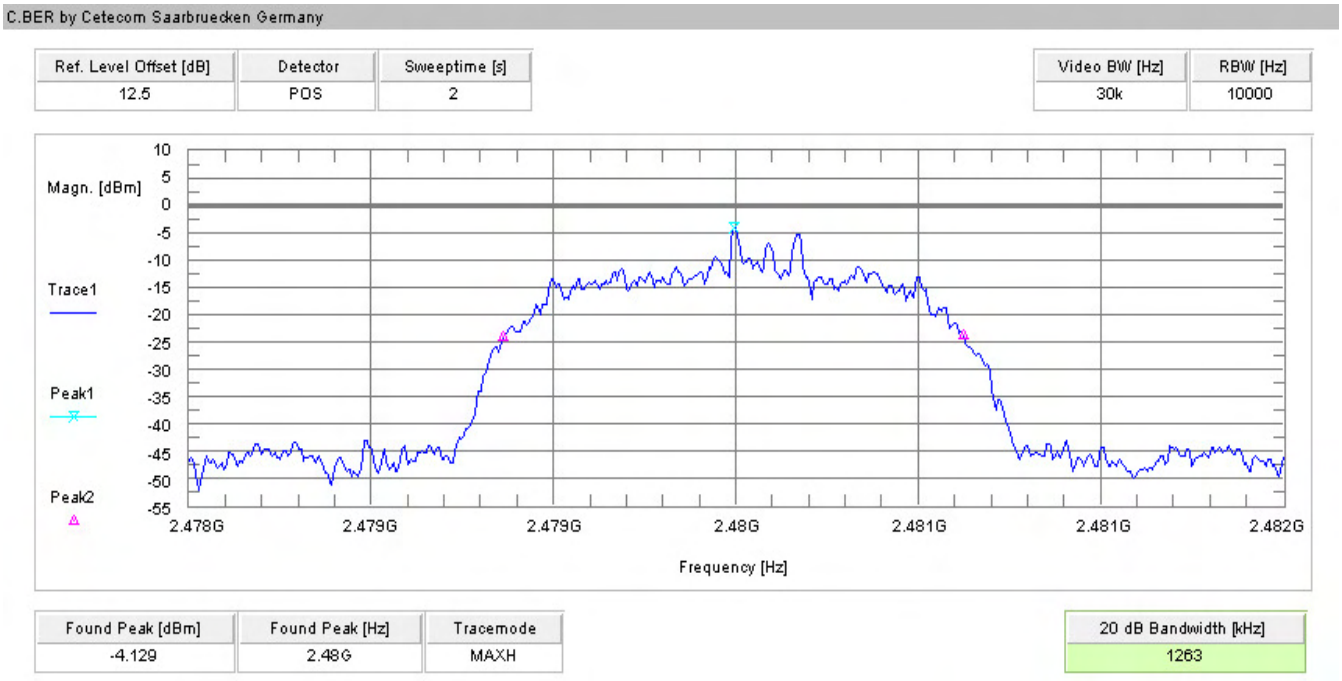
Plot 7: 8DPSK, lowest channel



Plot 8: 8DPSK, middle channel



Plot 9: 8DPSK, highest channel



Result:

Modulation	20 dB BANDWIDTH [kHz]		
Frequency [MHz]	2402	2441	2480
GFSK	920	926	926
Pi/4 DQPSK	1305	1311	1311
8DPSK	1263	1263	1263
Measurement uncertainty	±1kHz		

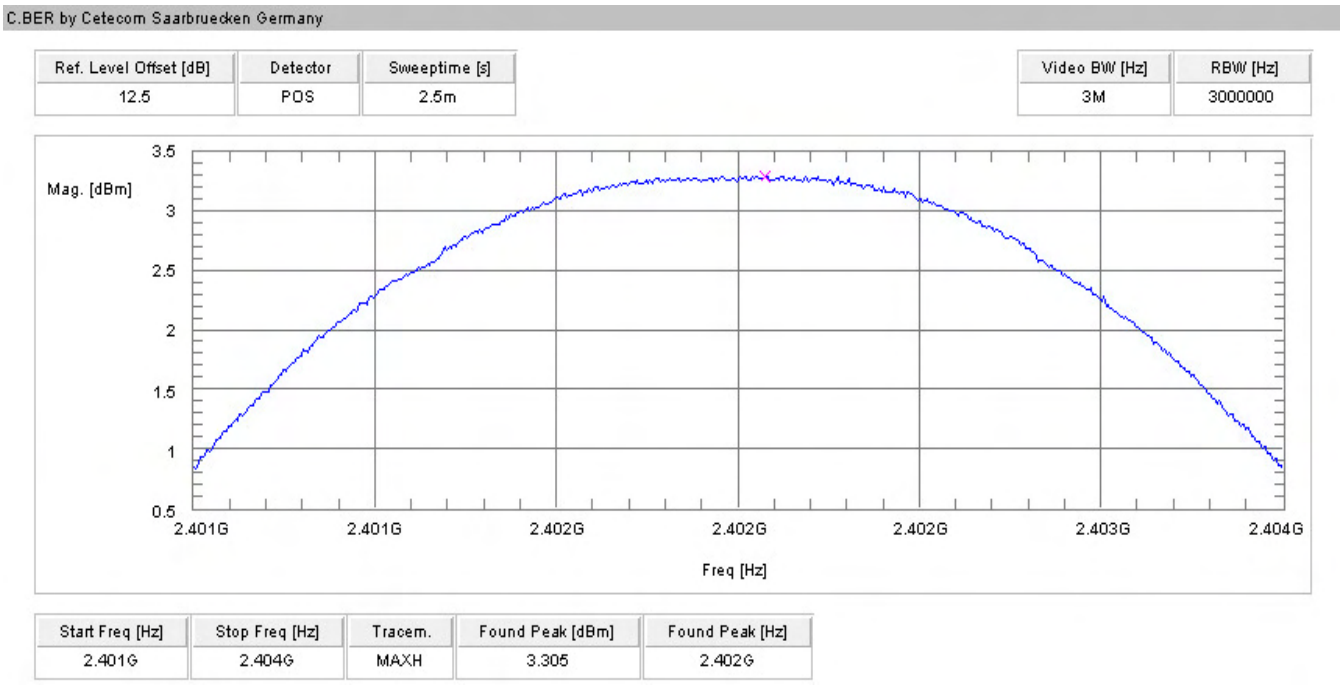
RBW / VBW as provided in the „Measurement Guidelines“ (DA 00-705, March 30, 2000)
RBW: 10 kHz / VBW 10 kHz

Limits:

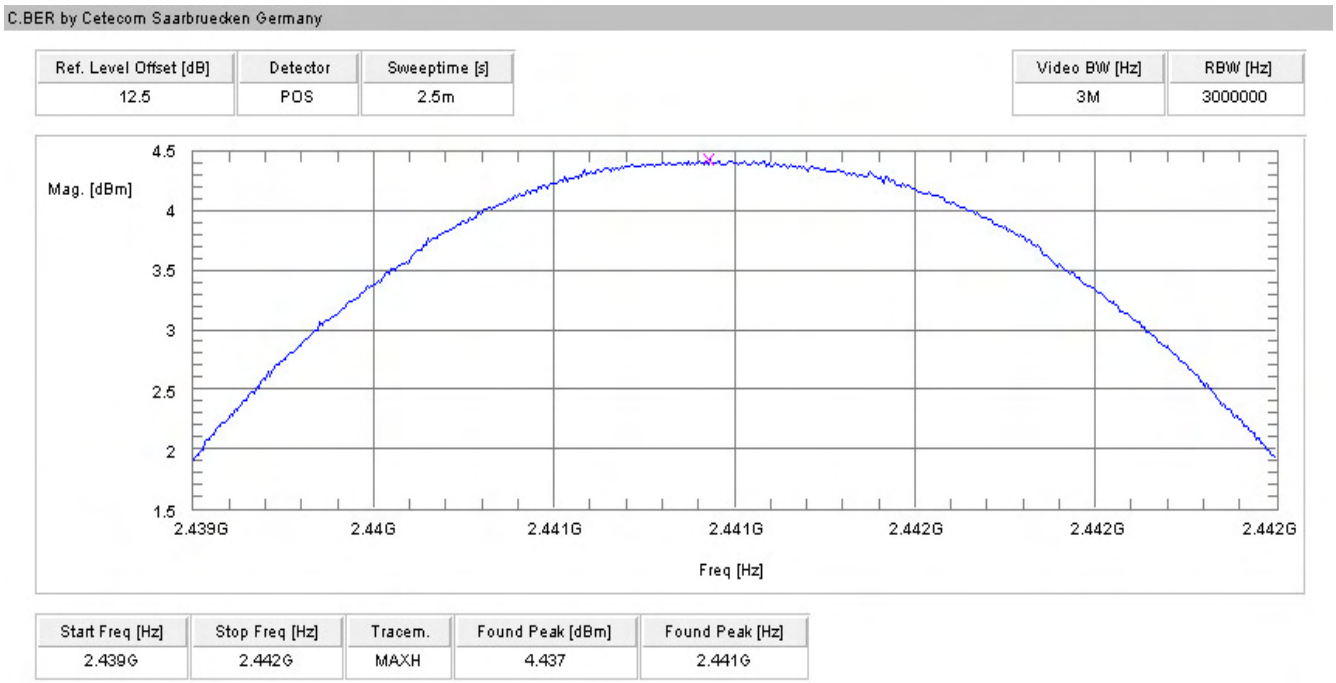
Under normal test conditions only	GFSK < 1000 kHz Pi/4 DQPSK < 1500 8DPSK < 1500

