



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. : 1-1954-06-07/10
Type identification : AAD-3880070-BV
Applicant : Sony Ericsson Mobile Communications AB
FCC ID : PY7A3880070
IC Certification No : 4170B-A3880070
Test standards : 47 CFR Part 15
RSS - 210 Issue 7

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1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 3.1.1. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.

Test laboratory manager:

2010-03-05

Date

Marco Bertolino

Name



Signature

Technical responsibility for area of testing:

2010-03-05

Date

Stefan Bös

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: 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 (0) 46 19 32 95
Contact:	Johan Wedin
E-mail:	johan.wedin@sonyericsson.com
Telephone:	+46 (0) 707 19 57 36

1.4 Application details

Date of receipt of order:	2010-02-10
Date of receipt of test item:	2010-03-03
Date of start test:	2010-03-03
Date of end test:	2010-03-05
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/FDD2/FDD5 / HSDPA / WLAN / BT EDR / A-GPS / FM-Rx
Type identification	:	AAD-3880070-BV
S/N serial number	:	Conducted: BX901AZ6CJ BX901AZ6R1 Radiated: BX901AZ6F4 BX901AZ6PF
HW hardware status	:	AP2.1
SW software status	:	R2BA026V ATP
Frequency Band [MHz]	:	ISM band 2.400 - 2.483,5 (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 8 – photos of the EUT
Power Supply	:	4.0 V DC by battery EP500 + charger CST-80 / power supply
Temperature Range	:	-20 °C to +55 °C

Max. power radiated: 8.47 dBm (Pi/4 DQPSK modulation)

Max. power conducted: 7.56 dBm (Pi/4 DQPSK modulation)

FCC ID: PY7A3880070

IC: 4170B-A3880070

3.1.2 Additional EUT information For IC Canada (appendix 2)

IC Registration Number:	4170B-A3880070
Model Name:	AAD-3880070-BV
Manufacturer (complete Address):	Sony Ericsson Mobile Communications AB Nya Vattentorget 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 2.400 - 2.483,5 (channel 00 – 2402 MHz; channel 78 – 2480 MHz)
RF: Power [W] (max):	<u>GFSK modulation:</u> Rad. EIRP: 4.18 mW Conducted : 3.39 mW <u>Pi/4 DQPSK modulation:</u> Rad. EIRP: 7.03 mW Conducted : 5.70 mW <u>8 DPSK modulation:</u> Rad. EIRP: 6.43 mW Conducted : 5.21 mW
Antenna Type:	Integrated PCB antenna → for more information, please take a look at 8 – photos of the EUT
Occupied Bandwidth (99% BW) [kHz]:	GFSK modulation: 920 Pi/4 DQPSK modulation: 1317 8 DPSK modulation: 1287
Type of Modulation:	GFSK, Pi/4 DQPSK, 8 DPSK
Emission Designator (TRC-43):	GFSK modulation: 920KFXD Pi/4 DQPSK modulation: 1M32GXD 8 DPSK modulation: 1M29GXD
Transmitter Spurious (worst case) [dBμV/m in 3m]:	50.19
Receiver Spurious (worst case) [dBμV/m in 3m]:	50.13

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: 2010-03-05

3.1.3 Extreme conditions testing values

Description	Shortcut	Unit	Value
Nominal Temperature	T _{nom}	°C	20
Nominal Humidity	H _{nom}	%	40
Nominal Power Source	V _{nom}	V	4.0

Type of power source: **DC by battery EP500 + charger CST-80 / power supply**

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	2010-03-05	-/-

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	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	Pi/4 DQPSK	Yes			
§ 15.109	Spurious Emissions - radiated (Receiver)	-/-	Yes			
§ 15.209	Spurious Emissions - radiated (Transmitter) <30 MHz	Pi/4 DQPSK	Yes			
§ 15.107/207	Conducted Emissions <30 MHz	Pi/4 DQPSK	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.

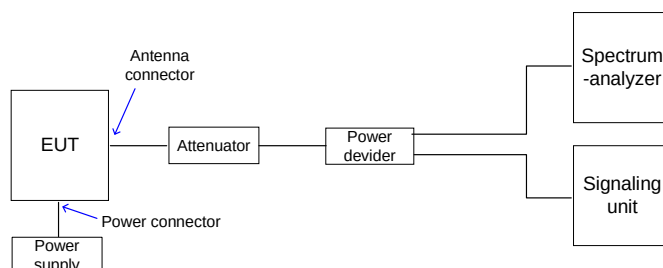
9 kHz - 150 kHz: Quasi Peak measurement, 200 Hz Bandwidth, passive loop antenna.
150 kHz - 30 MHz: Quasi Peak measurement, 9 kHz Bandwidth, passive loop antenna.
30 MHz - 200 MHz: Quasi Peak measurement, 120 kHz Bandwidth, tri-log antenna
200MHz - 1GHz: Quasi Peak measurement, 120 kHz Bandwidth, tri-log 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

The Pi/4 DQPSK / 2-DH5 mode provides the maximum conducted output power.