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

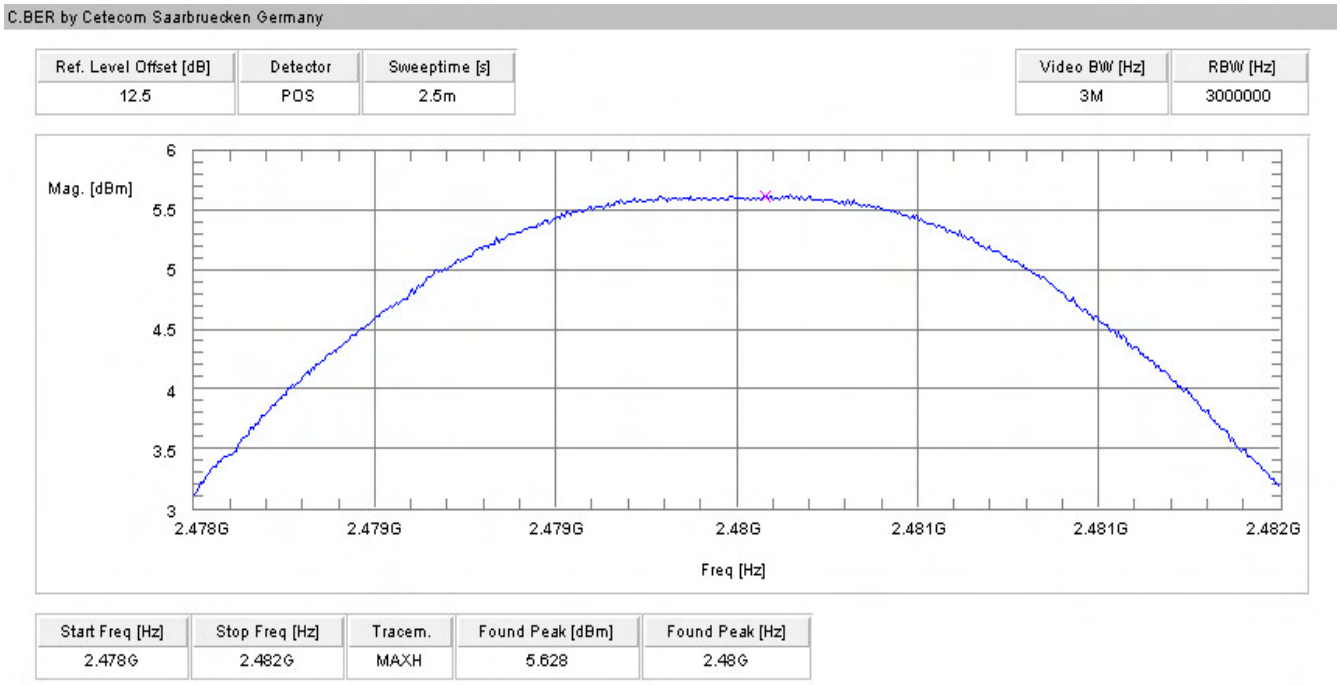
Plot 1: GFSK, lowest channel



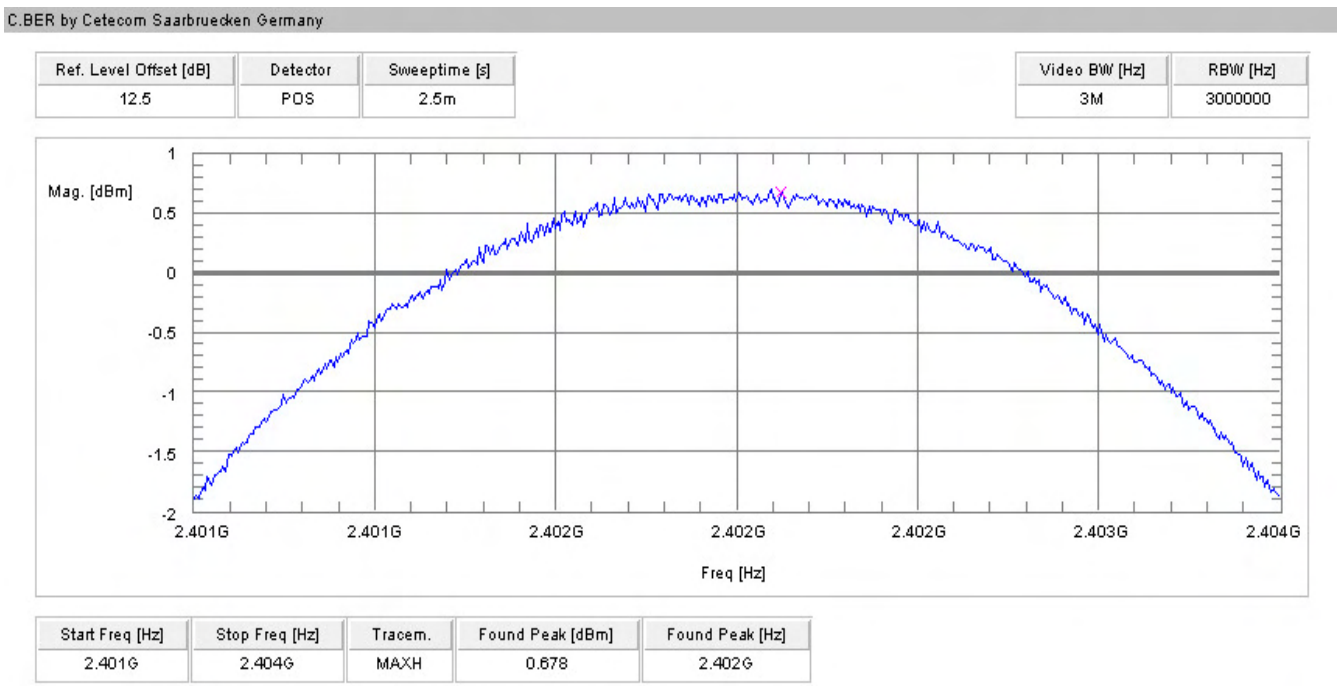
Plot 2: GFSK, middle channel



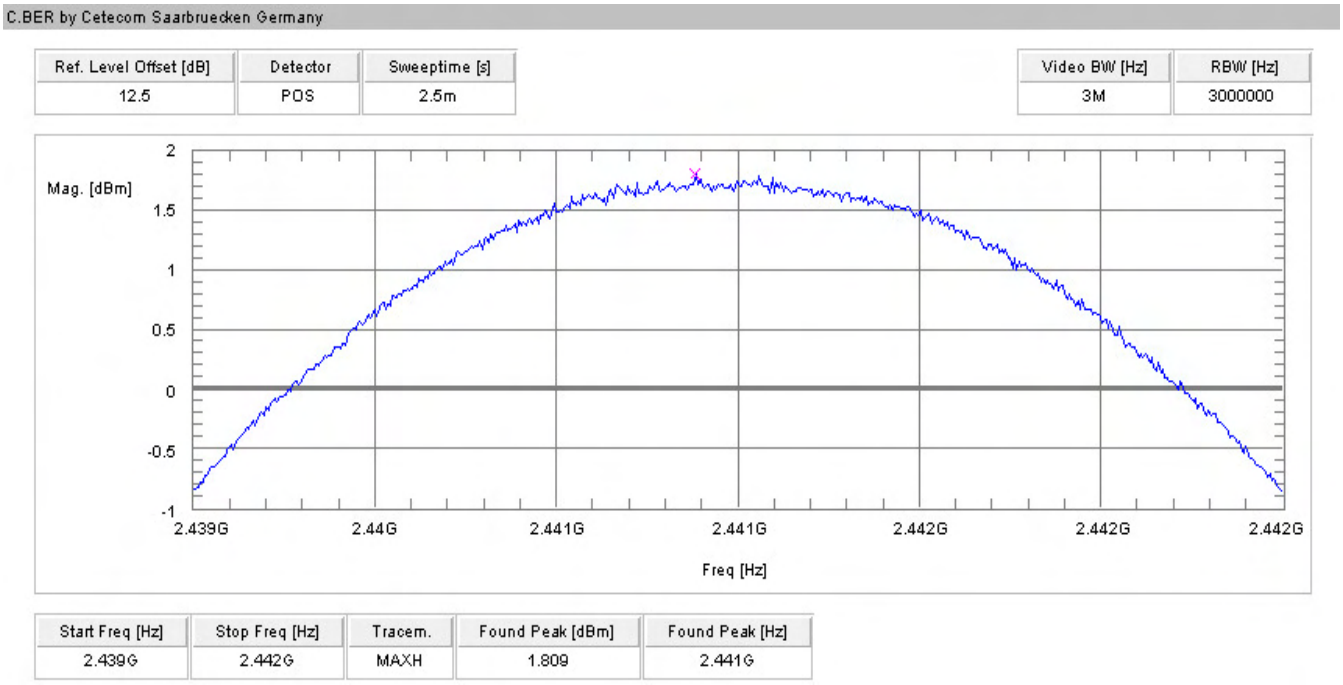
Plot 3: GFSK, highest channel



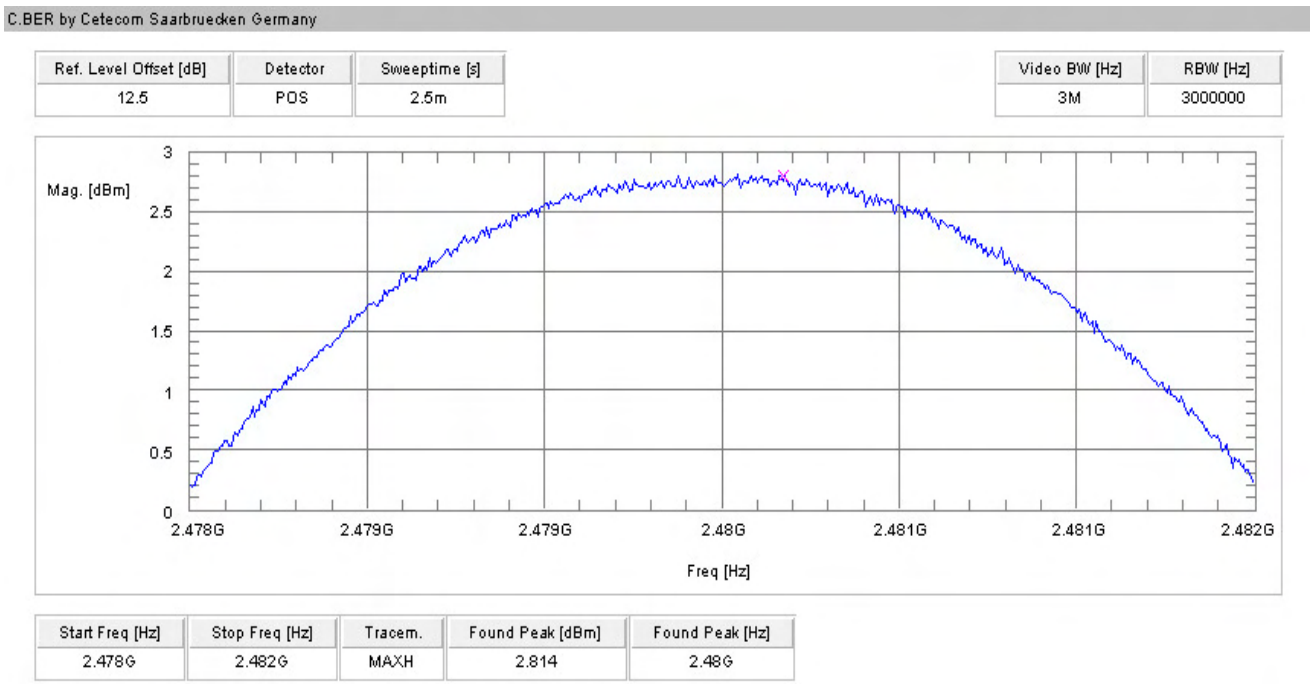
Plot 4: Pi/4 DQPSK, lowest channel



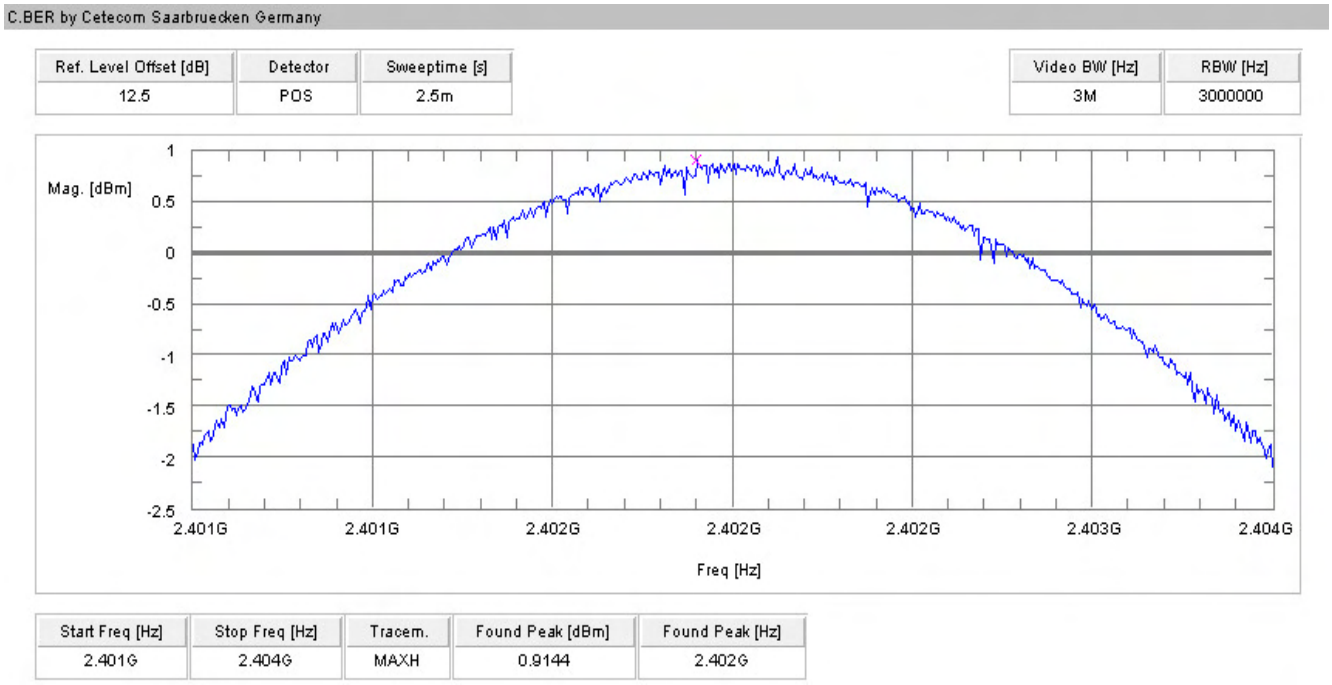
Plot 5: Pi/4 DQPSK, middle channel



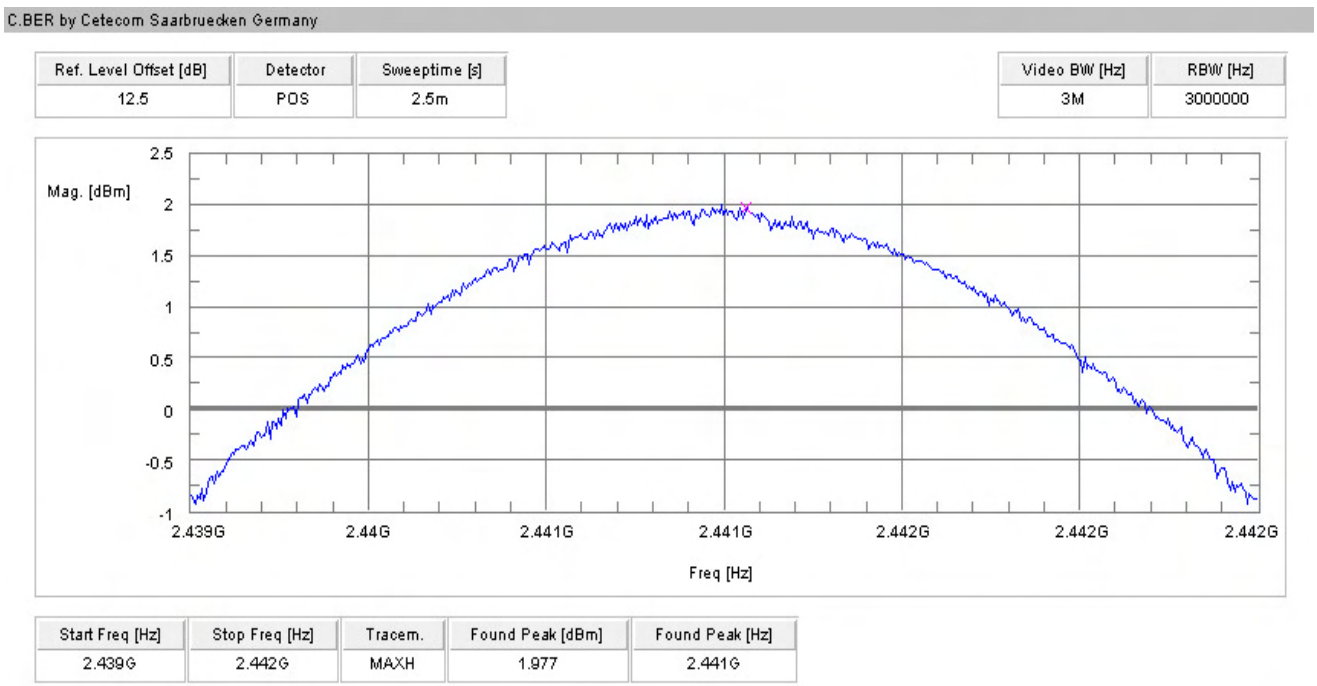
Plot 6: Pi/4 DQPSK, highest channel



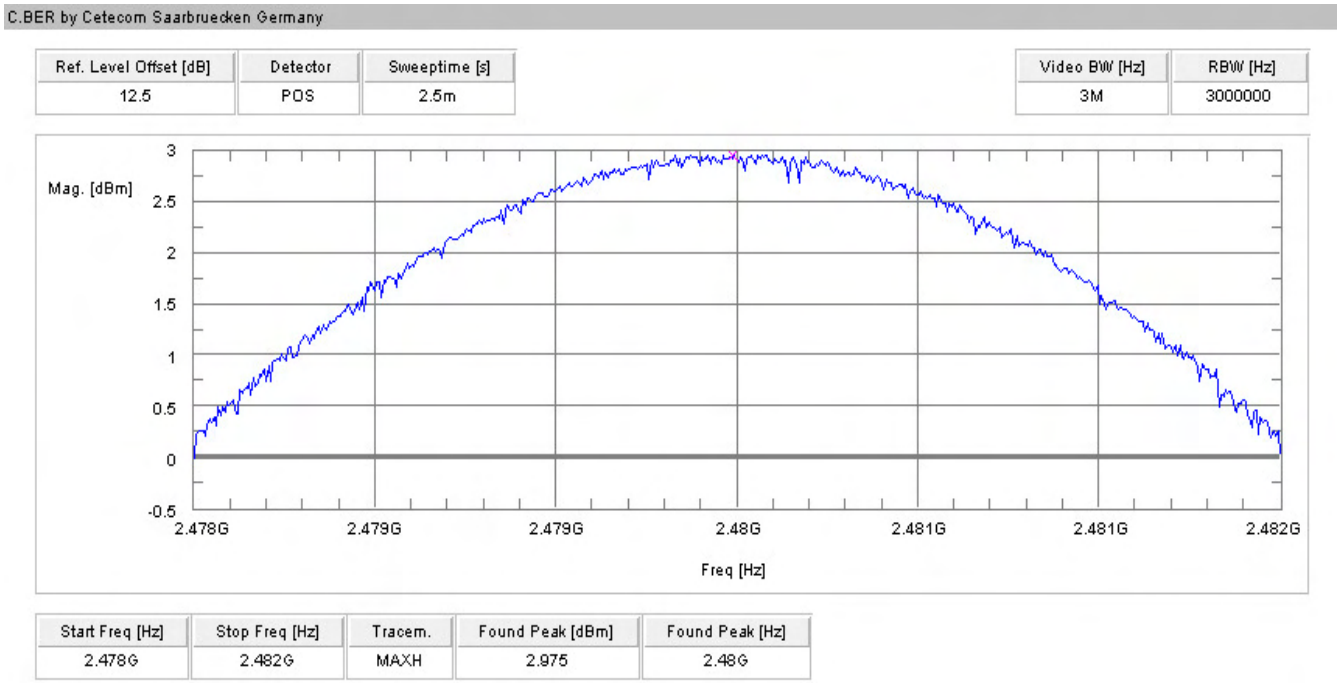
Plot 7: 8DPSK, lowest channel



Plot 8: 8DPSK, middle channel



Plot 9: 8DPSK, highest channel



Results:

Modulation	**Max. peak output power [dBm]**		
Frequency [MHz]	2402	2441	2480
GFSK	3.31	4.44	**5.63**
Pi/4 DQPSK	0.68	1.81	**2.81**
8DPSK	0.91	1.98	**2.98**
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_{nom}	V_{nom}	4.81	6.04	**6.51**
Measurement uncertainty		±3dB		

Modulation: Pi/4 DQPSK

Results:

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T_{nom}	V_{nom}	2.18	3.41	**3.69**
Measurement uncertainty		±3dB		

Modulation: 8 DPSK

Results:

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T_{nom}	V_{nom}	2.41	3.58	**3.86**
Measurement uncertainty		±3dB		

RBW / VBW: 3 MHz
Measured at a distance of 3m

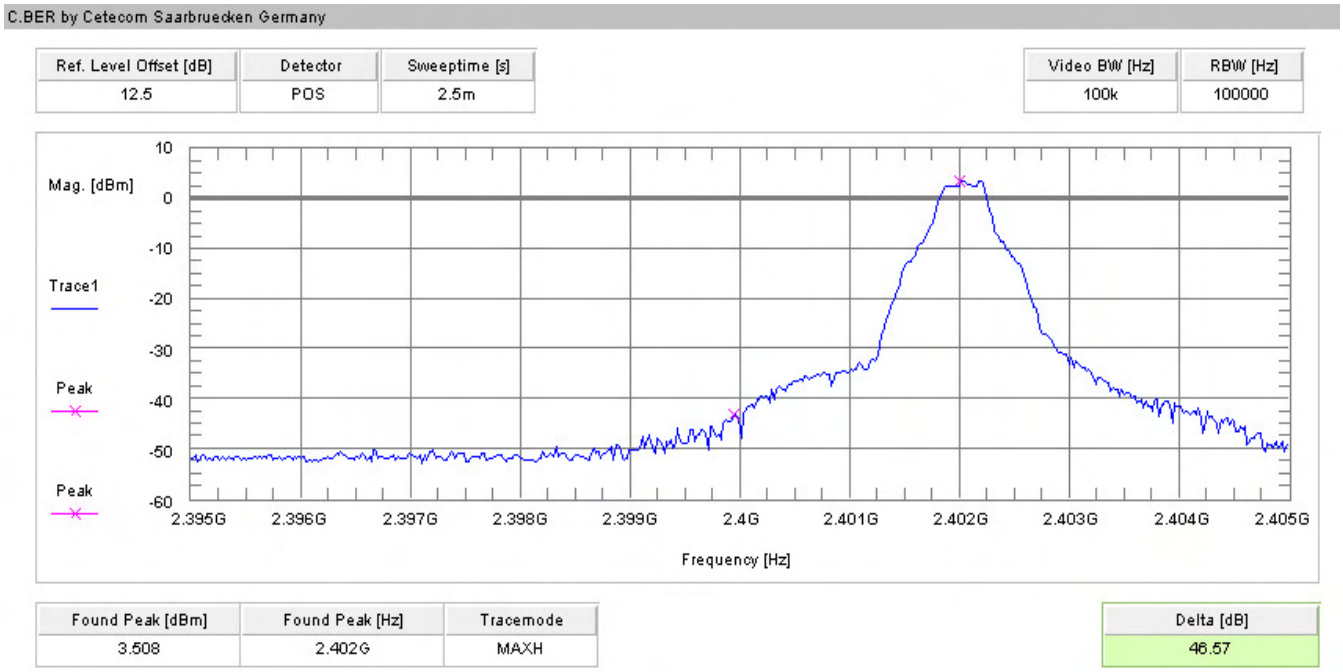
Limits:

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

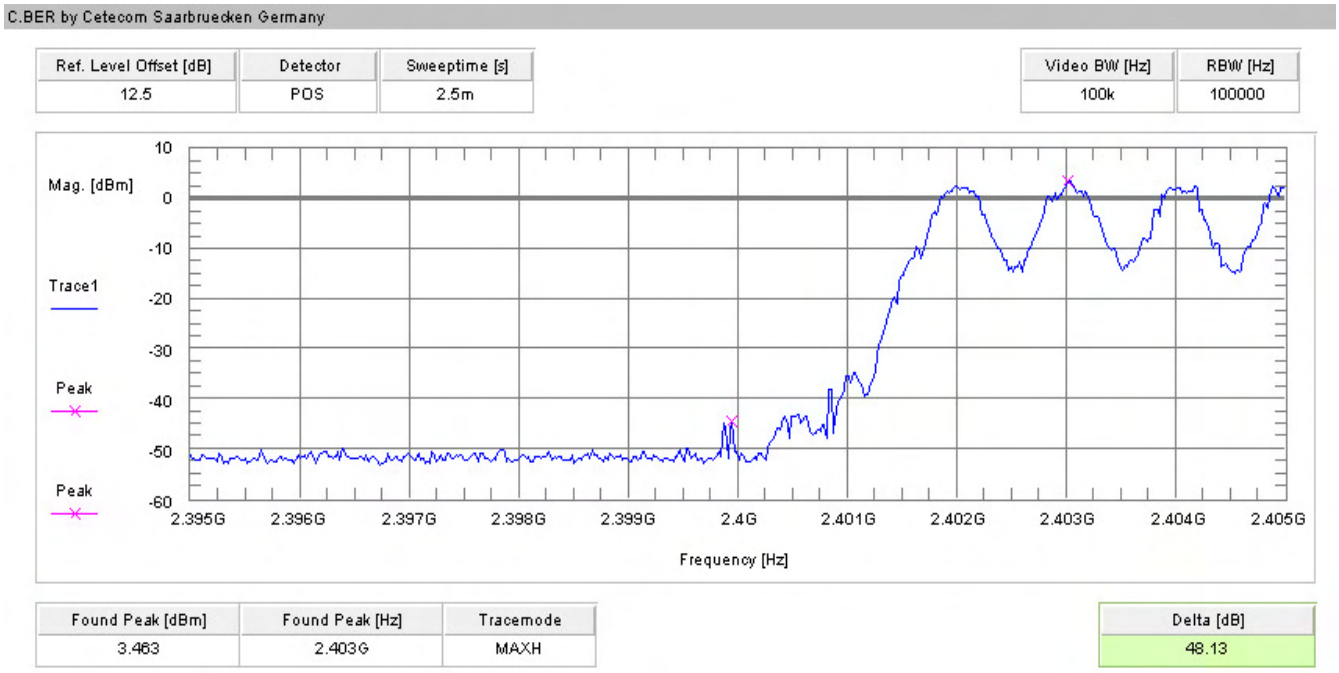
5.12 Band-edge compliance of conducted emissions §15.247 (d)

Modulation: GFSK

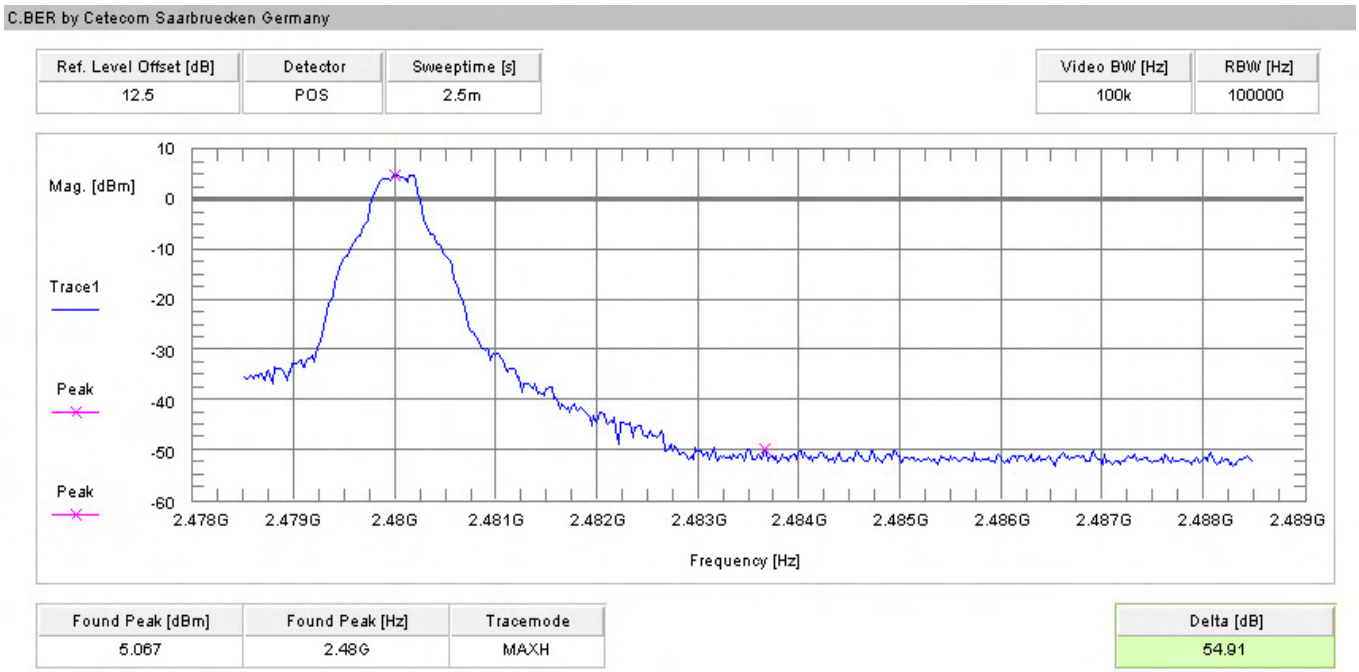
Plot 1 of 4 (hopping off, lowest frequency):



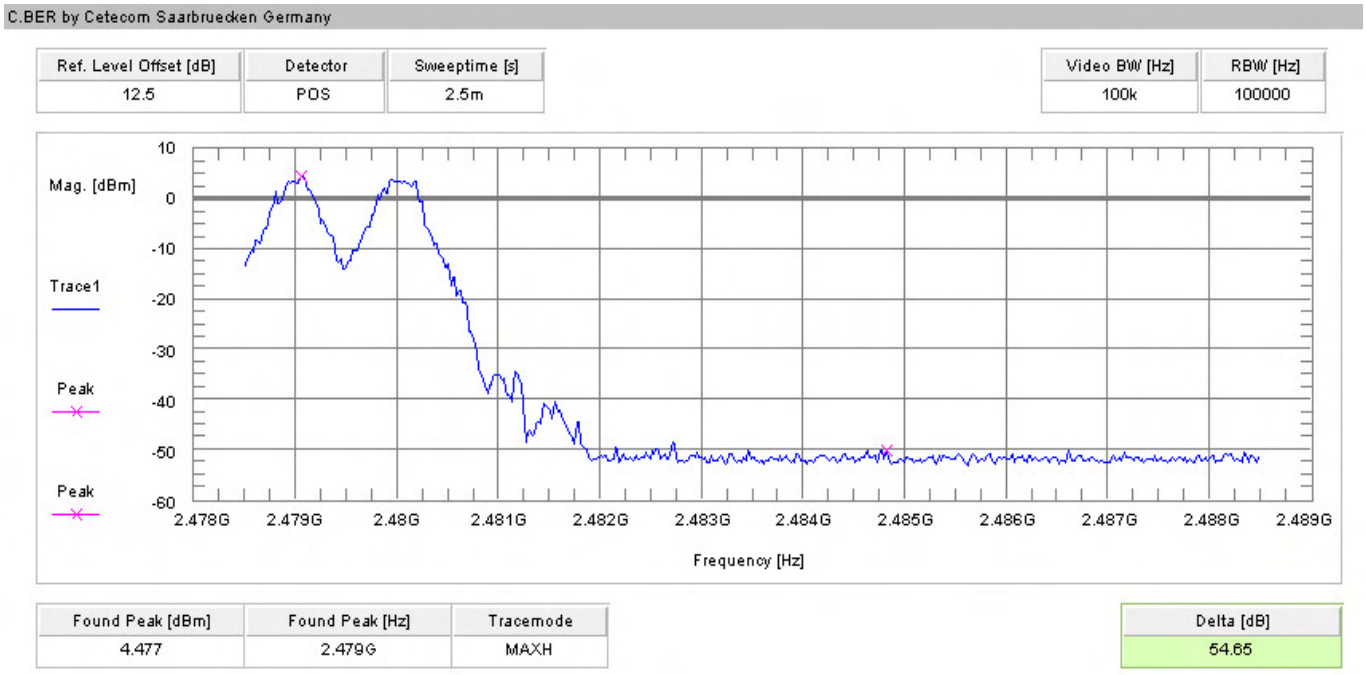
Plot 2 of 4 (hopping on, lowest frequency):



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



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

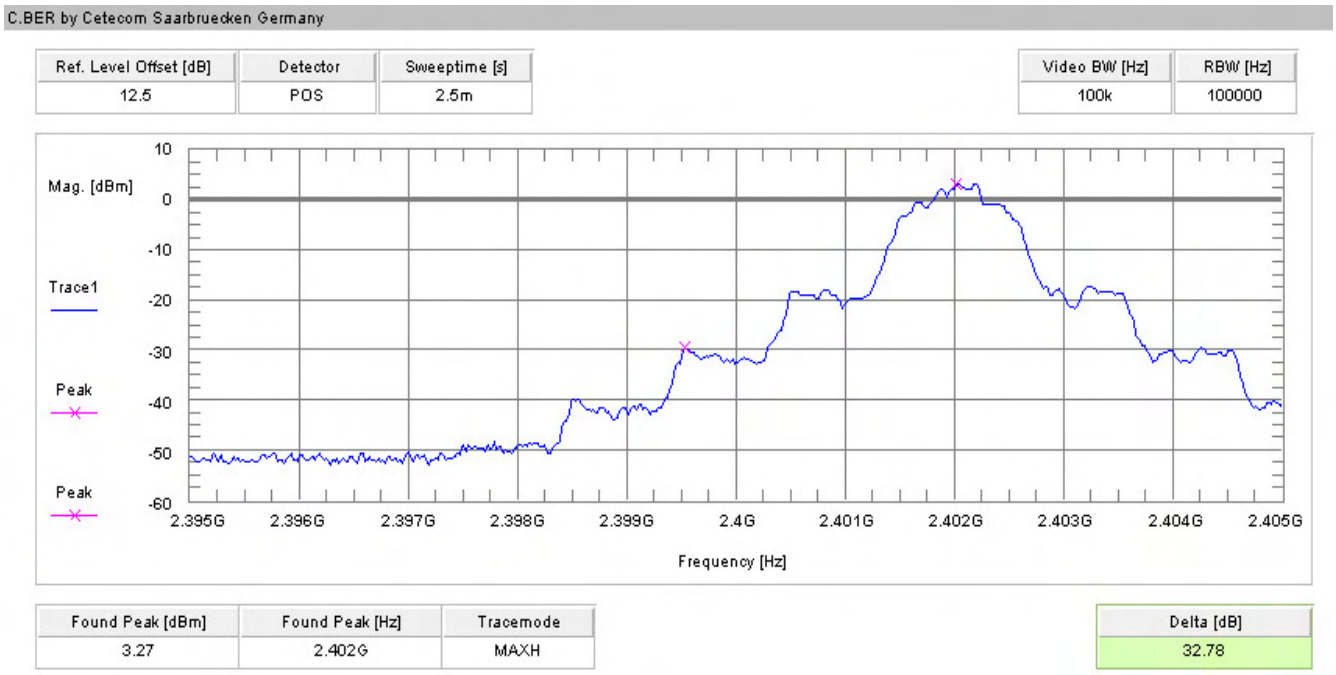


Results:

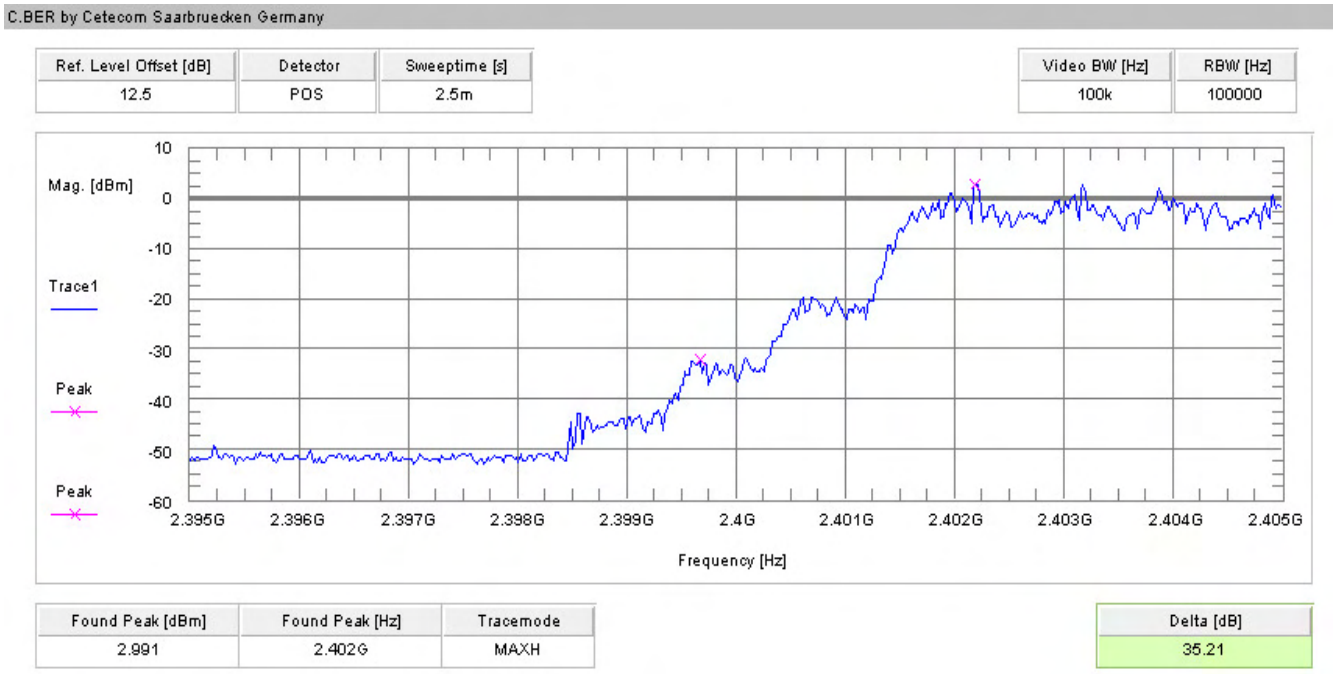
SZENARIO	DELTA VALUE [DB]
hopping off, lowest frequency	> 20 dB
hopping on, lowest frequency	> 20 dB
hopping off, highest frequency	> 20 dB
hopping on, highest frequency	> 20 dB
Measurement uncertainty	±1,5dB

Modulation: Pi/4 DQPSK

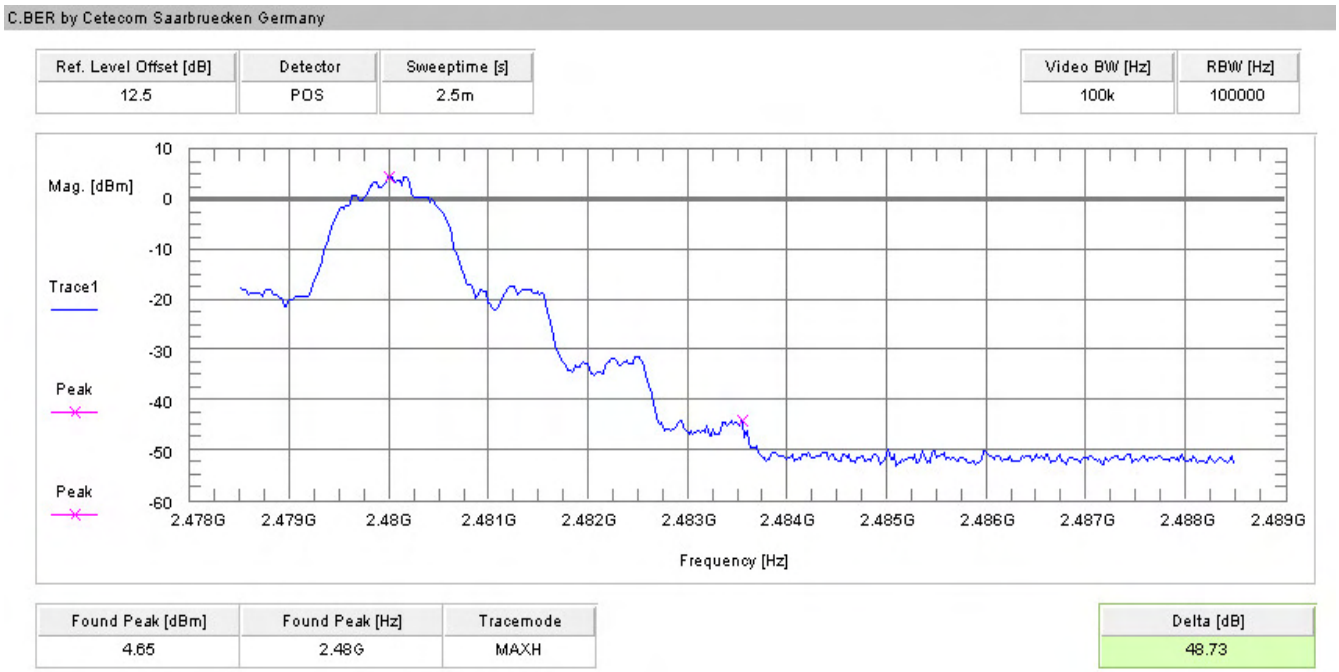
Plot 1 of 4 (hopping off, lowest frequency):



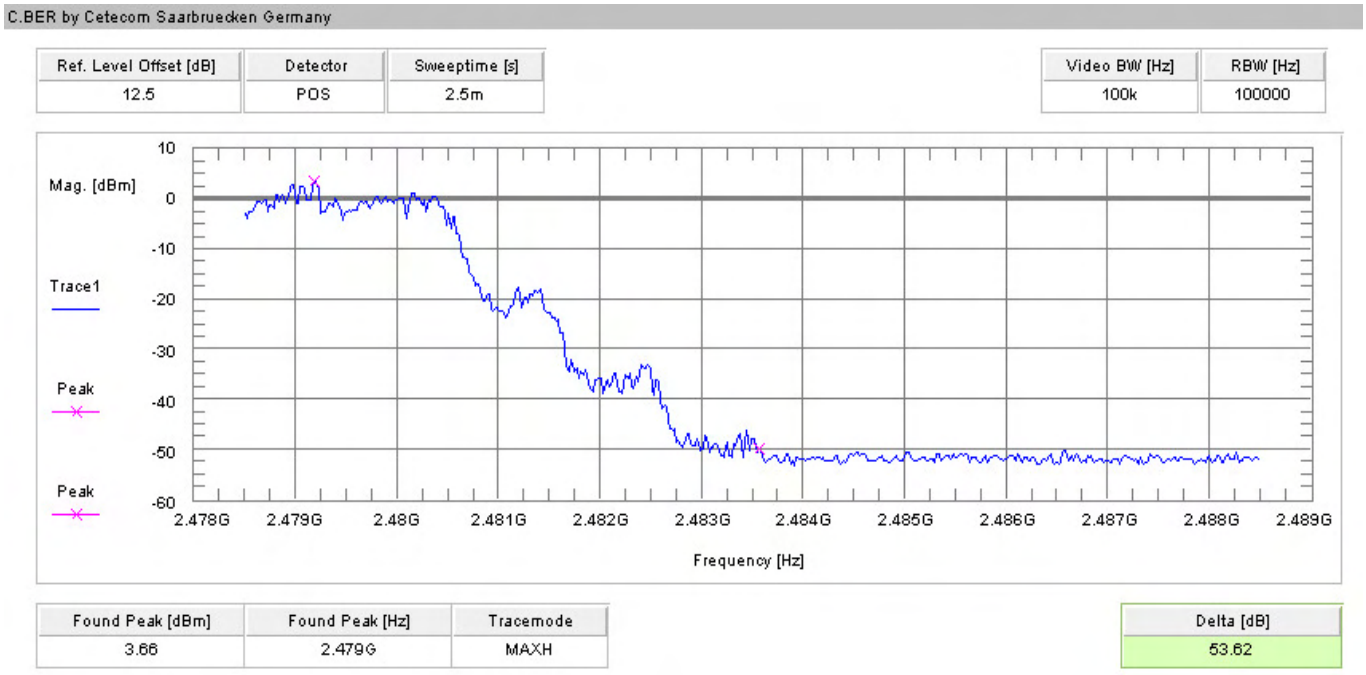
Plot 2 of 4 (hopping on, lowest frequency):



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



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

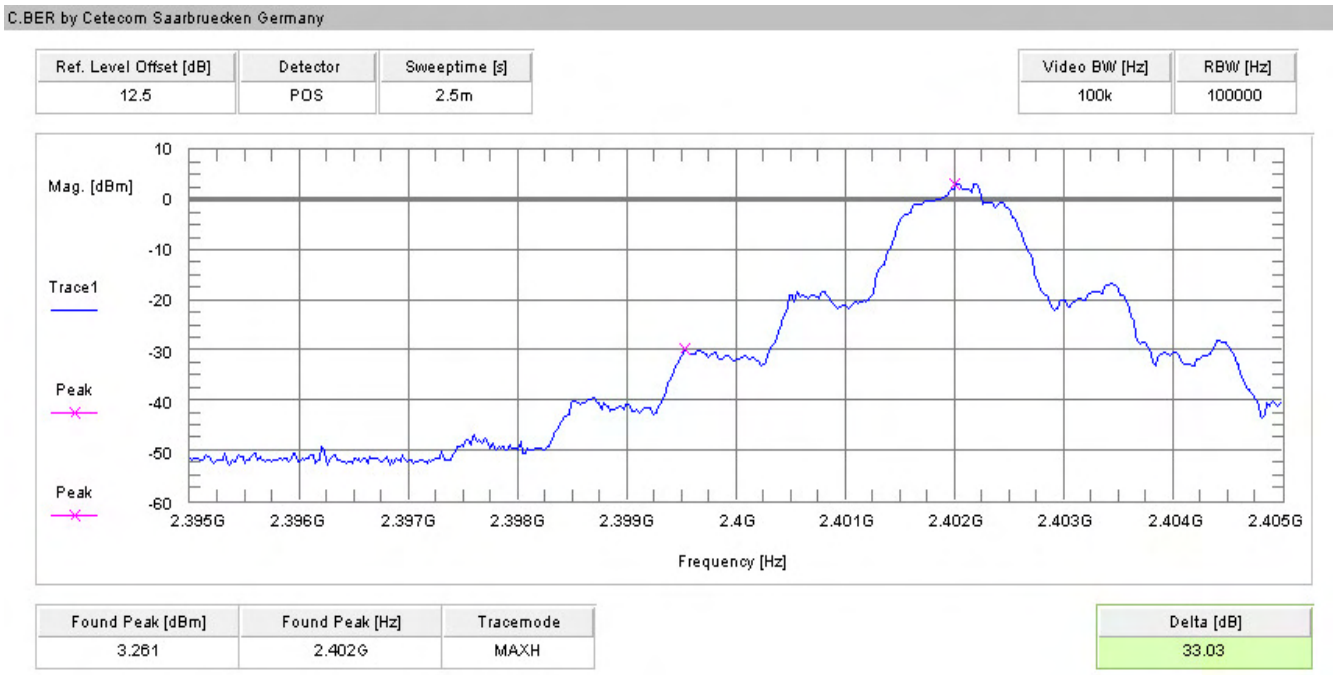


Results:

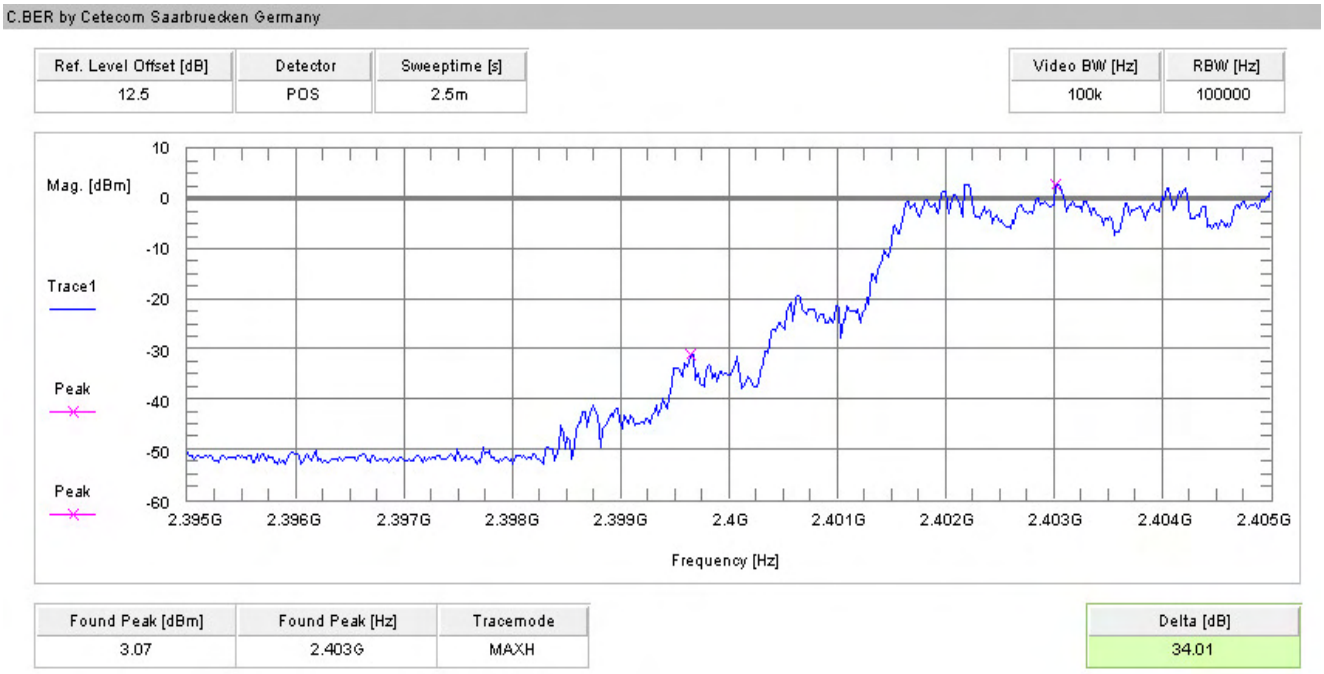
SZENARIO	DELTA VALUE [DB]
hopping off, lowest frequency	> 20 dB
hopping on, lowest frequency	> 20 dB
hopping off, highest frequency	> 20 dB
hopping on, highest frequency	> 20 dB
Measurement uncertainty	±1,5dB

Modulation: 8 DPSK

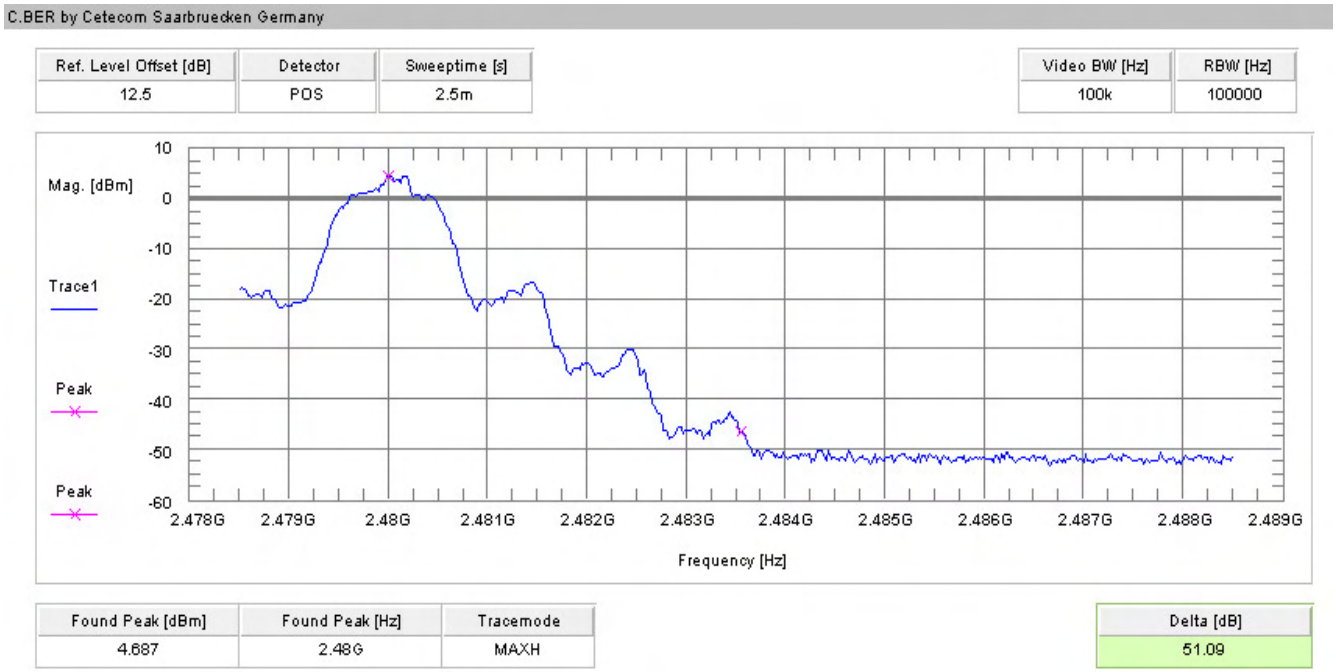
Plot 1 of 4 (hopping off, lowest frequency):



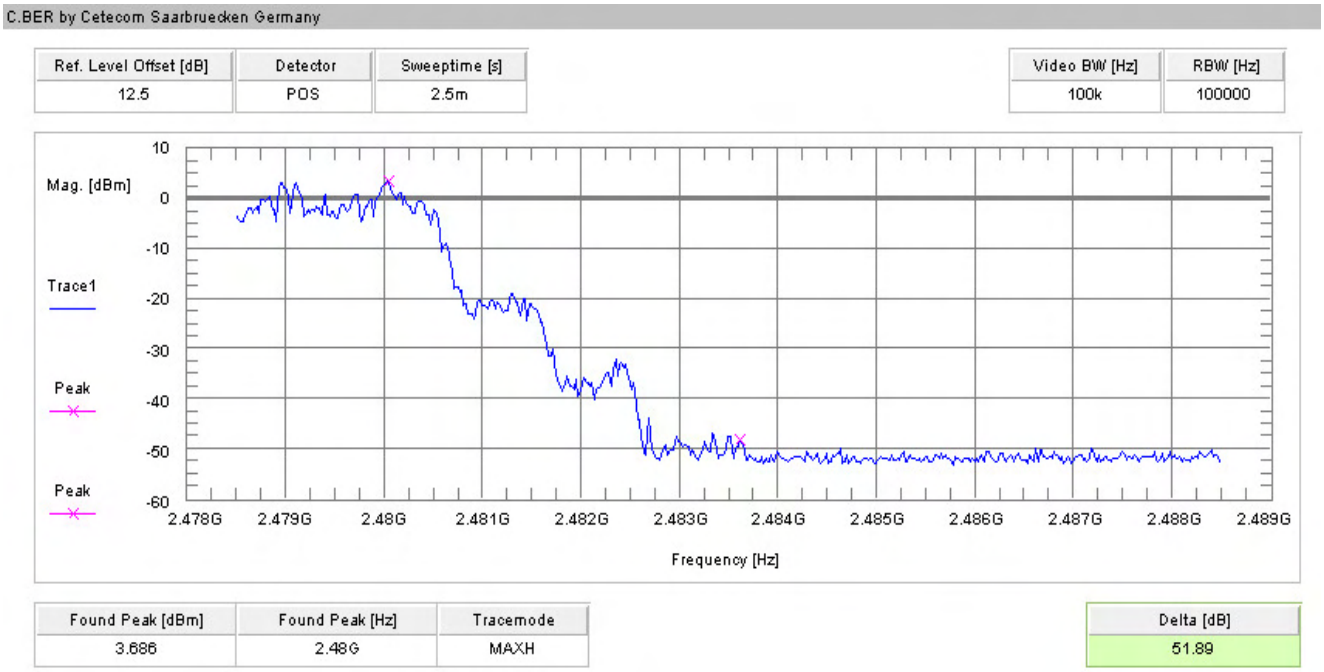
Plot 2 of 4 (hopping on, lowest frequency):



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



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



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

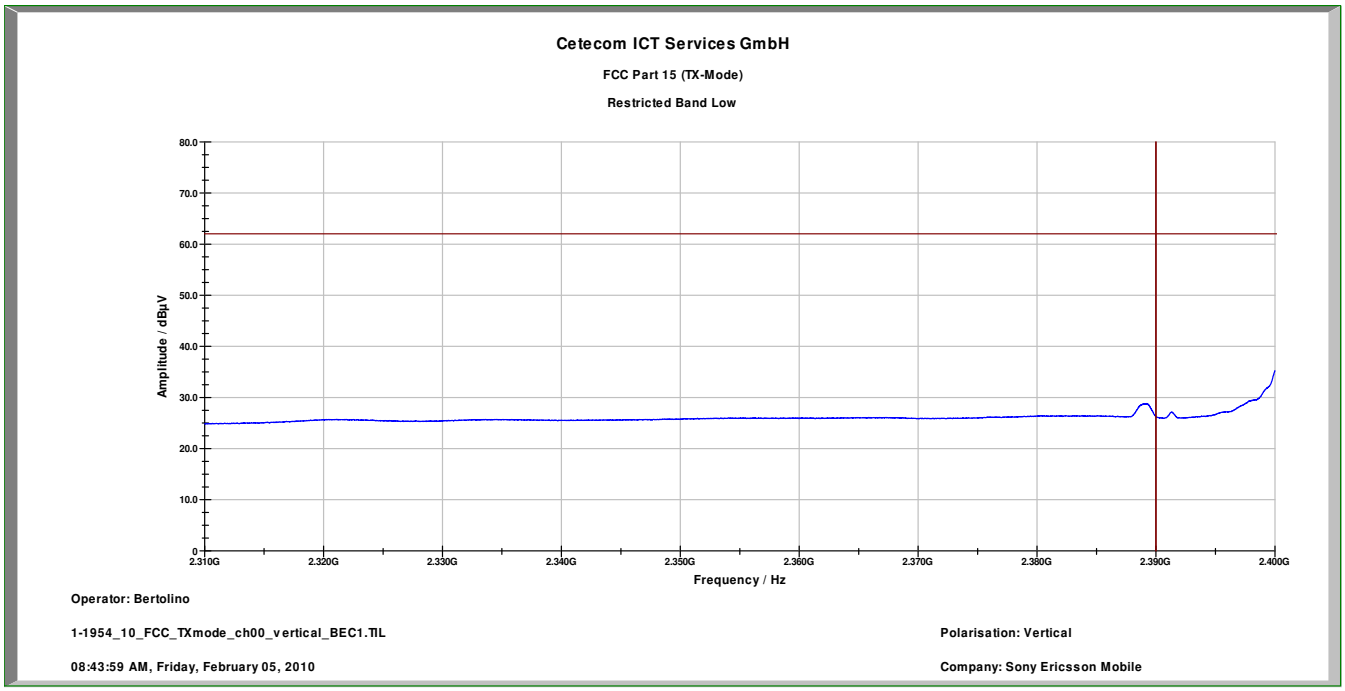
Limits:

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)).

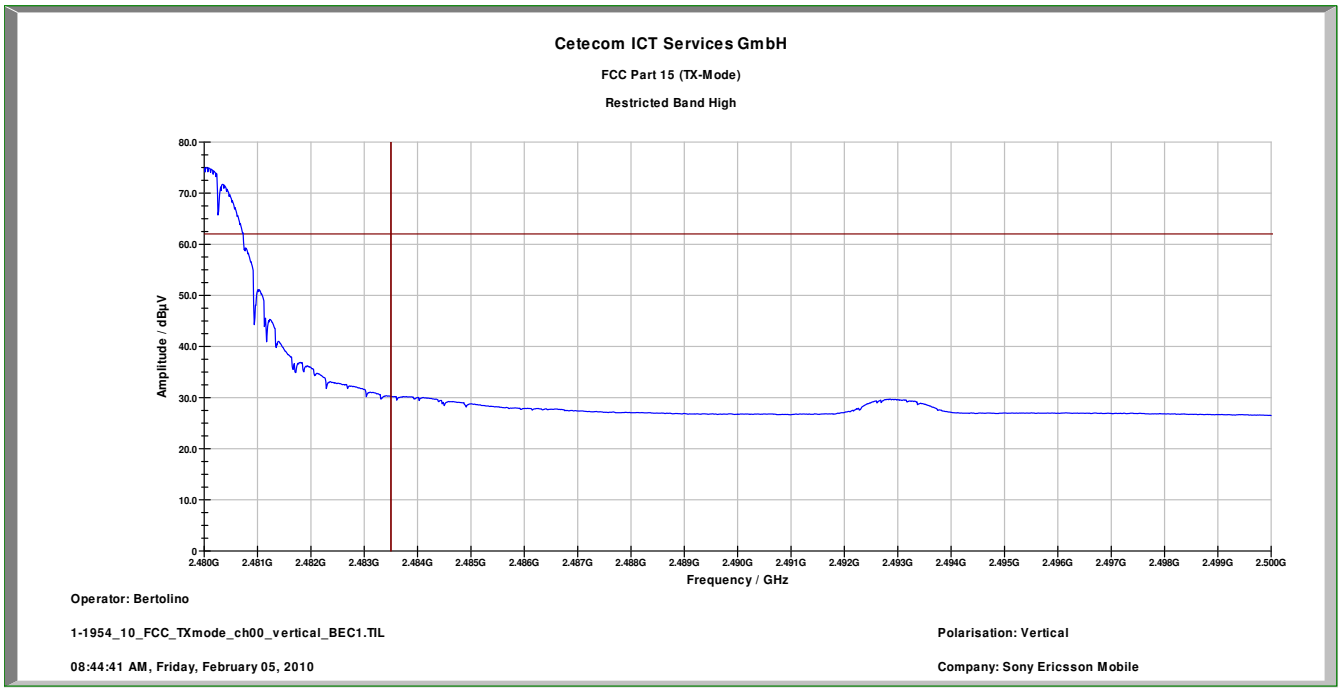
5.13 Band-edge compliance of radiated emissions §15.205

Modulation: GFSK

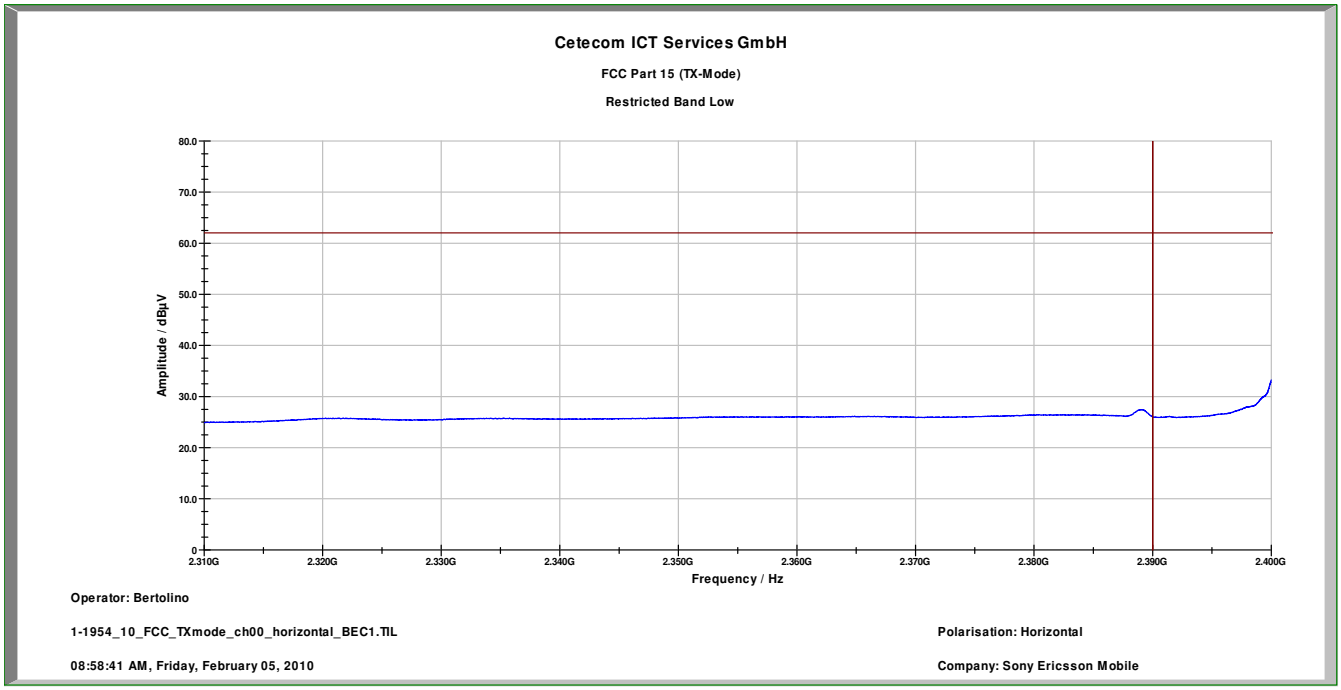
Plot 1: Restricted Bands low, vertical polarization