The radiated spurious emissions and the conducted spurious emissions over AC line are performed with the highest power mode.

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:

	low channel 2402 MHz	mid channel 2441 MHz	high channel 2480 MHz
Conducted power [dBm] Measured, GFSK modulation	5.30	5.19	4.80
Radiated power [dBm] Measured, GFSK modulation	6.21	5.26	5.06
Gain [dBi] Calculated	0.91	0.07	0.26

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

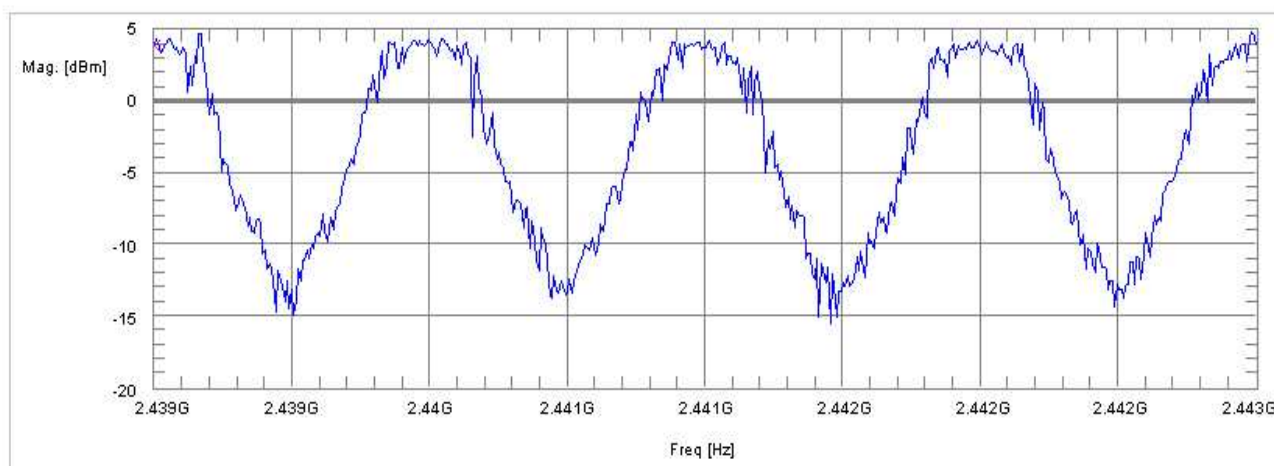
Modulation: GFSK

Plot 1 of 1:

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Ref. Level Offset [dB]	Detector	Sweep time [s]
11	POS	5m

Video BW [Hz]	RBW [Hz]
100k	100000



Start Freq [Hz]	Stop Freq [Hz]	Trace	Found Peak [dBm]	Found Peak [Hz]
2.439 GHz	2.443 GHz	MAXH	3.905	2.439 GHz