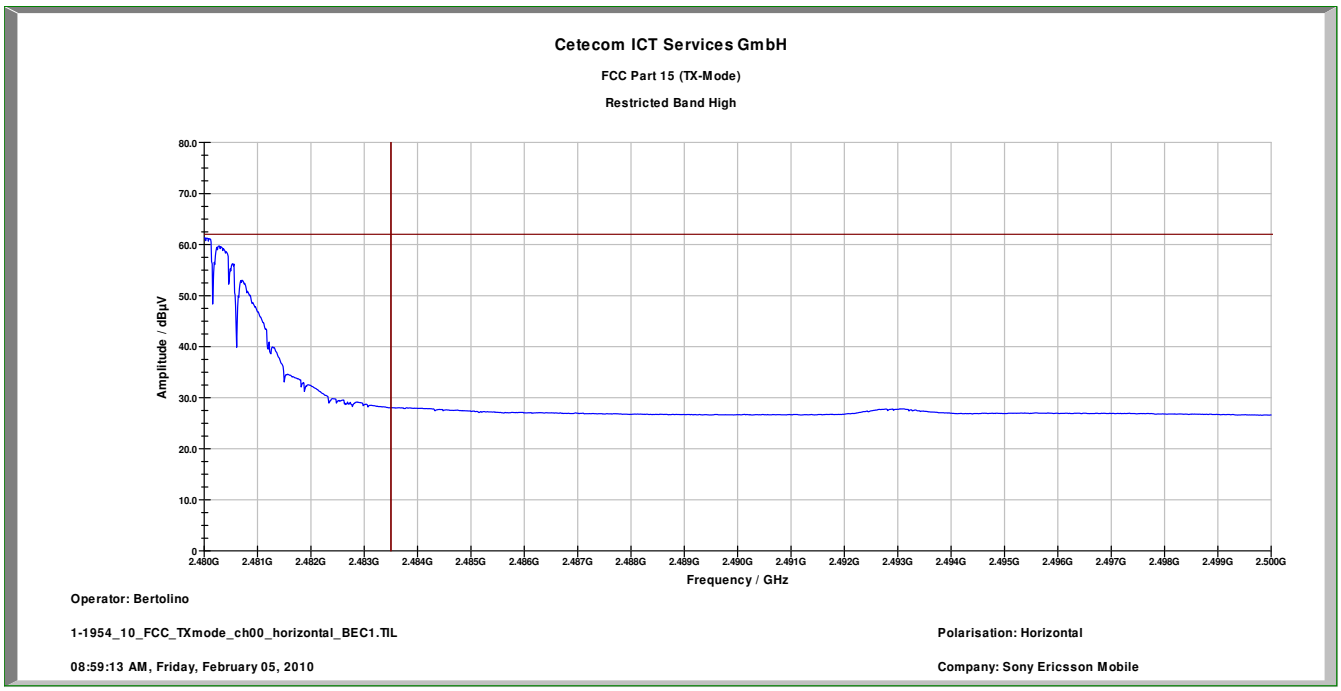
Plot 2: Restricted Bands high, vertical polarization



Plot 3: Restricted Bands low, horizontal polarization

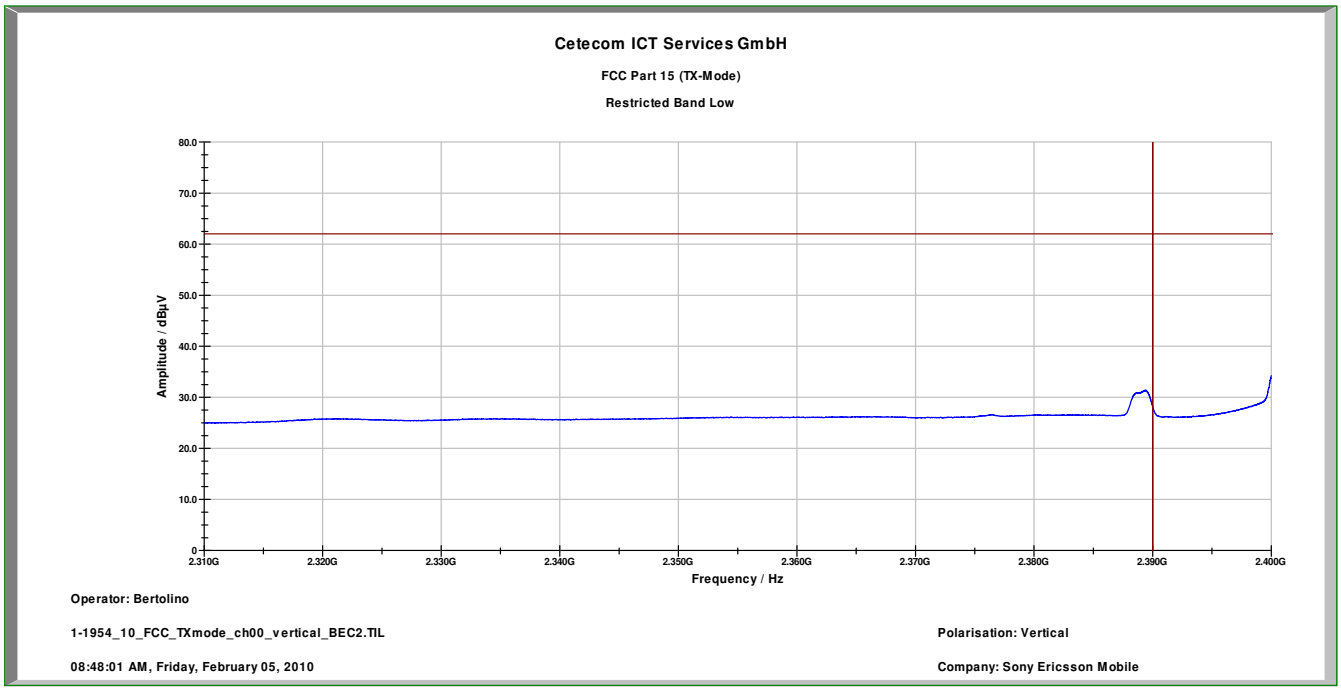


Plot 4: Restricted Bands high, horizontal polarization

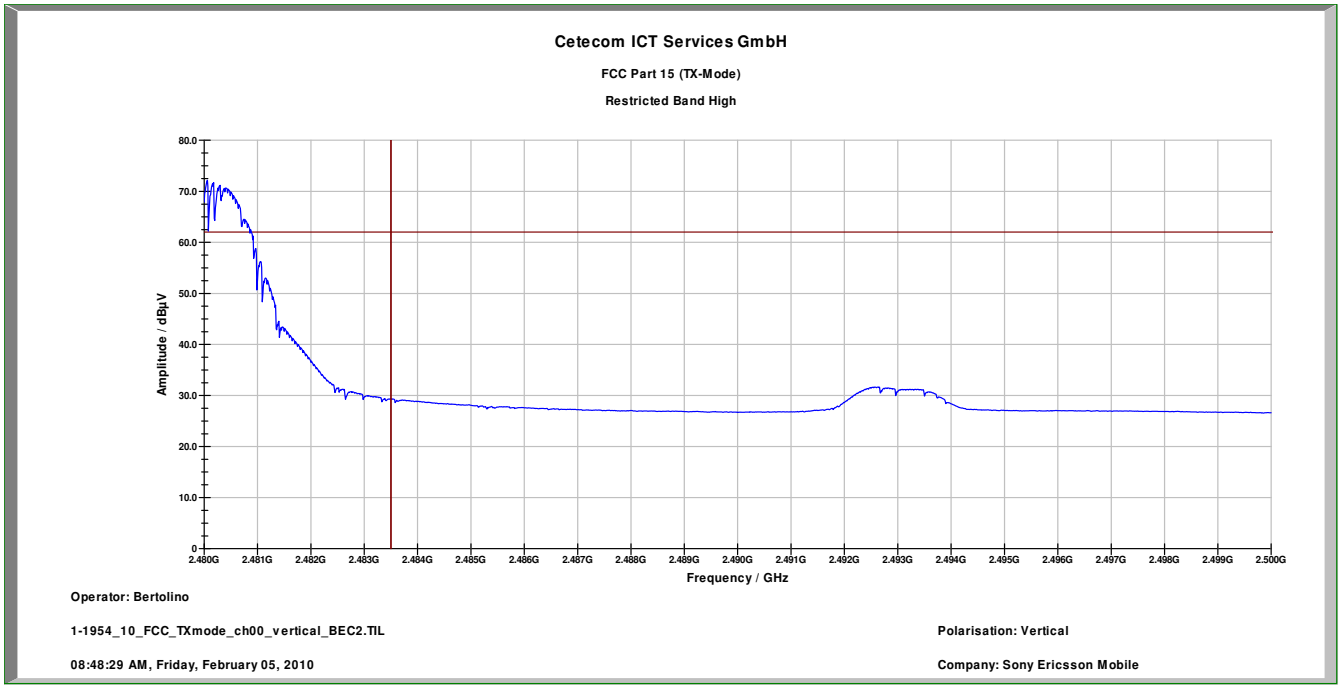


Modulation: Pi/4 DQPSK

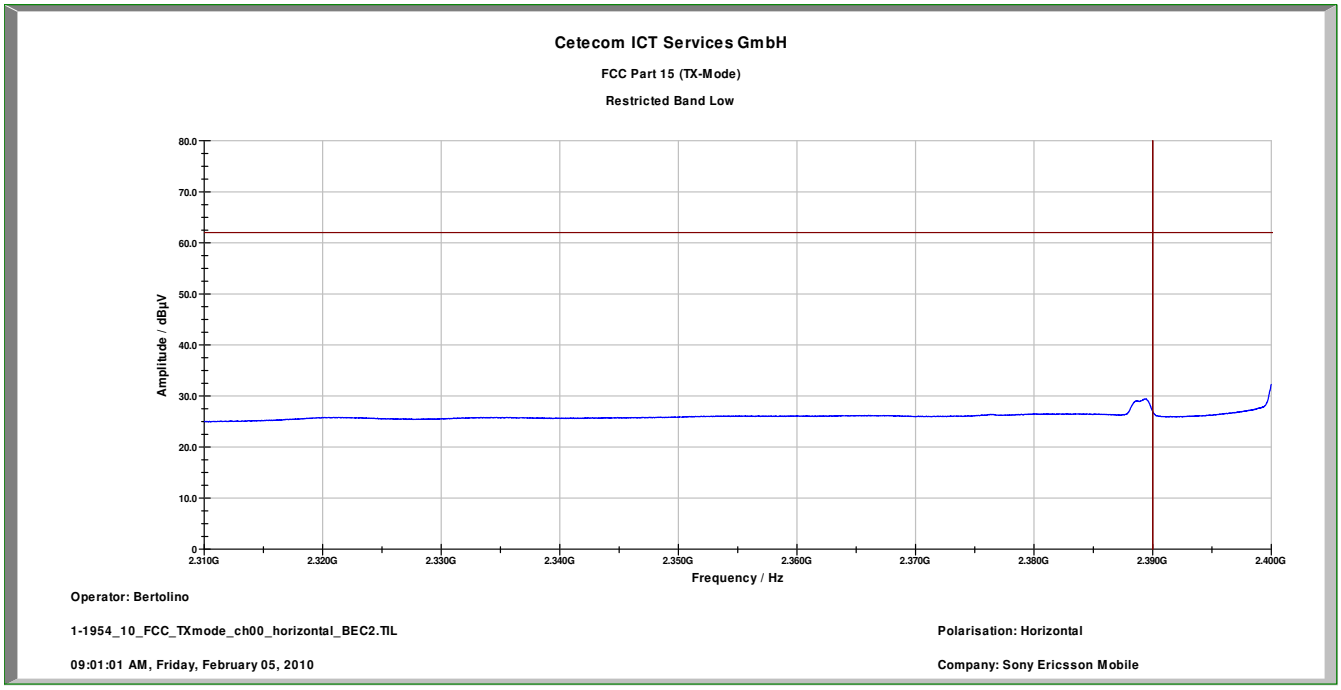
Plot 1: Restricted Bands low, vertical polarization



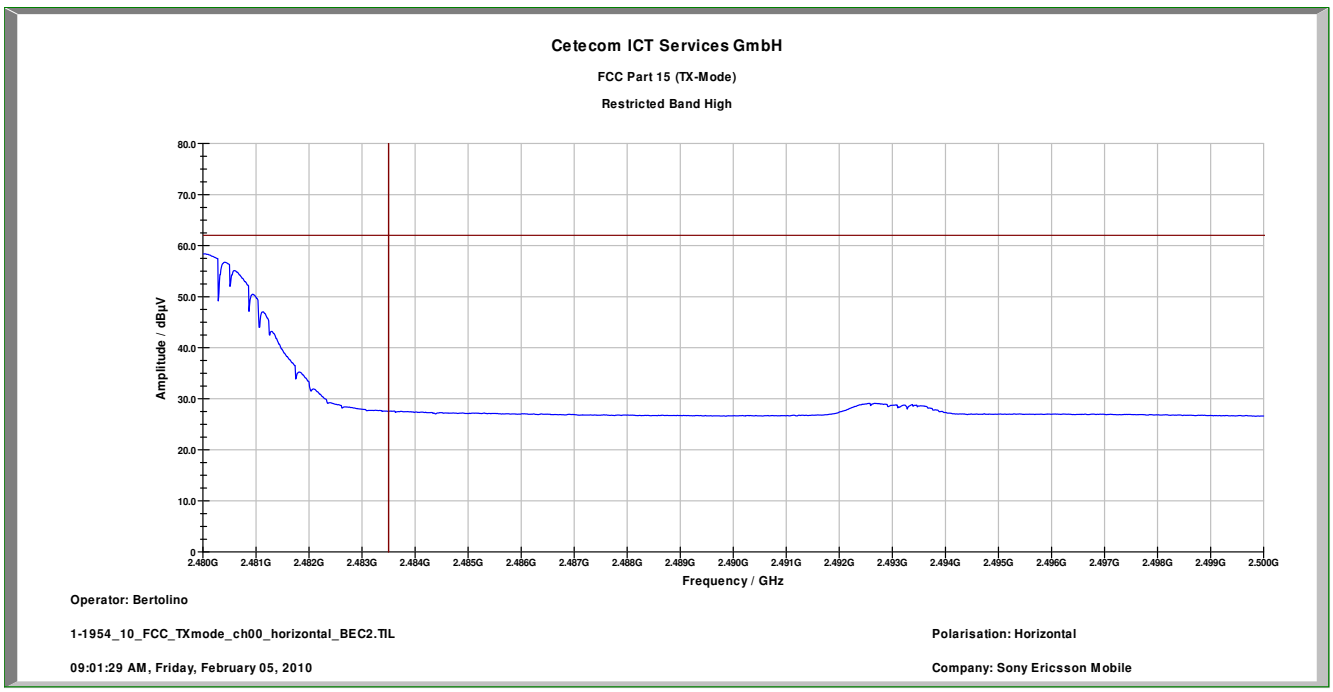
Plot 2: Restricted Bands high, vertical polarization



Plot 3: Restricted Bands low, horizontal polarization

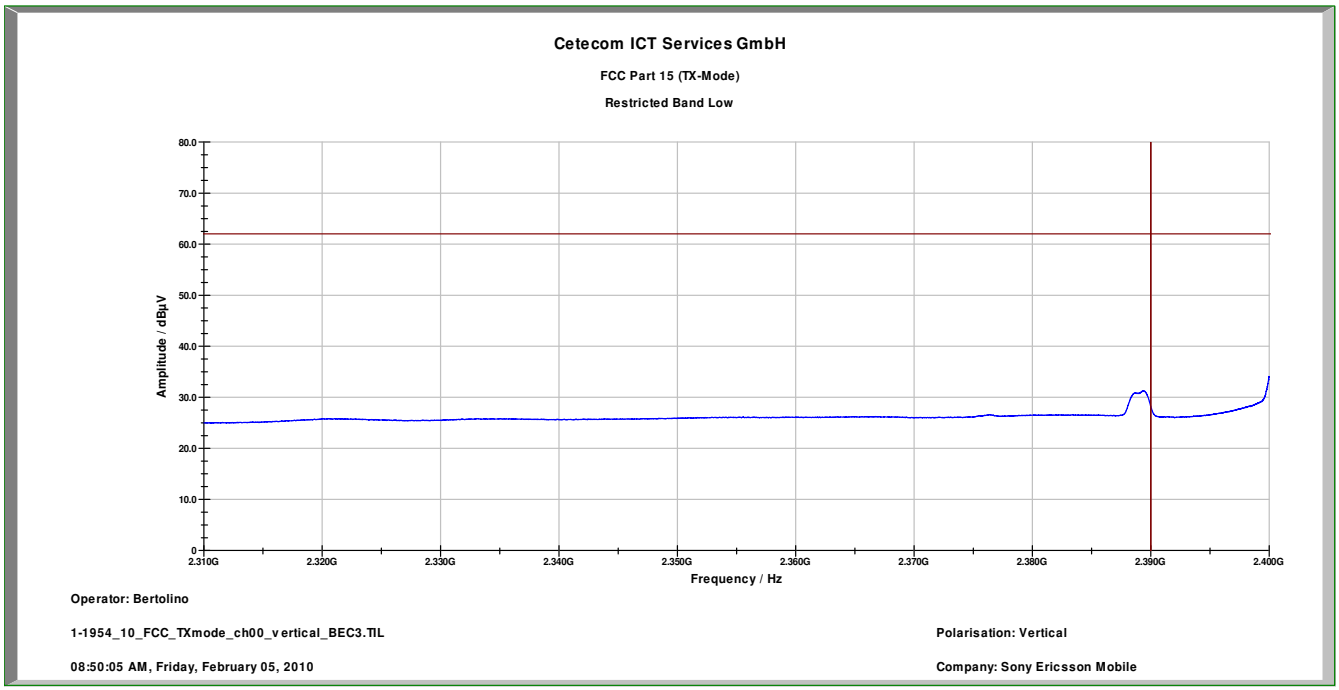


Plot 4: Restricted Bands high, horizontal polarization

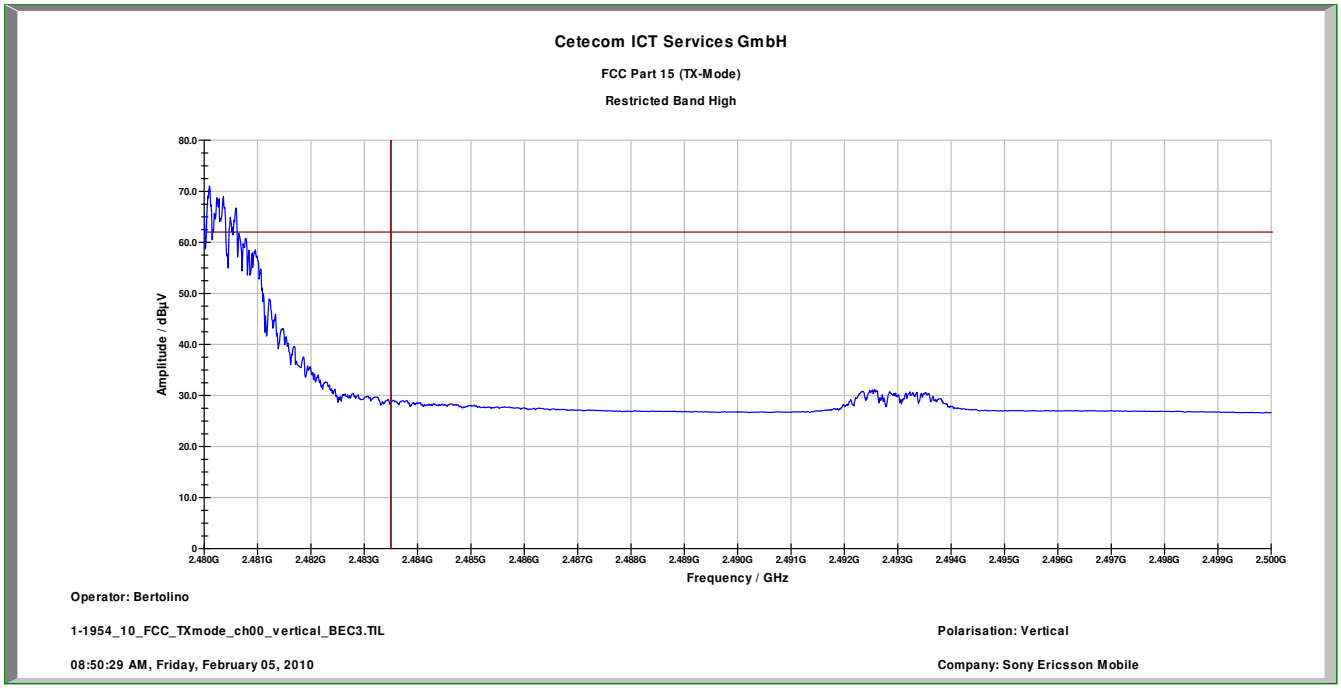


Modulation: 8 DPSK

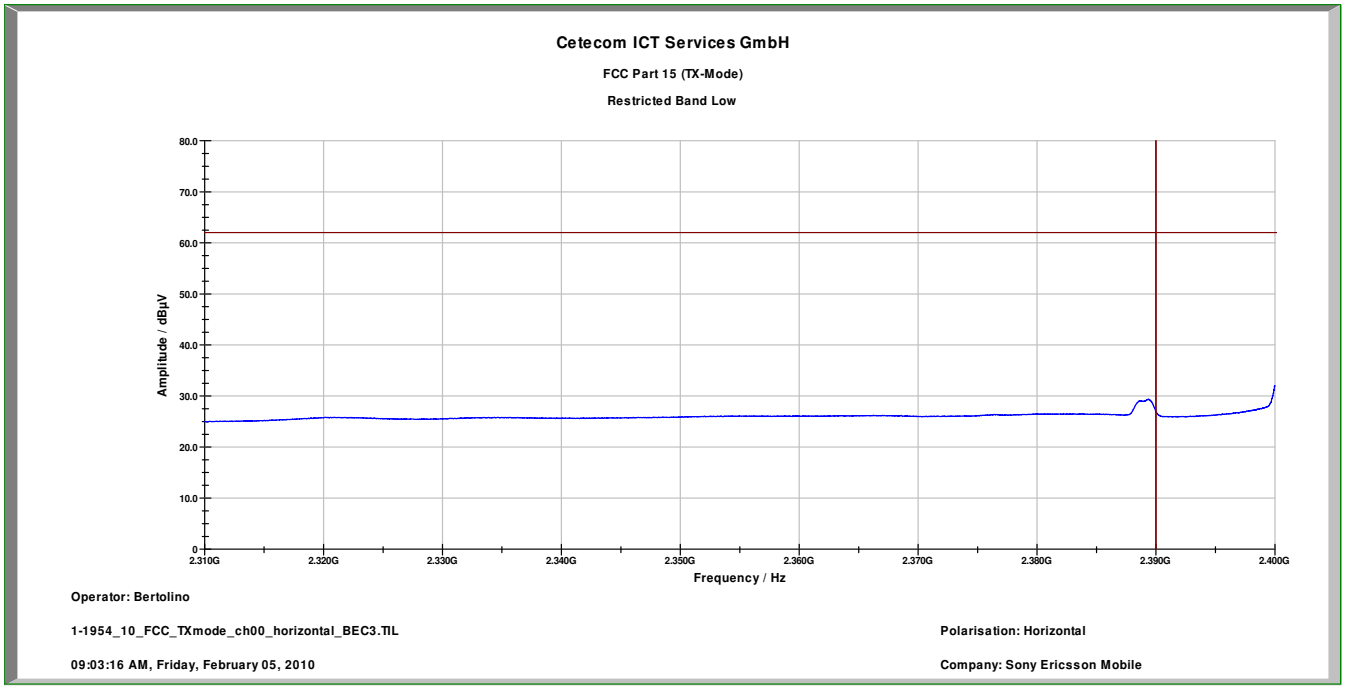
Plot 1: Restricted Bands low, vertical polarization



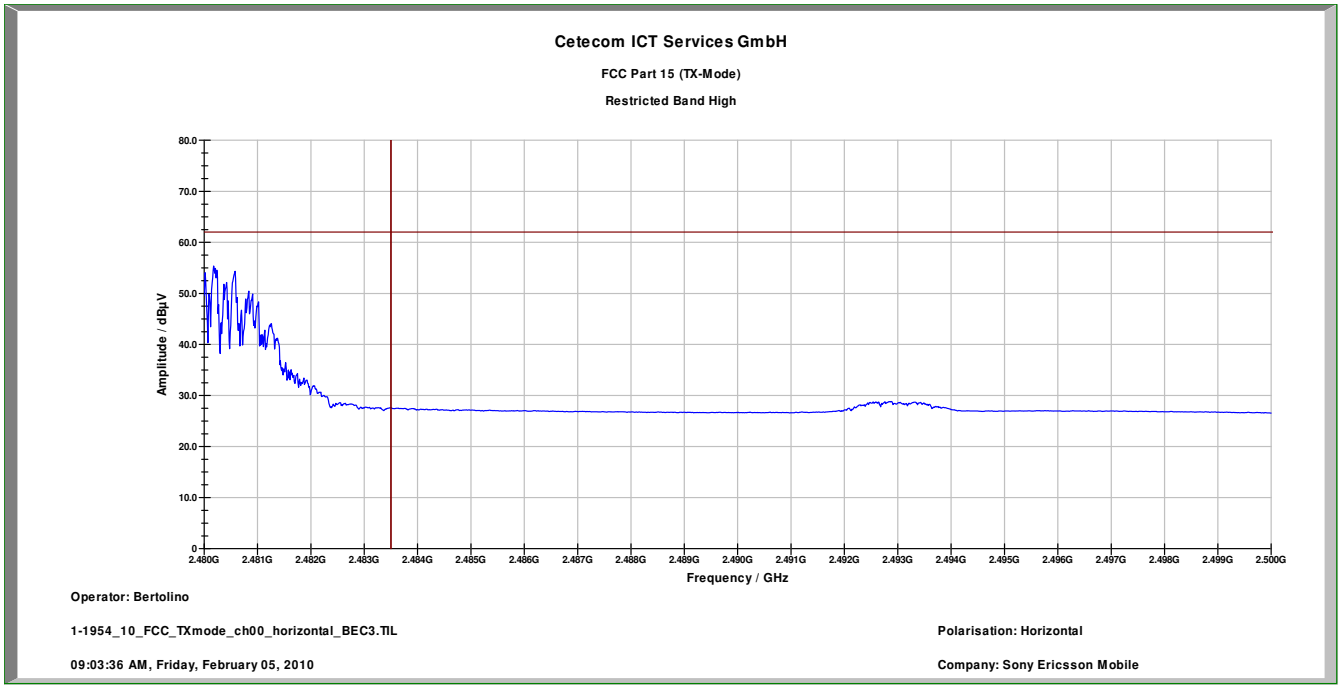
Plot 2: Restricted Bands high, vertical polarization



Plot 3: Restricted Bands low, horizontal polarization



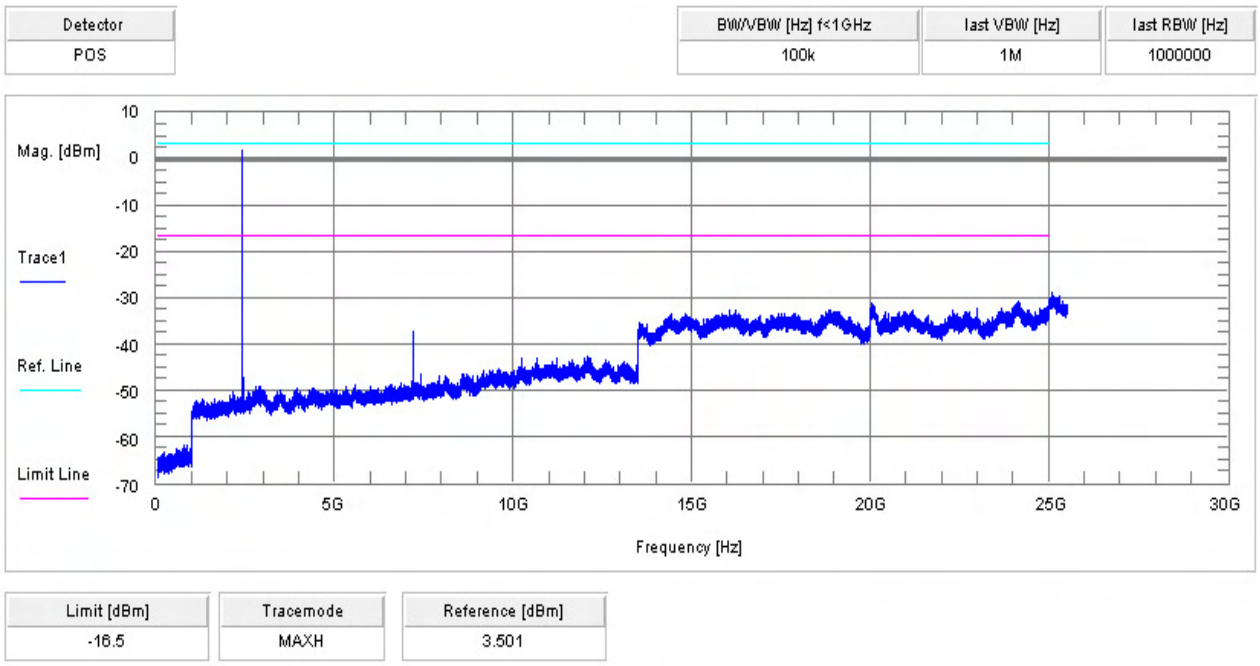
Plot 4: Restricted Bands high, horizontal polarization



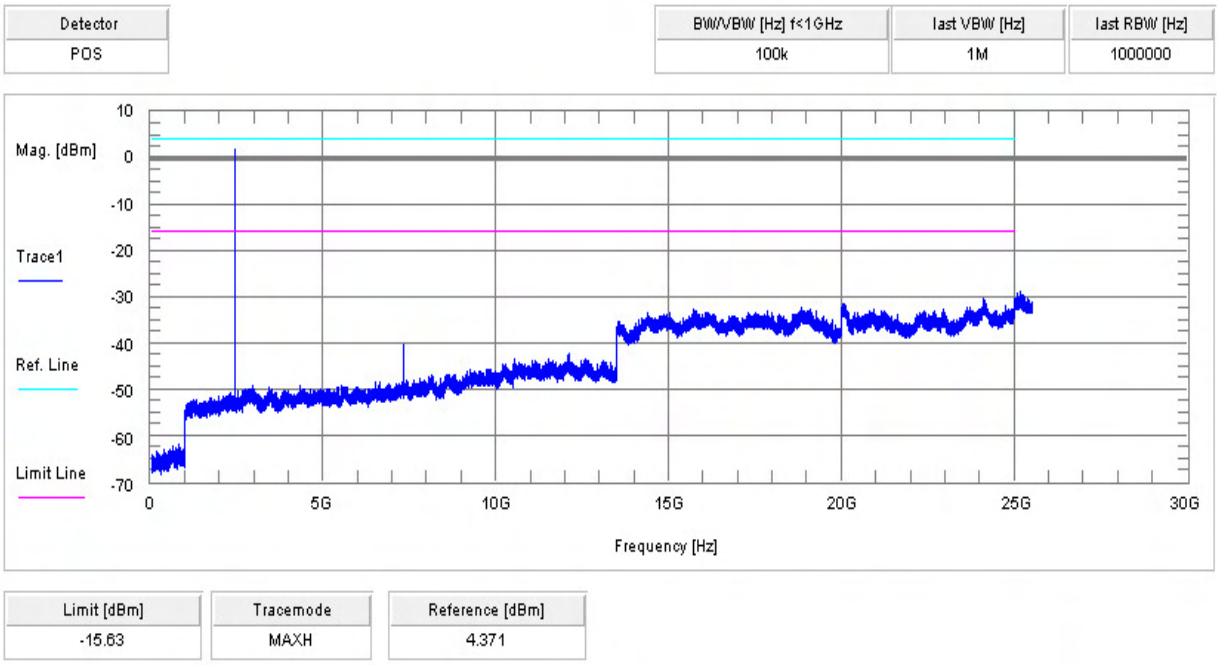
5.14 Spurious Emissions - conducted (Transmitter) § 15.247 (c)(1)

Modulation: GFSK

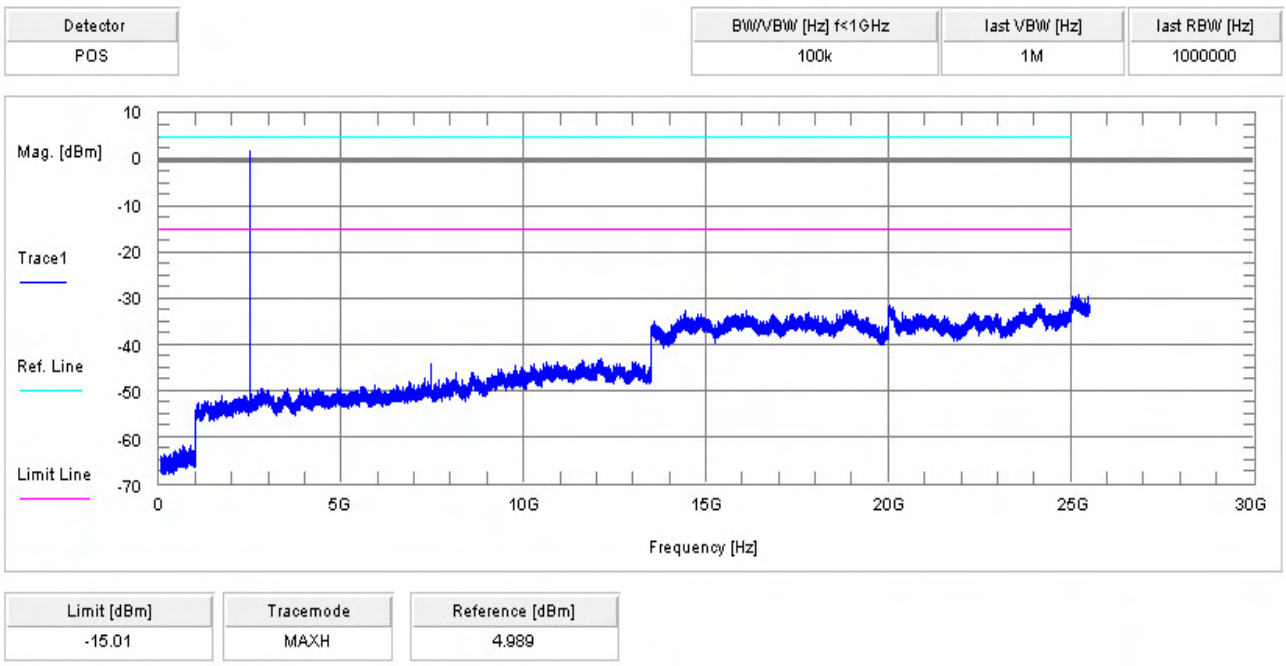
Plot 1 of 3: lowest channel



Plot 2 of 3: middle channel



Plot 3 of 3: highest channel



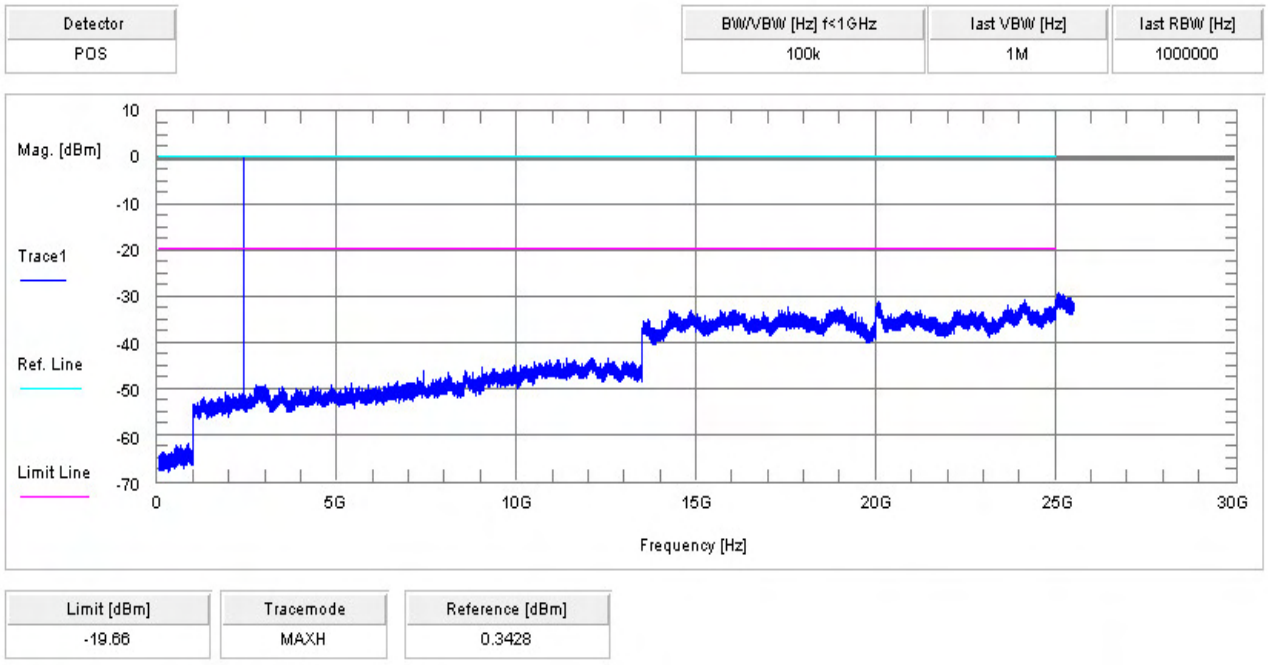
Result & Limits:

Emission Limitation					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		3.50	30 dBm		Operating frequency
No critical peaks detected! All emissions are below the 20 dBc criteria!			-20 dBc		complies
2441		4.37	30 dBm		Operating frequency
No critical peaks detected! All emissions are below the 20 dBc criteria!			-20 dBc		complies
2480		4.99	30 dBm		Operating frequency
No critical peaks detected! All emissions are below the 20 dBc criteria!			-20 dBc		complies
Measurement uncertainty		± 3dB			

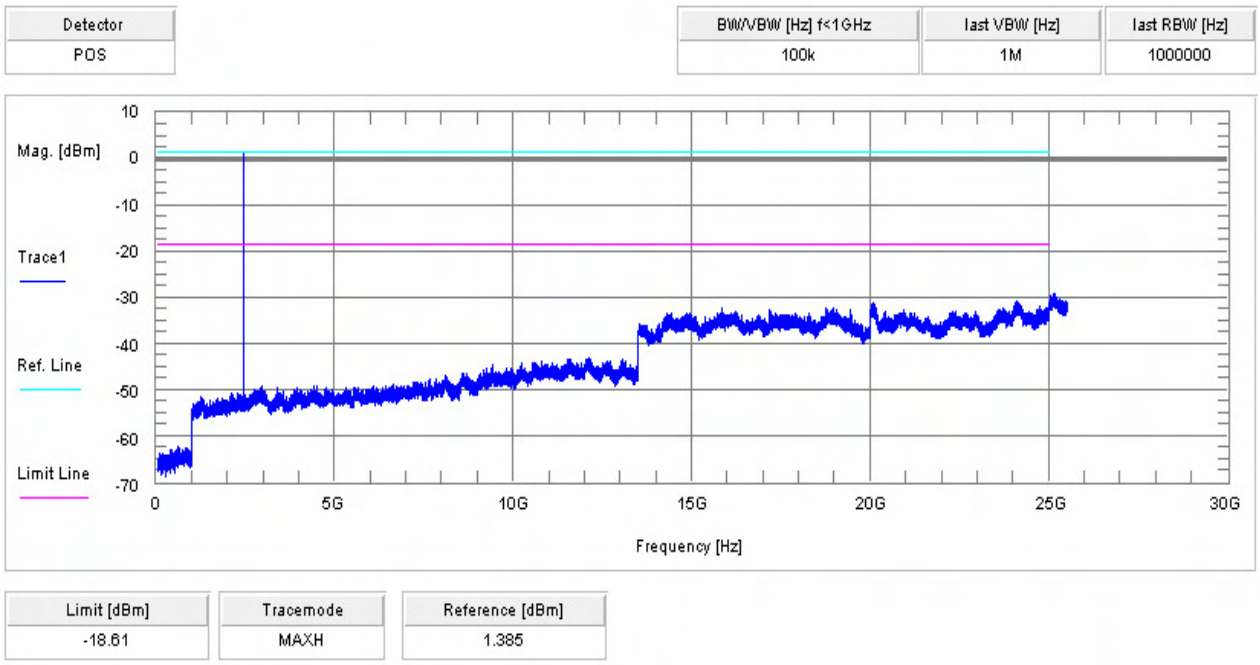
F < 1 GHz: RBW: 100 kHz VBW: 100 kHz
F > 1 GHz: RBW: 1 MHz VBW: 1 MHz

Modulation: Pi/4 DQPSK

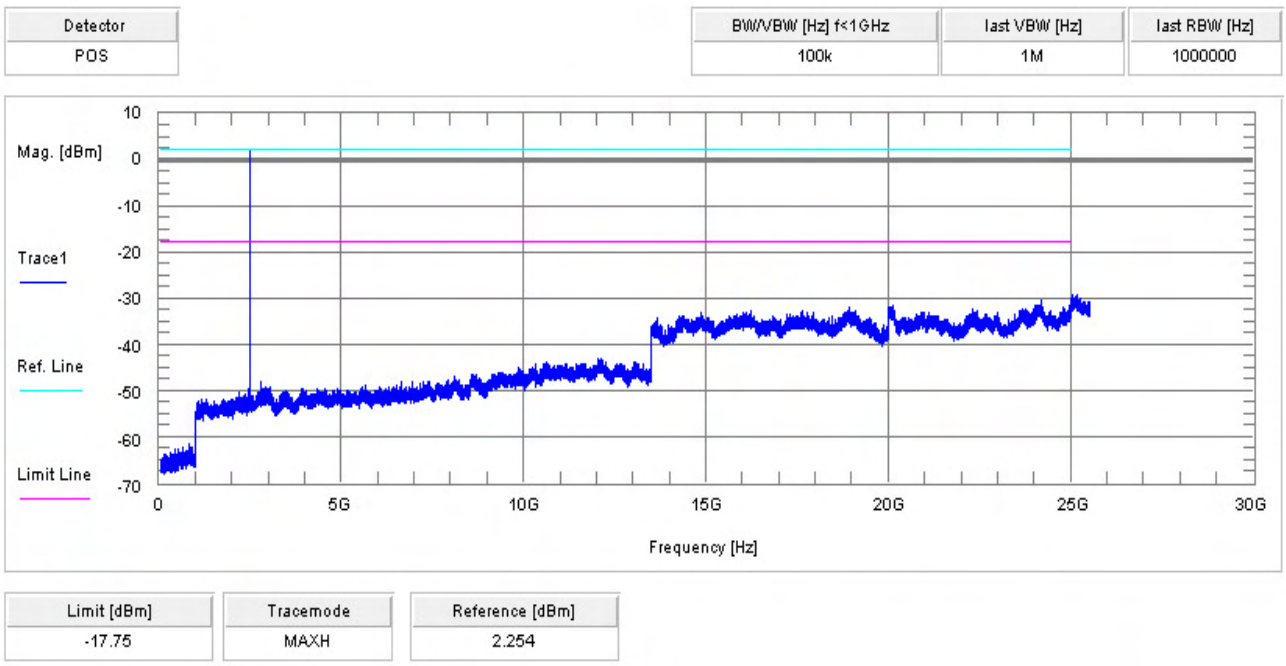
Plot 1 of 3: lowest channel



Plot 2 of 3: middle channel



Plot 3 of 3: highest channel



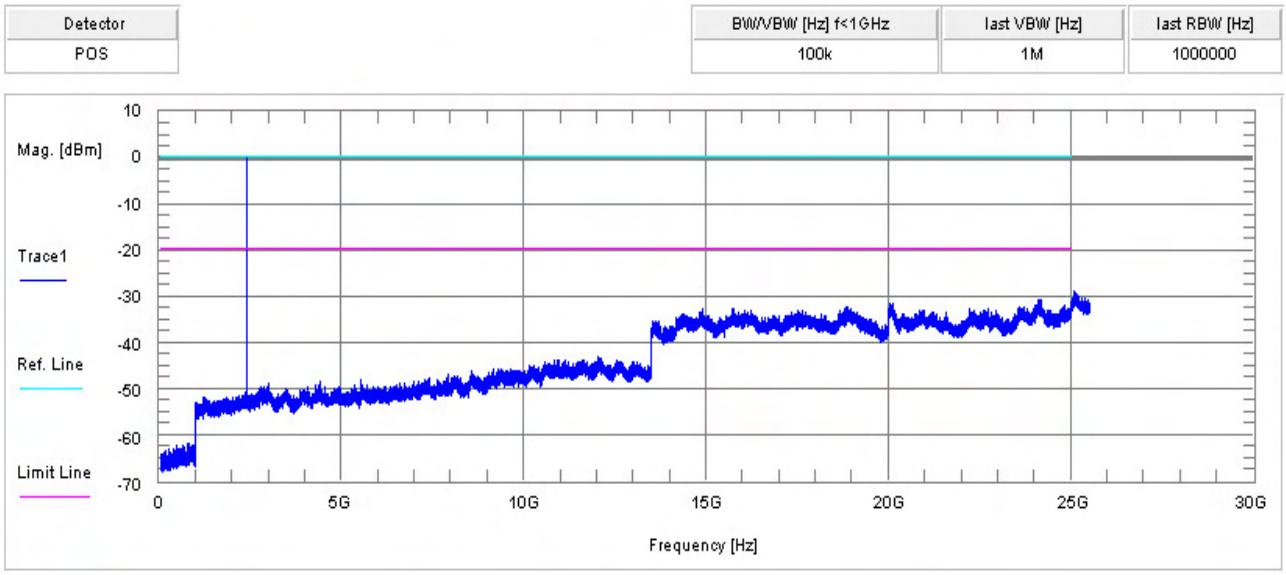
Result & Limits:

Emission Limitation					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		0.34	30 dBm		Operating frequency
No critical peaks detected! All emissions are below the 20 dBc criteria!			-20 dBc		complies
2441		1.39	30 dBm		Operating frequency
No critical peaks detected! All emissions are below the 20 dBc criteria!			-20 dBc		complies
2480		2.25	30 dBm		Operating frequency
No critical peaks detected! All emissions are below the 20 dBc criteria!			-20 dBc		complies
Measurement uncertainty			± 3dB		

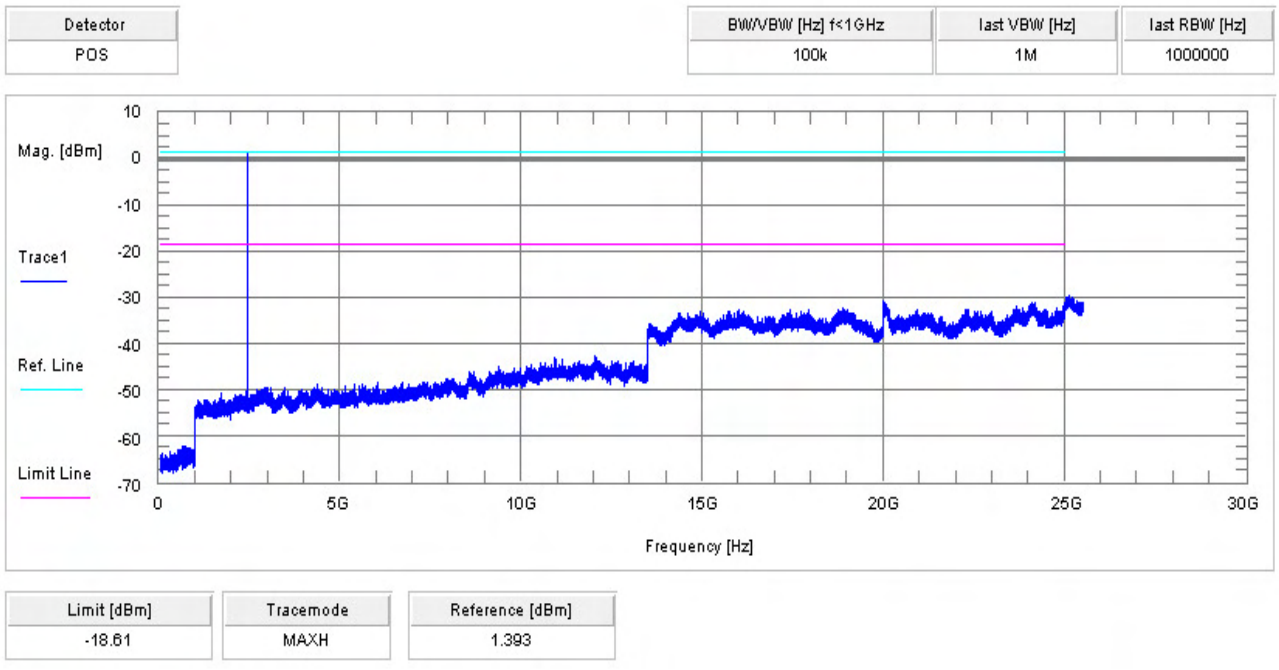
F < 1 GHz: RBW: 100 kHz VBW: 100 kHz
F > 1 GHz: RBW: 1 MHz VBW: 1 MHz

Modulation: 8 DPSK

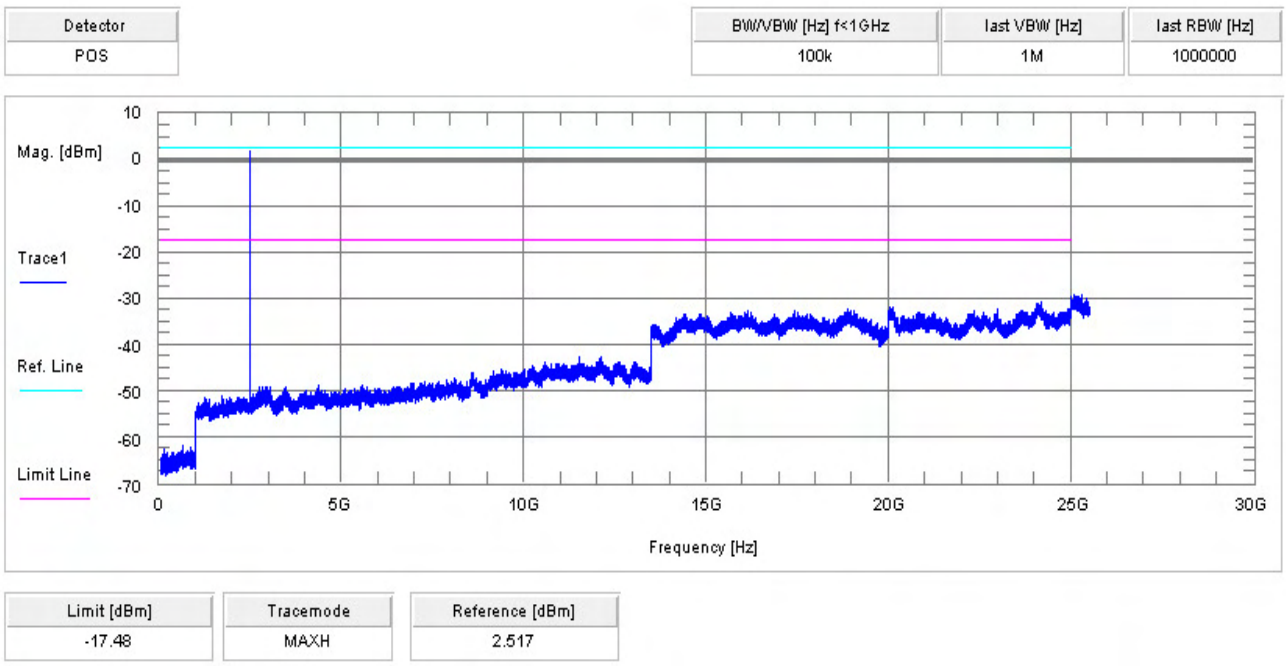
Plot 1 of 3: lowest channel



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		0.23	30 dBm		Operating frequency
No critical peaks detected! All emissions are below the 20 dBc criteria!			-20 dBc		complies
2441		1.39	30 dBm		Operating frequency
No critical peaks detected! All emissions are below the 20 dBc criteria!			-20 dBc		complies
2480		2.52	30 dBm		Operating frequency
No critical peaks detected! All emissions are below the 20 dBc criteria!			-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: GFSK

Plot 1: 0.03 – 1 GHz vertical & horizontal polarization (lowest channel)

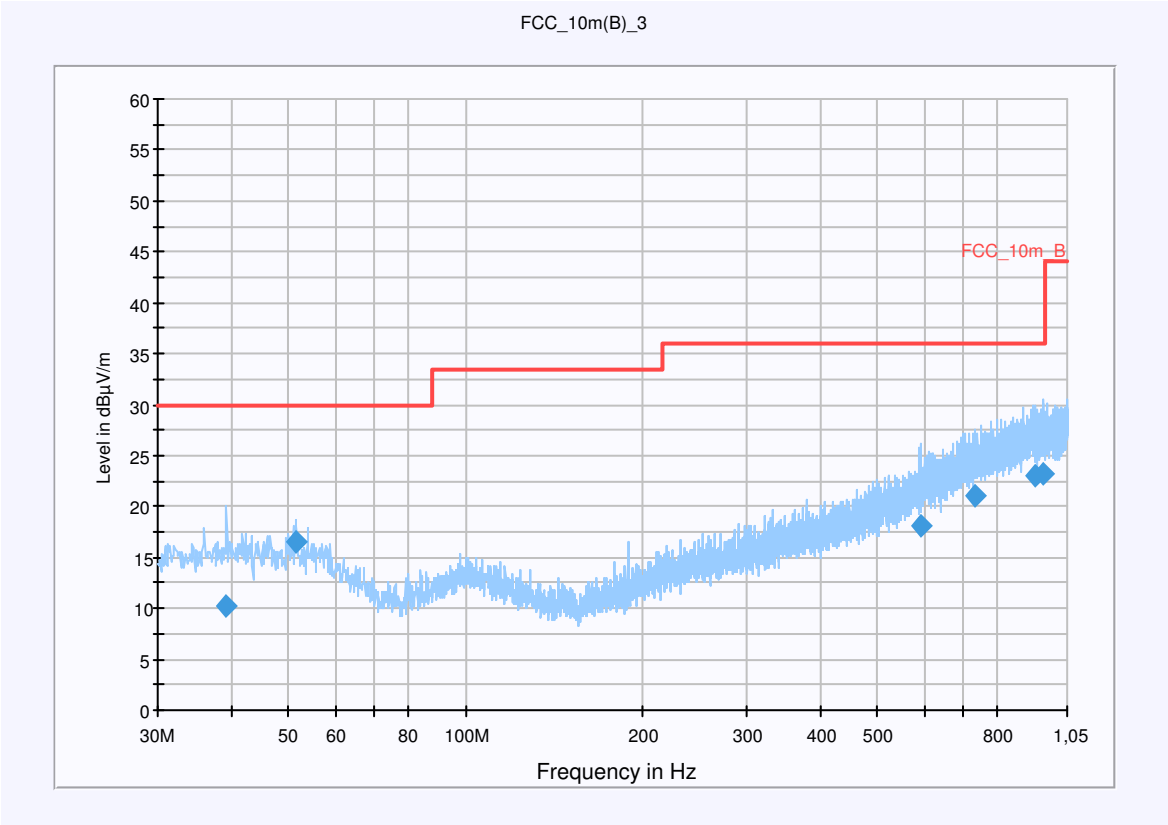
Common Information

EUT:	AAD-3880063-BV
Serial Number:	BX90176ZL3
Test Description:	FCC part 15 < 1 GHz @ 10 m
Operating Conditions:	BT TX Ch 0
Operator Name:	Klos
Comment:	powered by battery

Scan Setup: STAN_Fin [EMI radiated]

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

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

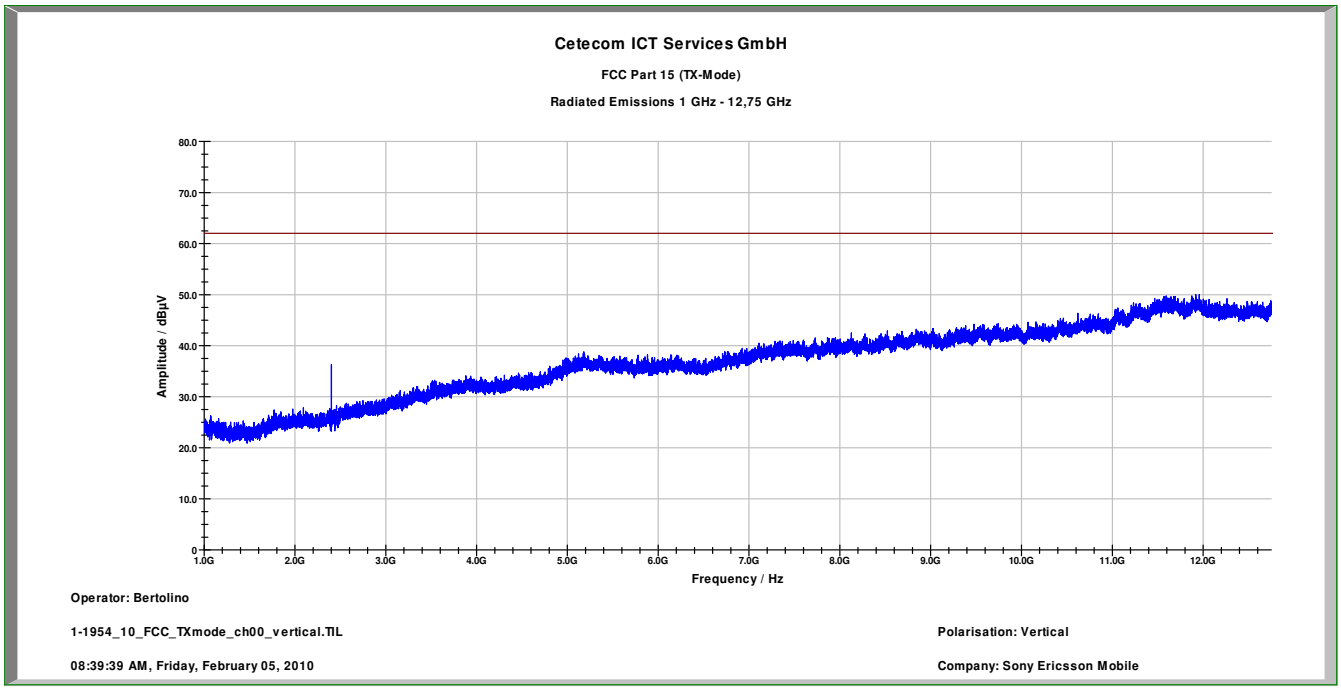
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
39.284850	10.2	15000.000	120.000	98.0	V	231.0	13.5	19.8	30.0	
51.612000	16.5	15000.000	120.000	104.0	V	49.0	13.4	13.5	30.0	
593.936400	18.0	15000.000	120.000	113.0	V	210.0	21.2	18.0	36.0	
731.953950	21.1	15000.000	120.000	189.0	V	202.0	23.7	14.9	36.0	
929.959650	22.9	15000.000	120.000	116.0	H	154.0	25.8	13.1	36.0	
954.695400	23.3	15000.000	120.000	220.0	V	166.0	25.9	12.7	36.0	

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

	Subrange 1
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (0909)
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

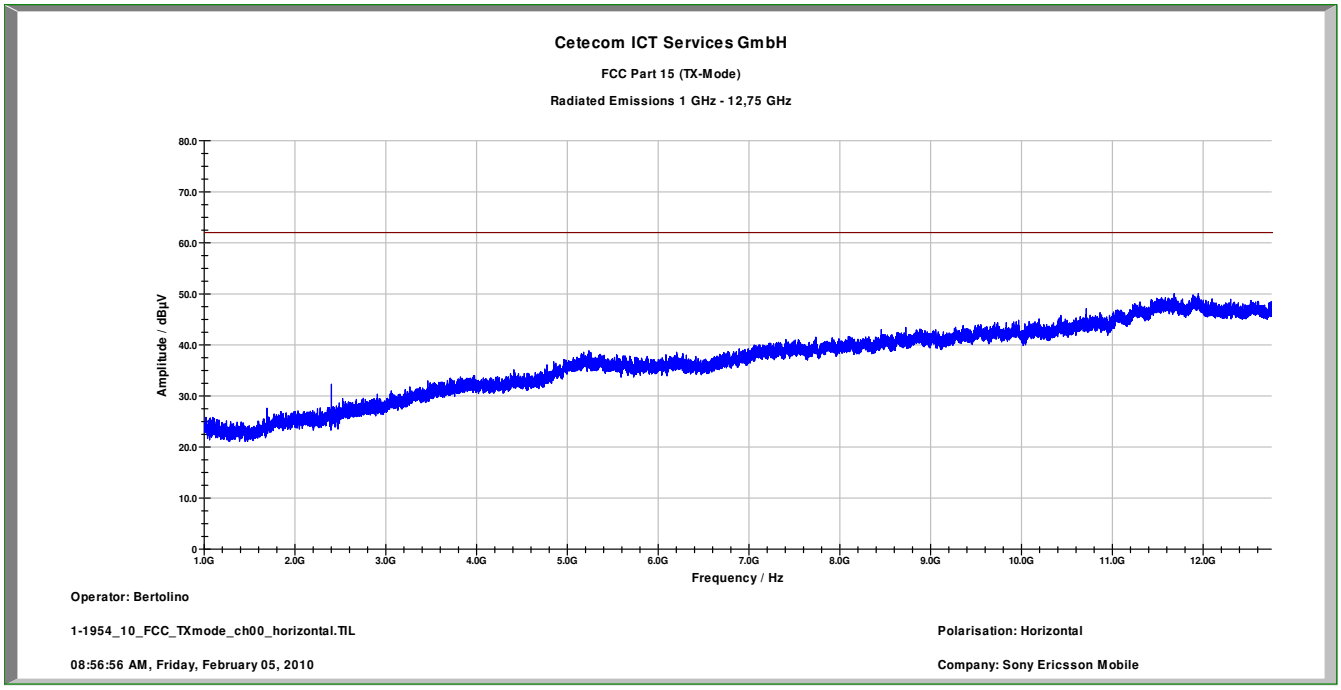
EMC 32 Version 8.10.00

Plot 2: 1 – 12.75 GHz vertical polarization (lowest channel)



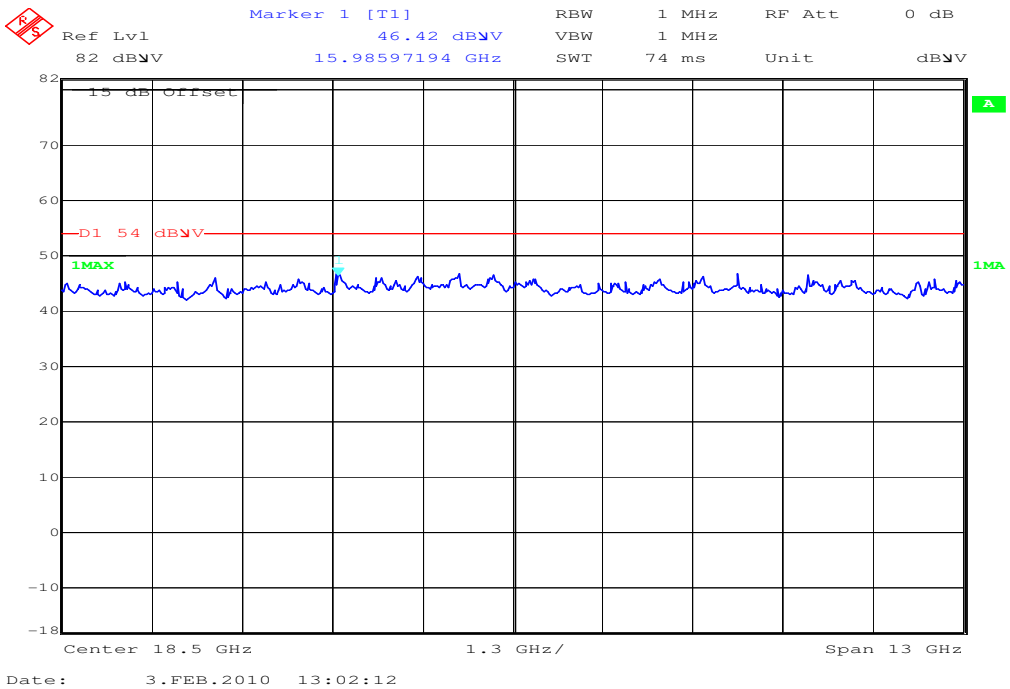
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: 1 – 12.75 GHz horizontal polarization (lowest channel)



The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 4: 12 – 25 GHz vertical & horizontal polarization (valid for all channels)



Plot 5: 0.03 – 1 GHz vertical & horizontal polarization (middle channel)

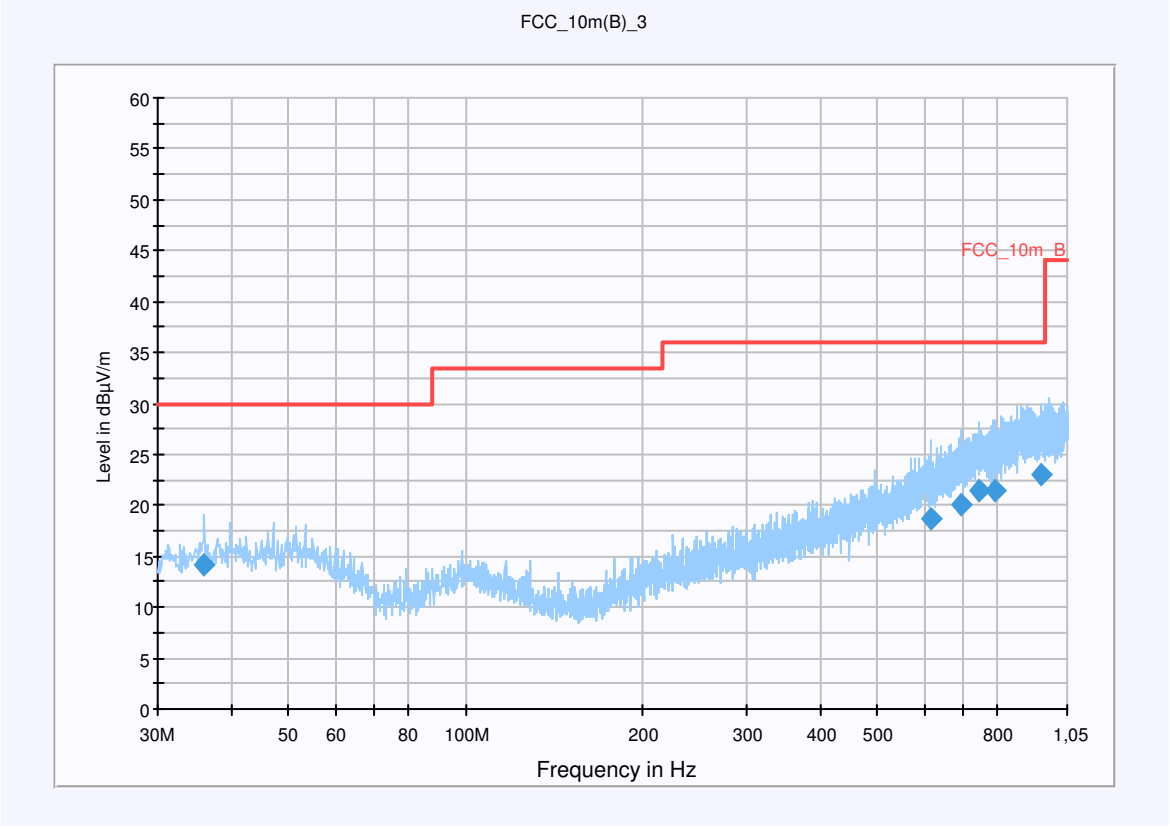
Common Information

EUT:	AAD-3880063-BV
Serial Number:	BX90176ZL3
Test Description:	FCC part 15 < 1 GHz @ 10 m
Operating Conditions:	BT TX Ch 39
Operator Name:	Klos
Comment:	powered by battery

Scan Setup: STAN_Fin [EMI radiated]

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

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

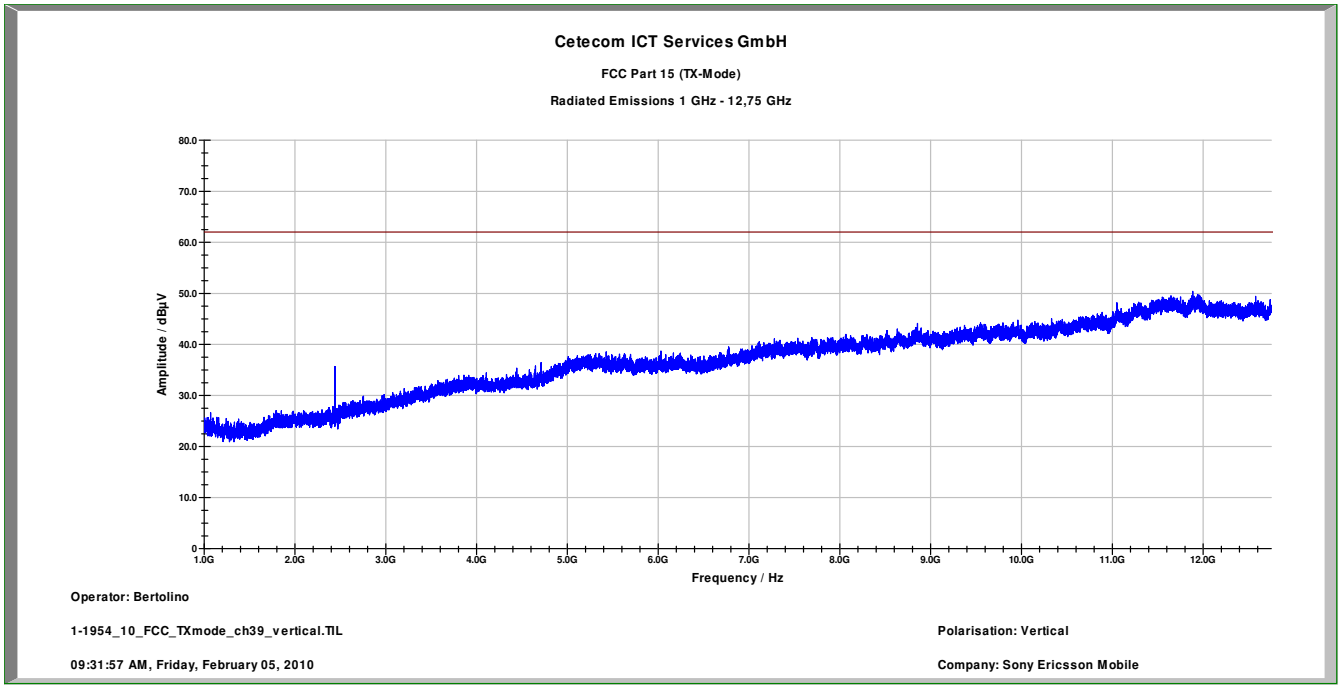
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
36.017250	14.1	15000.000	120.000	220.0	V	196.0	13.2	15.9	30.0	
617.328150	18.8	15000.000	120.000	220.0	H	187.0	21.5	17.2	36.0	
695.041500	20.1	15000.000	120.000	136.0	H	324.0	22.9	15.9	36.0	
744.619800	21.4	15000.000	120.000	220.0	V	277.0	24.0	14.6	36.0	
790.519050	21.4	15000.000	120.000	220.0	V	163.0	24.3	14.6	36.0	
948.160800	23.1	15000.000	120.000	98.0	V	311.0	25.8	12.9	36.0	

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

	Subrange 1
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (0909)
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

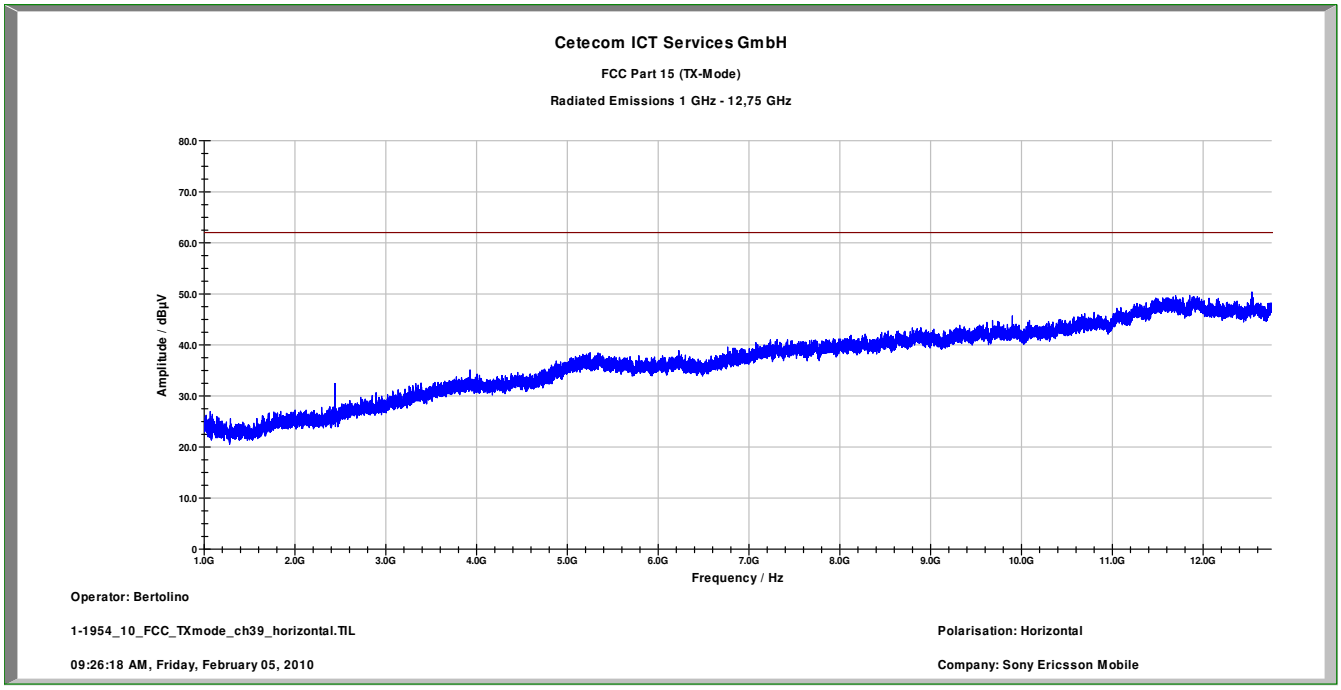
EMC 32 Version 8.10.00

Plot 6: 1 – 12.75 GHz vertical polarization (middle channel)



The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 7: 1 – 12.75 GHz horizontal polarization (middle channel)



The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 8: 0.03 – 1 GHz vertical & horizontal polarization (highest channel)

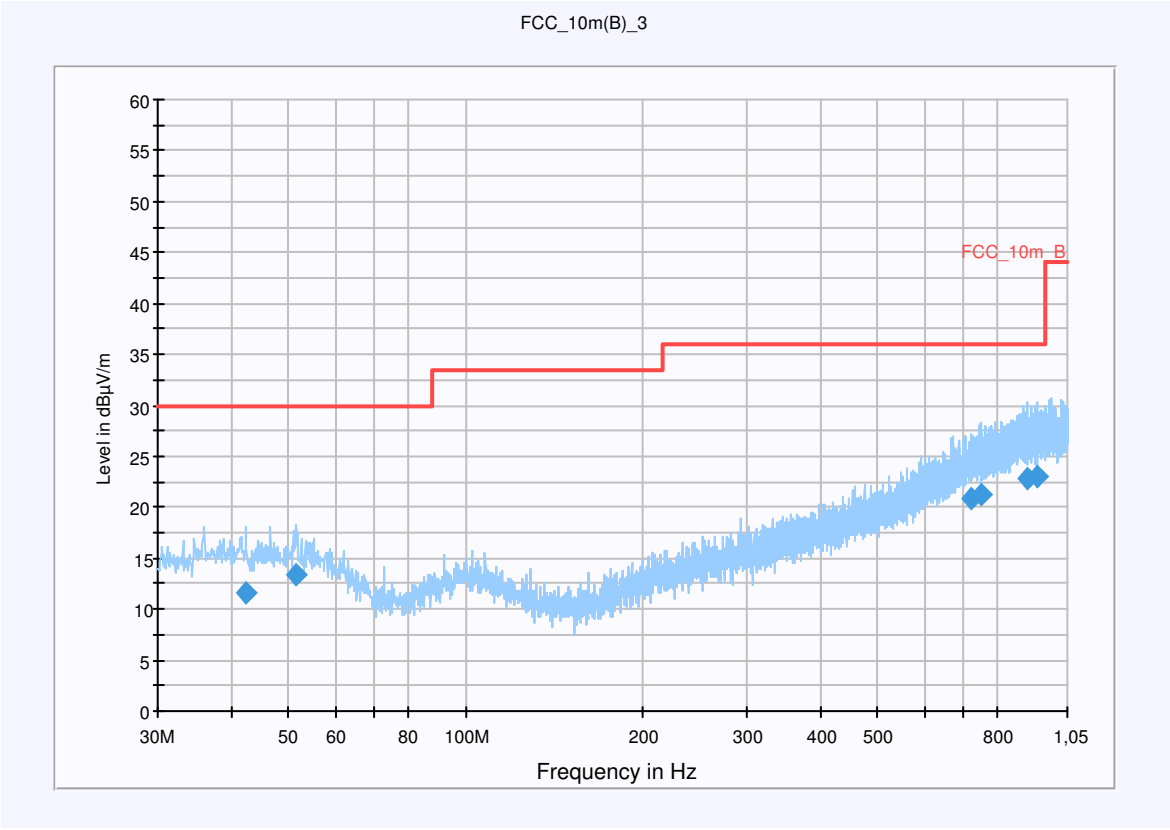
Common Information

EUT:	AAD-3880063-BV
Serial Number:	BX90176ZL3
Test Description:	FCC part 15 < 1 GHz @ 10 m
Operating Conditions:	BT TX Ch 78
Operator Name:	Klos
Comment:	powered by battery

Scan Setup: STAN_Fin [EMI radiated]

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

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

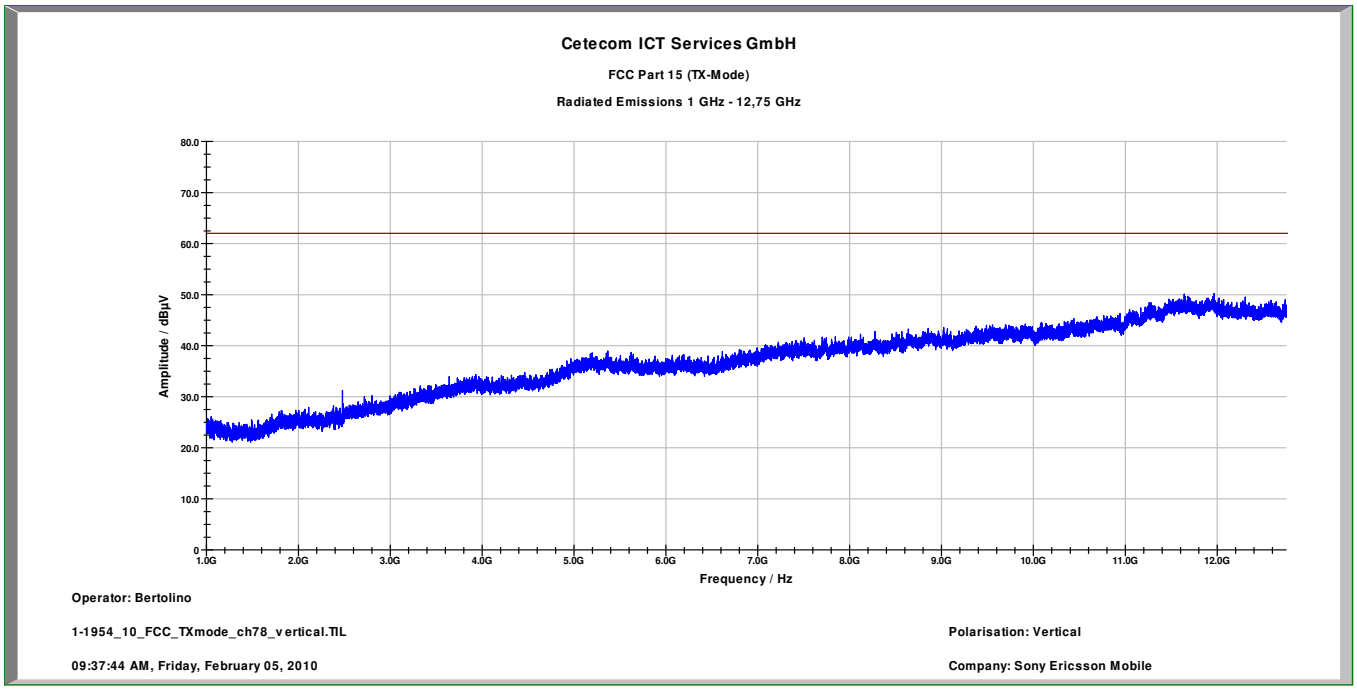
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
42.351600	11.6	15000.000	120.000	98.0	V	164.0	13.5	18.4	30.0	
51.648900	13.4	15000.000	120.000	220.0	V	143.0	13.4	16.6	30.0	
720.969450	20.9	15000.000	120.000	98.0	V	295.0	23.5	15.1	36.0	
747.269700	21.3	15000.000	120.000	153.0	H	284.0	24.1	14.7	36.0	
894.837900	22.9	15000.000	120.000	220.0	V	2.0	25.6	13.1	36.0	
931.606500	23.0	15000.000	120.000	220.0	H	6.0	25.8	13.0	36.0	

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

Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (0909)
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

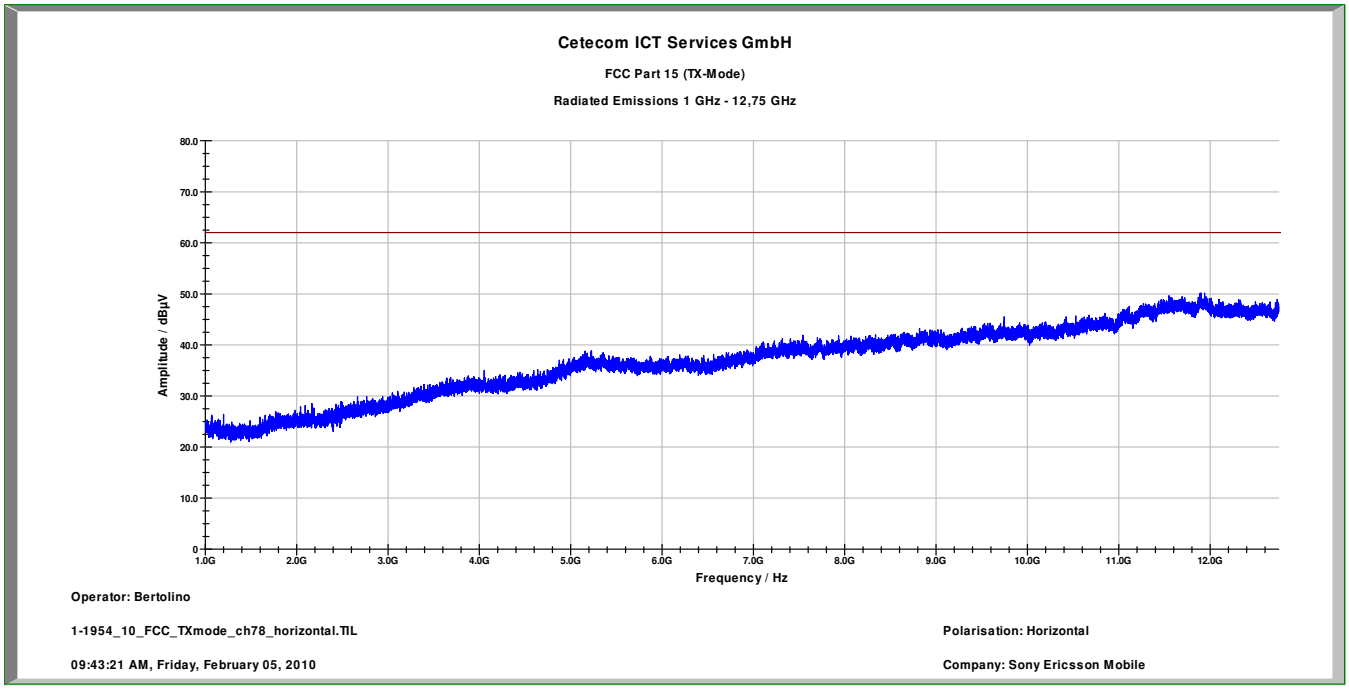
EMC 32 Version 8.10.00

Plot 9: 1 – 12.75 GHz vertical polarization (highest channel)



The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 10: 1 – 12.75 GHz horizontal polarization (highest channel)



The carrier signal is notched with a 2.4 GHz band rejection filter.

Results:

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

f < 1 GHz : RBW/VBW: 100 kHz f ≥ 1GHz : RBW/VBW: 1 MHz

Limits: § 15.247 (c)

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

Limits: § 15.209

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

5.16 Spurious Emissions - radiated (Receiver) § 15.109

Plot 1: 0.03 – 1 GHz vertical & horizontal polarization (receiver)

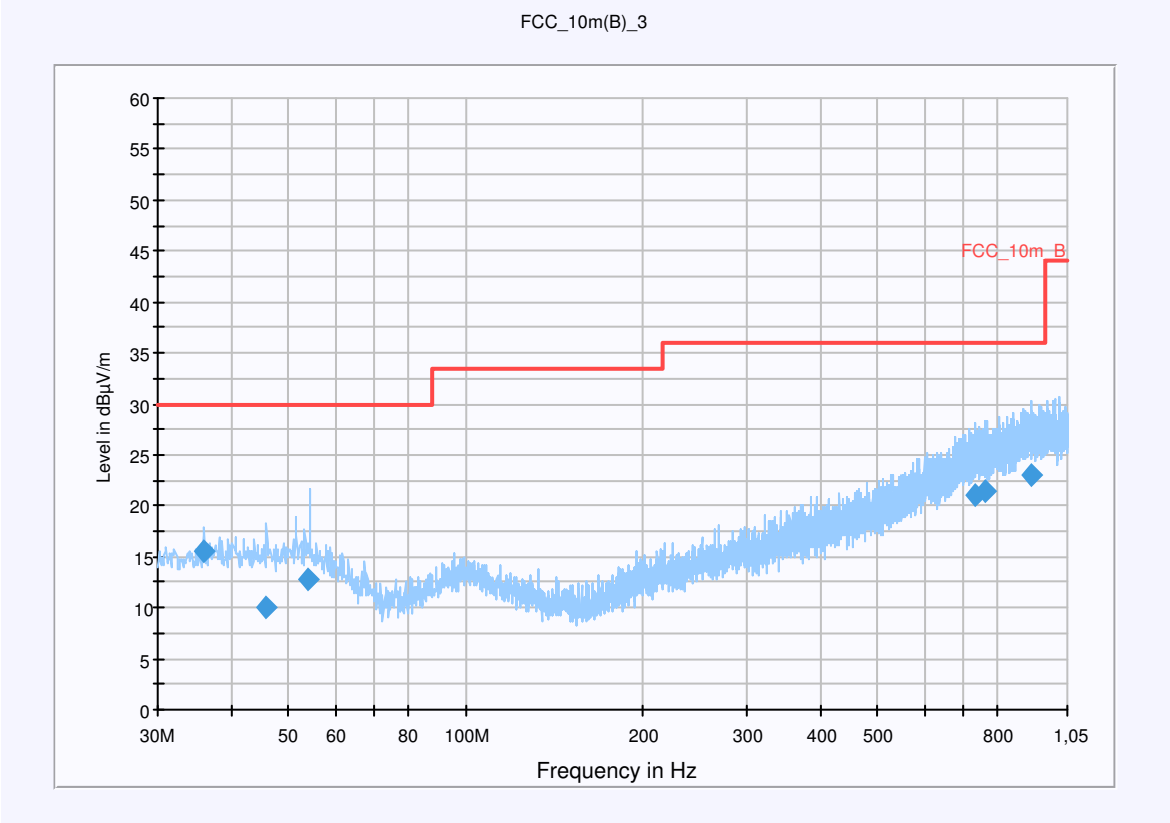
Common Information

EUT:	AAD-3880063-BV
Serial Number:	BX90176ZL3
Test Description:	FCC part 15 < 1 GHz @ 10 m
Operating Conditions:	BT RX
Operator Name:	Klos
Comment:	powered by battery

Scan Setup: STAN_Fin [EMI radiated]

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

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

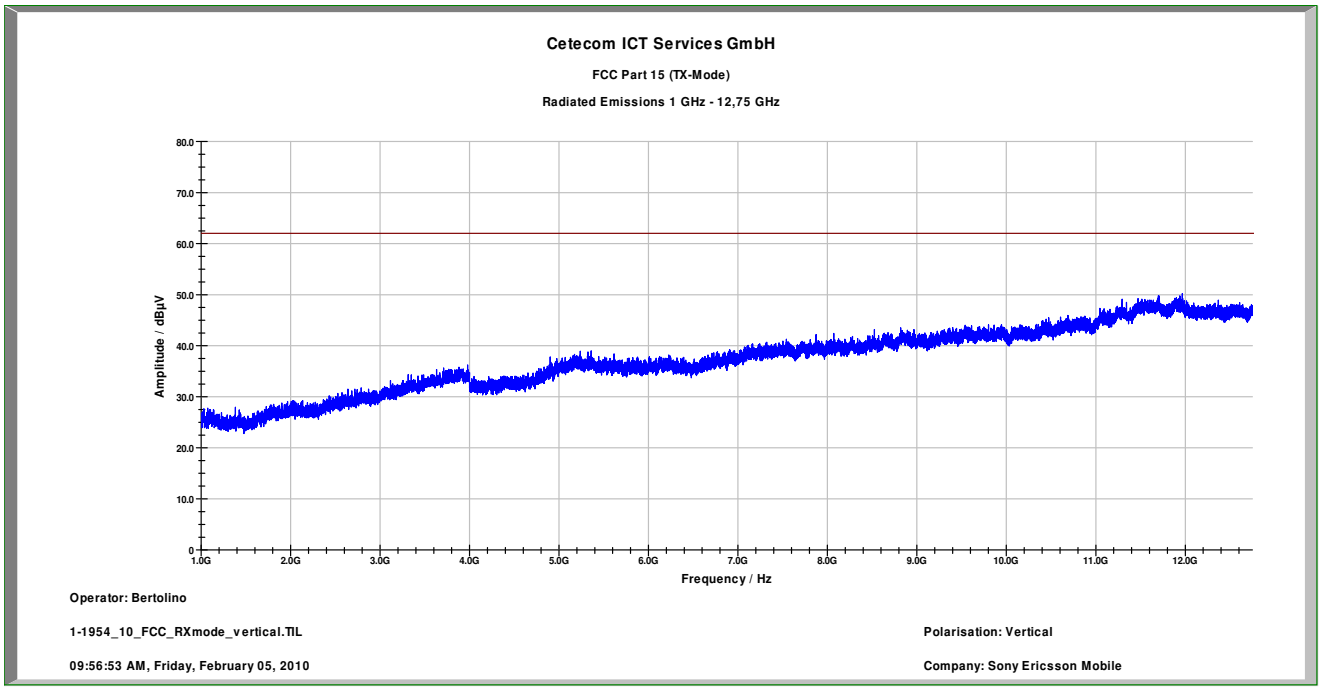
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
35.988150	15.6	15000.000	120.000	98.0	V	266.0	13.2	14.4	30.0	
45.714900	9.9	15000.000	120.000	220.0	V	55.0	13.4	20.1	30.0	
54.022050	12.8	15000.000	120.000	220.0	V	269.0	13.2	17.2	30.0	
735.109650	21.1	15000.000	120.000	220.0	V	31.0	23.8	14.9	36.0	
761.597700	21.4	15000.000	120.000	192.0	H	1.0	24.2	14.6	36.0	
912.655950	23.0	15000.000	120.000	220.0	H	137.0	25.7	13.0	36.0	

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

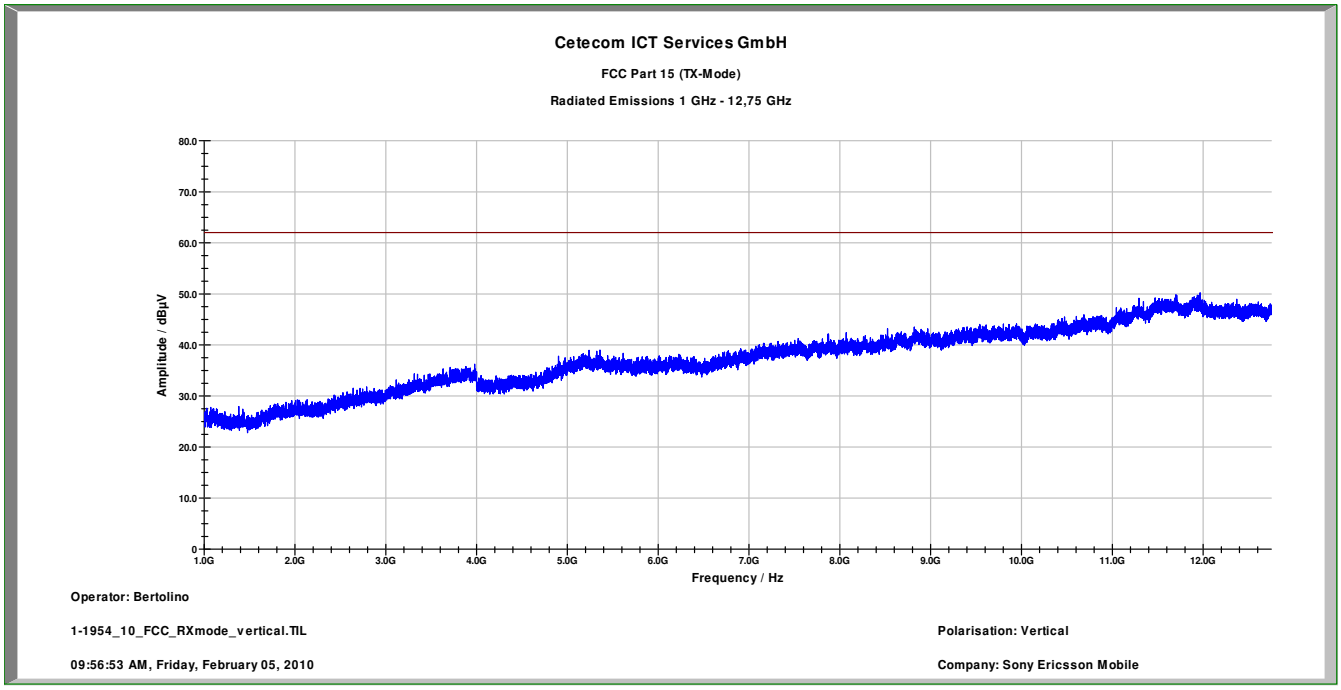
	Subrange 1
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (0909)
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

EMC 32 Version 8.10.00

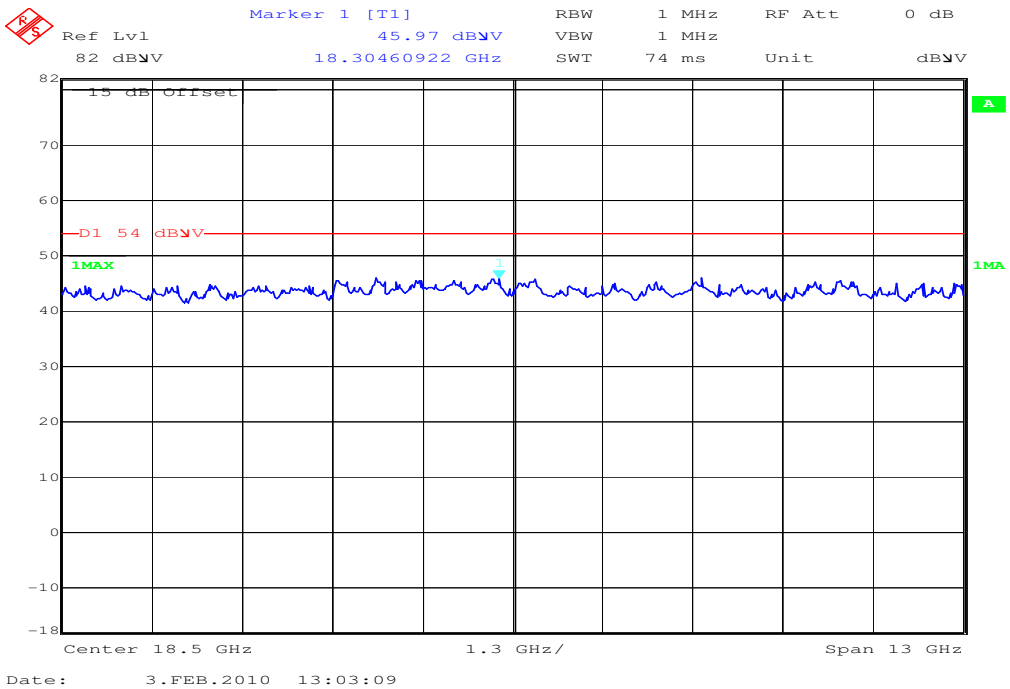
Plot 2: 1 – 12.75 GHz vertical polarization (receiver)



Plot 3: 1 – 12.75 GHz horizontal polarization (receiver)



Plot 4: 12 – 25 GHz vertical & horizontal polarization (receiver)



Results:

Spurious Emissions level [dBµV/m]		
f[MHz]	Detector	Level [dBµV/m]
No critical peaks detected.		
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

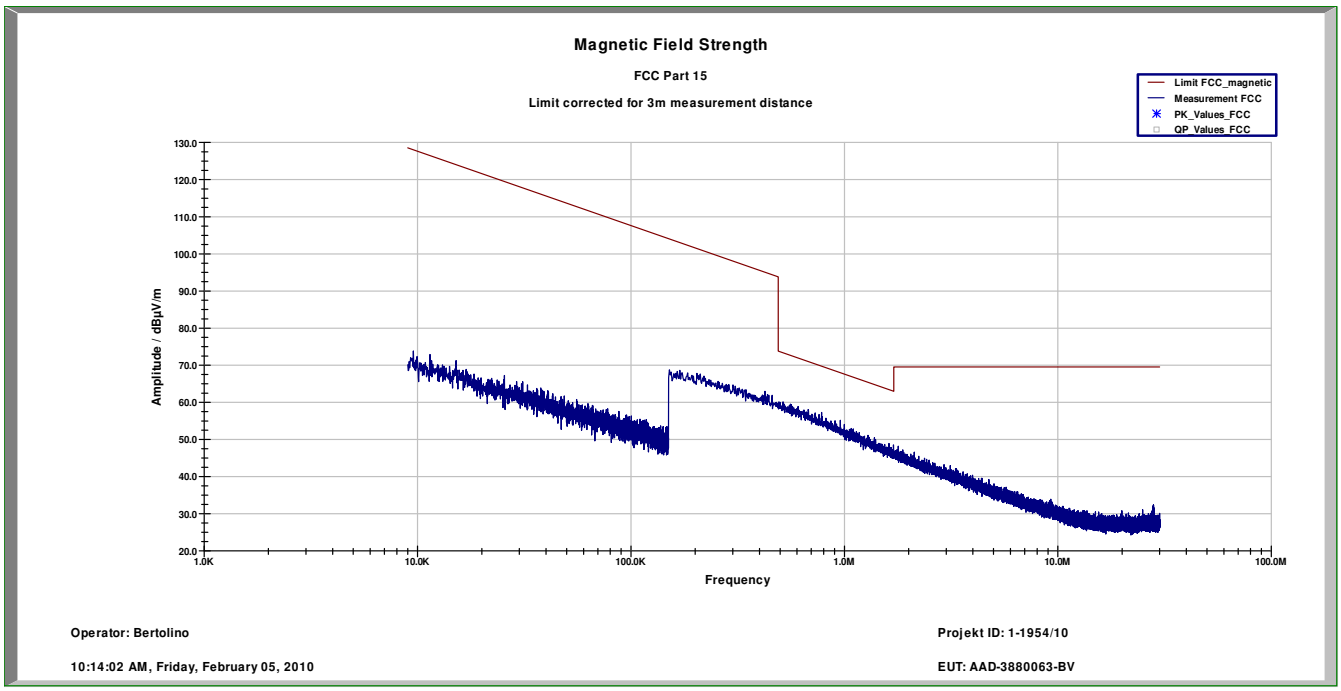
Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
30 - 88	100 (40 dBµV/m)	3
88 - 216	150 (43.5 dBµV/m)	3
216 - 960	200 (46 dBµV/m)	3
above 960	500 (54 dBµV/m)	3

5.17 Spurious Emissions < 30 MHz - Transmitter radiated § 15.209

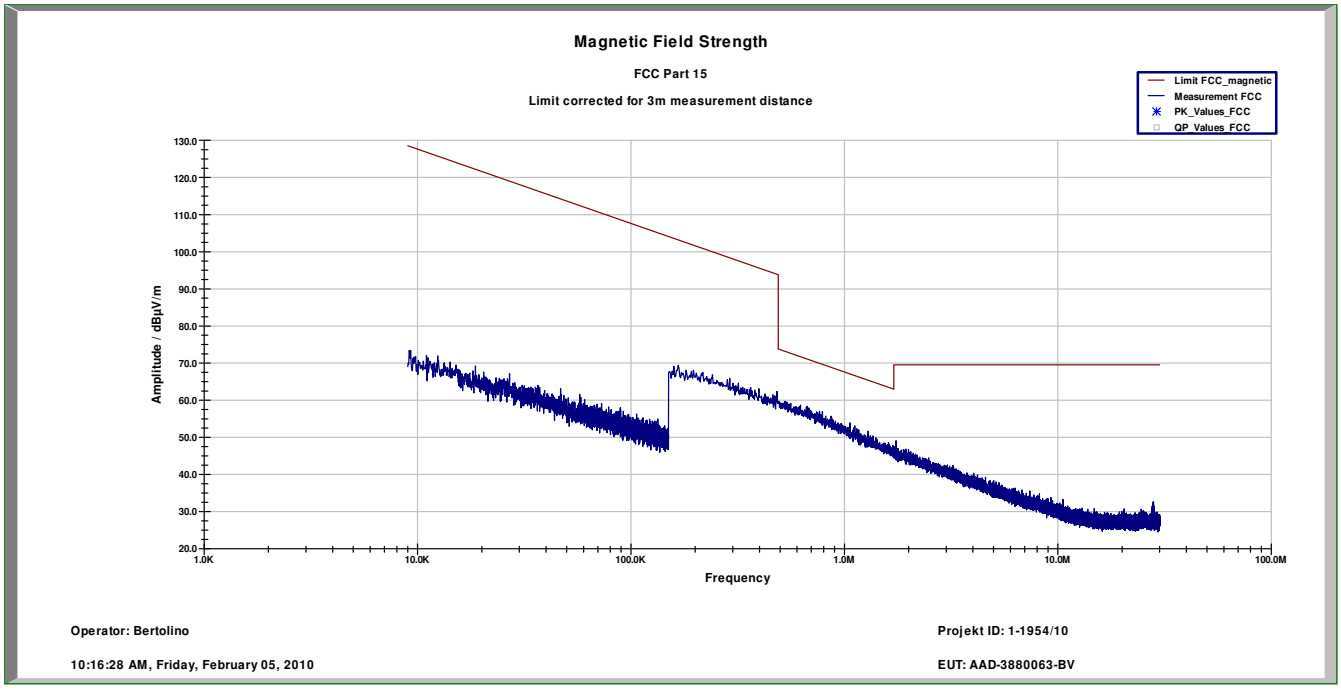
Modulation: GFSK

Measured at 10 m distance.
Values recalculated with 40 dB/decade according to FCC rules.

Plot 1: TX mode



Plot 2: RX mode



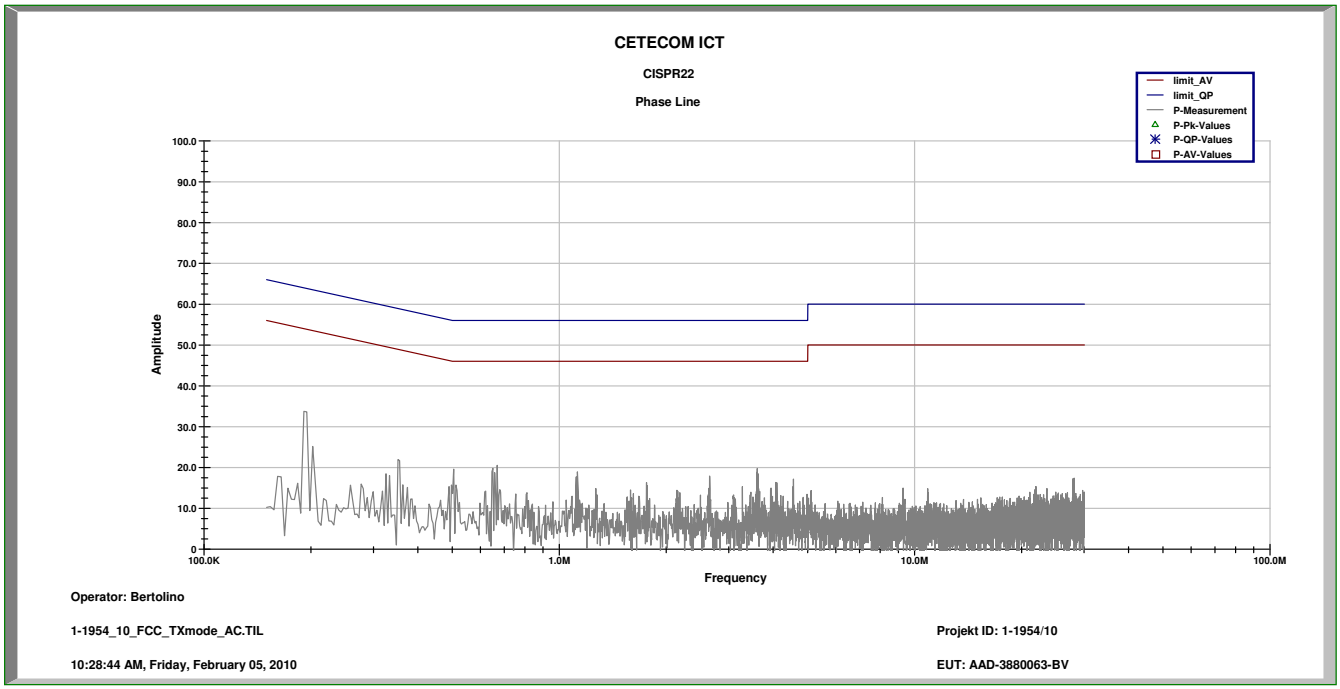
Limits:

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

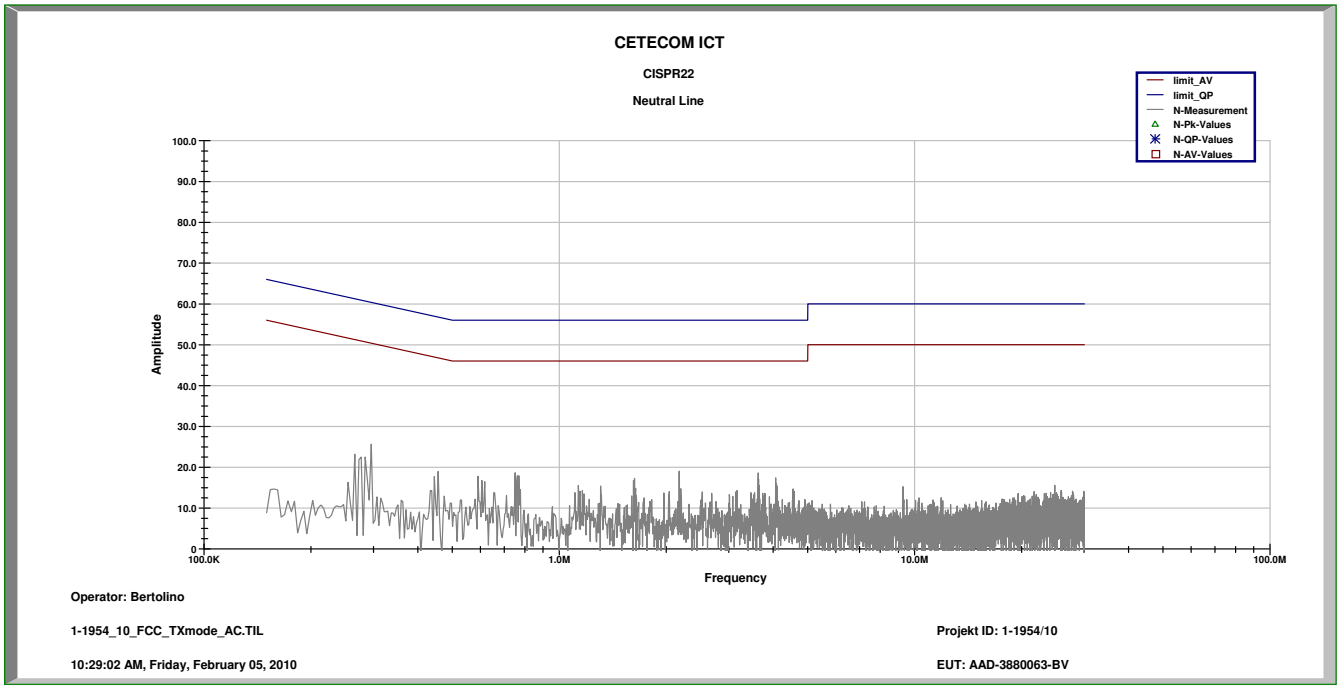
5.18 Conducted Emissions <30 MHz § 15.107/207

Modulation: GFSK

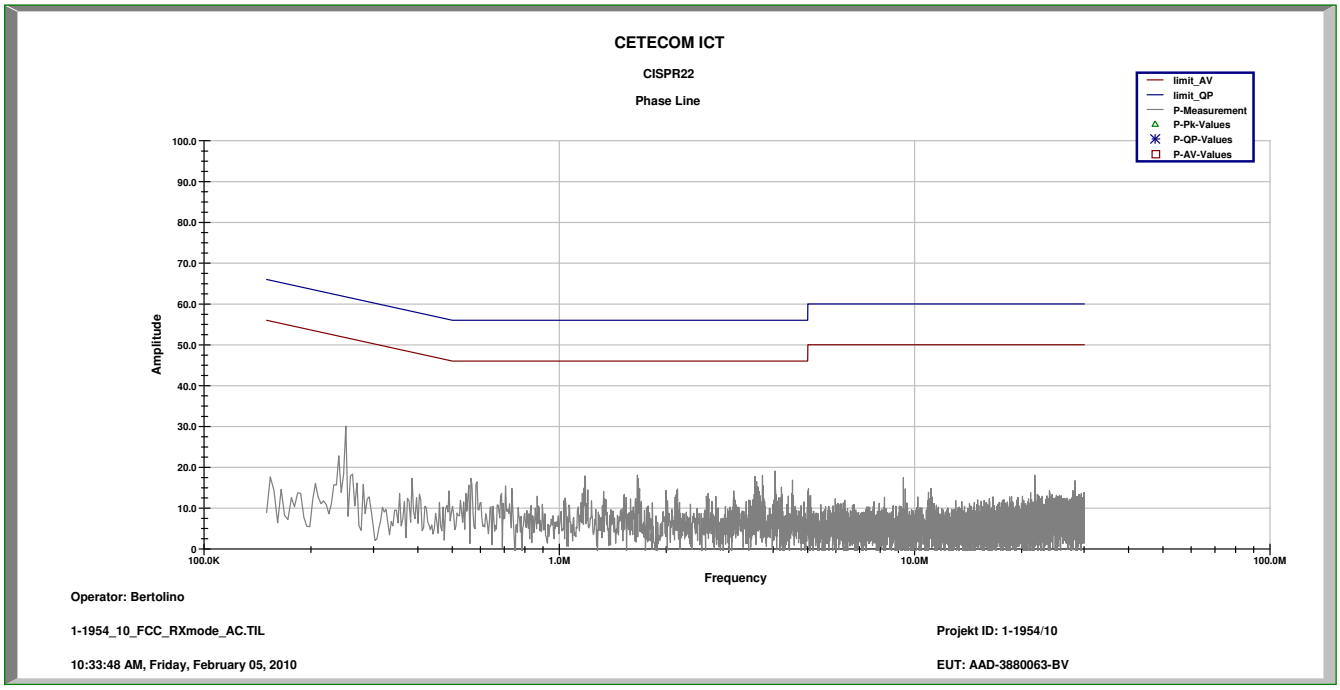
Plot 1: TX mode, phase line



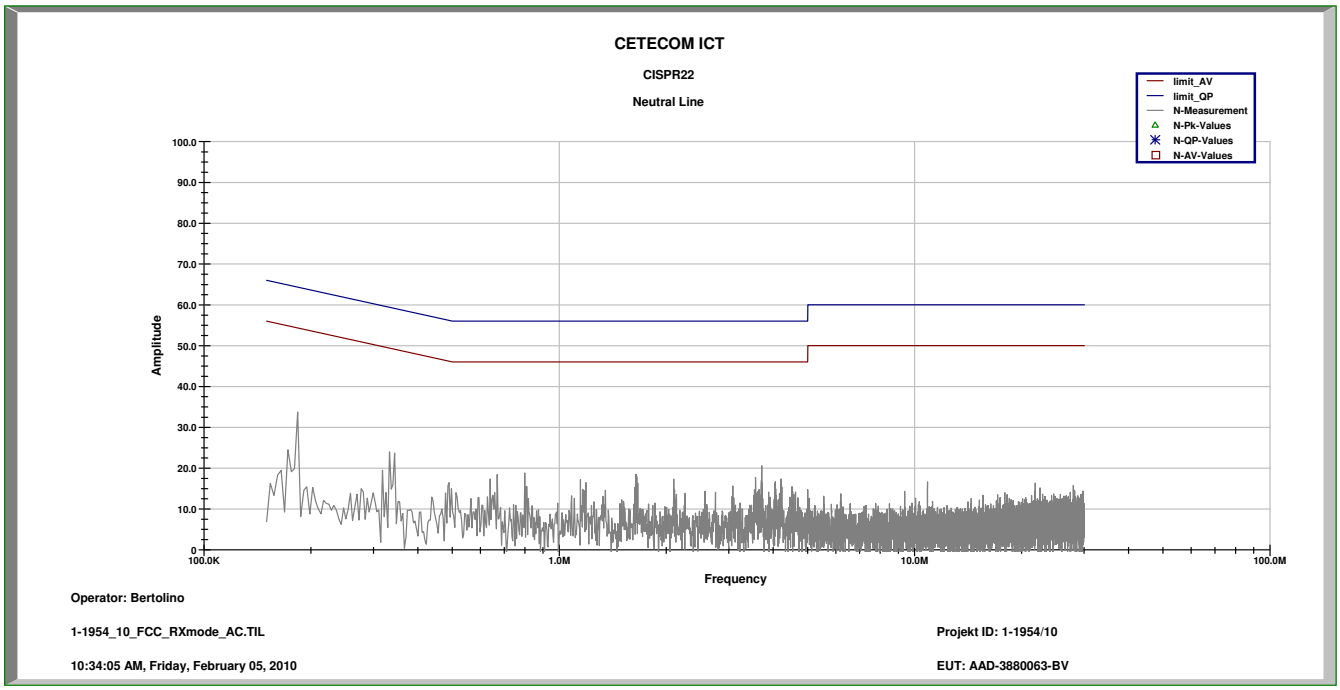
Plot 2: TX mode, neutral line



Plot 3: RX mode, phase line



Plot 4: RX mode, neutral line



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	PSA-Spektrumanalysator 3 Hz - 26.5 GHz (E4440A)	Agilent	MY48250080	300003812	05.08.2008	24	05.08.2010
5	EMI Preselector 9 kHz - 1 GHz (N9039A)	Agilent	MY48260003	300003825	19.08.2008	24	19.08.2010
6	Microwave Analog Signal Generator (N5183A)	Agilent	MY47420220	300003813	06.08.2008	24	06.08.2010
7	PC	F+W			n.a.		
8	TILE	TILE			n.a.		
9	TRILOG Super Broadband Antenna (VULB9163)	Schwarzbeck	371	300003854	Monthly verification (System cal.)		
10	Double Ridged Antenna 3115	EMCO	3088	300001032	Monthly verification (System cal.)		
11	Active Loop Antenna 6502	EMCO	2210	300001015	Monthly verification (System cal.)		
12	Switch / Control Unit 3488A	HP	2719A15013	300001156	n.a.		
13	Power Supply 6032A	HP	2818A03450	300001040	08.01.2009	36	08.01.2012
14	Busisolator	Kontron		300001056	n.a.		
15	Leitungsteiler 11850C	HP		300000997	Monthly verification (System cal.)		
16	Power attenuator 8325	Byrd	1530	300001595	Monthly verification (System cal.)		
17	Band reject filter WRCG1855/1910	Wainwright	7	300003350	Monthly verification (System cal.)		
18	Band reject filter WRCG2400/2483	Wainwright	11	300003351	Monthly verification (System cal.)		
19	Hochpassfilter WHK1.1/15G-10SS	Wainwright	3	300003255	Monthly verification (System cal.)		
20	Hochpassfilter WHKX2.9/18G-12SS	Wainwright	1	300003492	Monthly verification (System cal.)		
21	Hochpassfilter WHKX7.0/18G-8SS	Wainwright	18	300003789	Monthly verification (System cal.)		
22	Switch / Control Unit 3488A	HP	2605e08770	300001443	n.a.		
23	Trenntrafo RT5A	Grundig	9242	300001263	n.a.		
24	Relais Matrix PSU	R&S	890167/024	300001168	n.a.		
25	Netznachbildung ESH3-Z5	R&S	828576/020	300001210	n.a.		

Signalling Units:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	CBT	R&S	100313	300003516	03.09.2008	24	03.09.2010
2	CBT	R&S	100185	300003416	27.08.2008	24	27.08.2010
3	CMU-200	R&S	103992	300003231	04.06.2008	24	04.06.2010
4	CMU-200	R&S	106240	300003321	27.08.2008	24	27.08.2010
5	CMU-200	R&S	832221/0055	300002862	20.03.2008	24	20.03.2010

SRD Laboratory Room 005:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	Spektrum Analyzer 8566B	HP	2747A05275	300000219	18.01.2008	24	18.01.2010
2	Spektrum Analyzer Display 85662A	HP	2816A16497	300001690	23.01.2008	24	23.01.2010
3	Quasi-Peak-Adapter 85650A	HP	2811A01135	300000216	23.01.2008	24	23.01.2010
4	Power Supply	Heiden	003202	300001187	12.05.2007	36	12.05.2010
5	Power Supply	Heiden	1701	300001392	12.05.2007	36	12.05.2010

SRD Laboratory Room 011:

No	Equipment/Type	Manuf.	Serial Nr.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	NRP Power Meter	R&S	100212	300003780	27.02.2008	24	27.02.2010

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 VULB 9163	Schwarzbeck	295	300003787	01.04.2008	24	01.04.2010
3	Amplifier - 0518C-138	Veritech Micro-wave Inc.	-/-	-/-	-/-	-/-	-/-
4	Switch - 3488A	HP		300000368	-/-	-/-	-/-
5	EMI Test receiver - ESCI	R&S	100083	300003312	01.06.2009	24	01.06.2011
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	-/-	-/-	-/-	-/-

C.BER Bluetooth Rack Room AC2:

No	Equipment/Type	Manuf.	Inv. No. Cetecom	Last Calibration	Frequency (months)	Next Calibration
1	System Controller with XP Prof. & C.BER Control Software	F&W	300003580	na		
2	GPIB to USB Converter	Agilent	300003426	na		
3	FSP 30	R&S	300003575	25.08.2008	24	25.08.2010
4	RF-Generator SMIQ03 (Interferer Signal)	R&S	300002681-001	25.08.2008	36	25.08.2011
	Modulation Coder SMIQ-B20	R&S	300002681-001	s.No.4		
	Data Generator SMIQ-B11	R&S	300002681-001	s.No.4		
	RF Rear Connection SMIQ-B19	R&S	300002681-001	s.No.4		
	Fast CPU SM-B50	R&S	300002681-001	s.No.4		
	FM Modulator SM-B5	R&S	300002681-001	s.No.4		
5	Rubidium Standard RUB	R&S	300002681-009	27.08.2008	24	27.08.2010
6	Switching Unit 3488A including 2 44476A cards	HP	300000926	Verified with path compensation		
	44472A VHF switch	HP	300000926	Verified with path compensation		
7	Signalling Unit: CBT with EDR	R&S	300003416	27.08.2008	24	27.08.2010
8	RF-cable set	different	no	Verified with path compensation		
9	IEEE-cables	R&S	no	na		
10	NGPE programmable Power Supply for EUT	R&S	400000078	27.08.2008	24	27.08.2010
11	Coupling Unit 4324-2	Narda	no	Verified with path compensation		
12	Climatic Chamber VT4002	Voetch	300003019	28.05.2009	24	28.05.2011
13	6 dB Attenuator 1W	Narda	no	Verified with path compensation		
14	DCBlocker 30 MHz to 12.75 GHz 1W	Narda	no	Verified with path compensation		