Result: Channel separation is: ~ 1 MHz

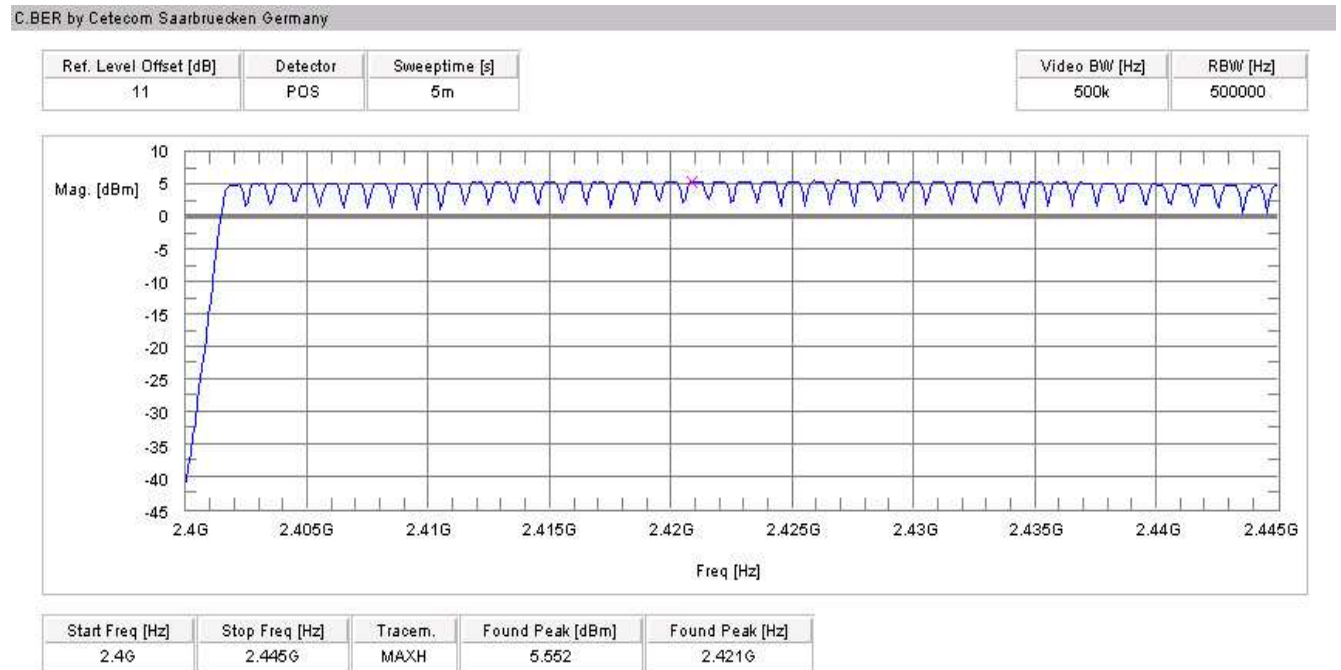
Limits:

Under normal test conditions only	Minimum 25 kHz or 20 dB Bandwidth of the hopping system
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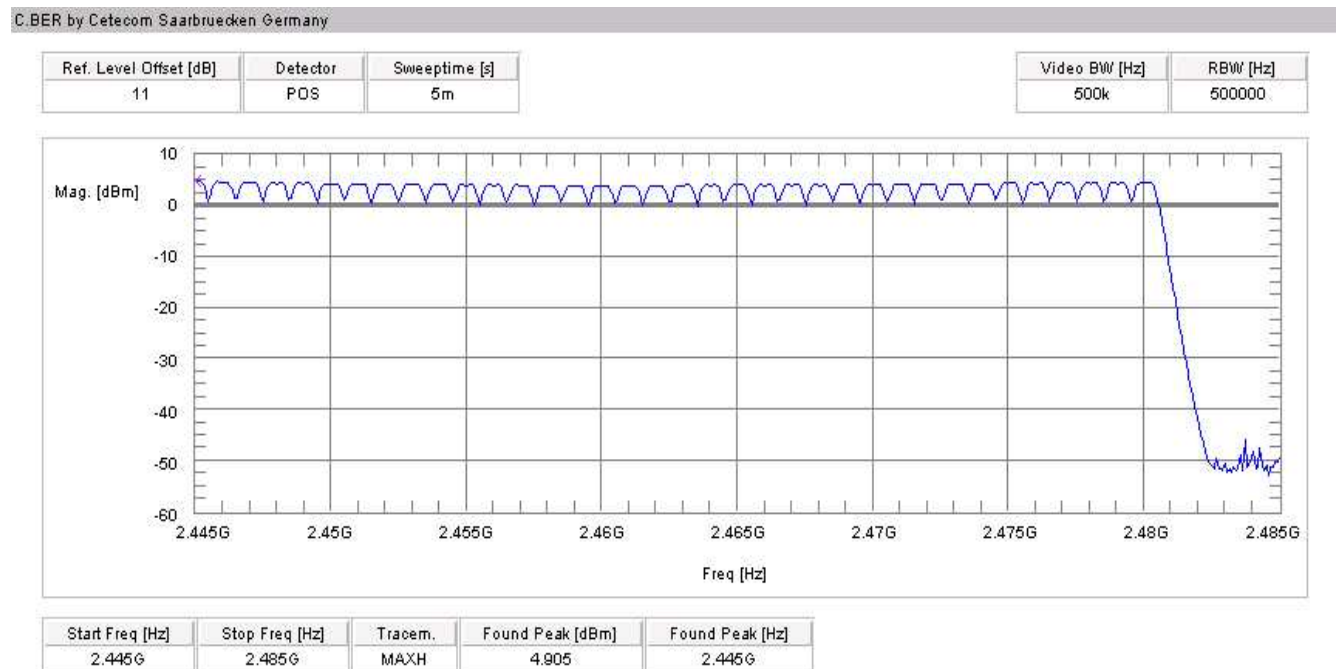
5.6 Number of hopping channels §15.247(a)(1)

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
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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)**

Not applicable!

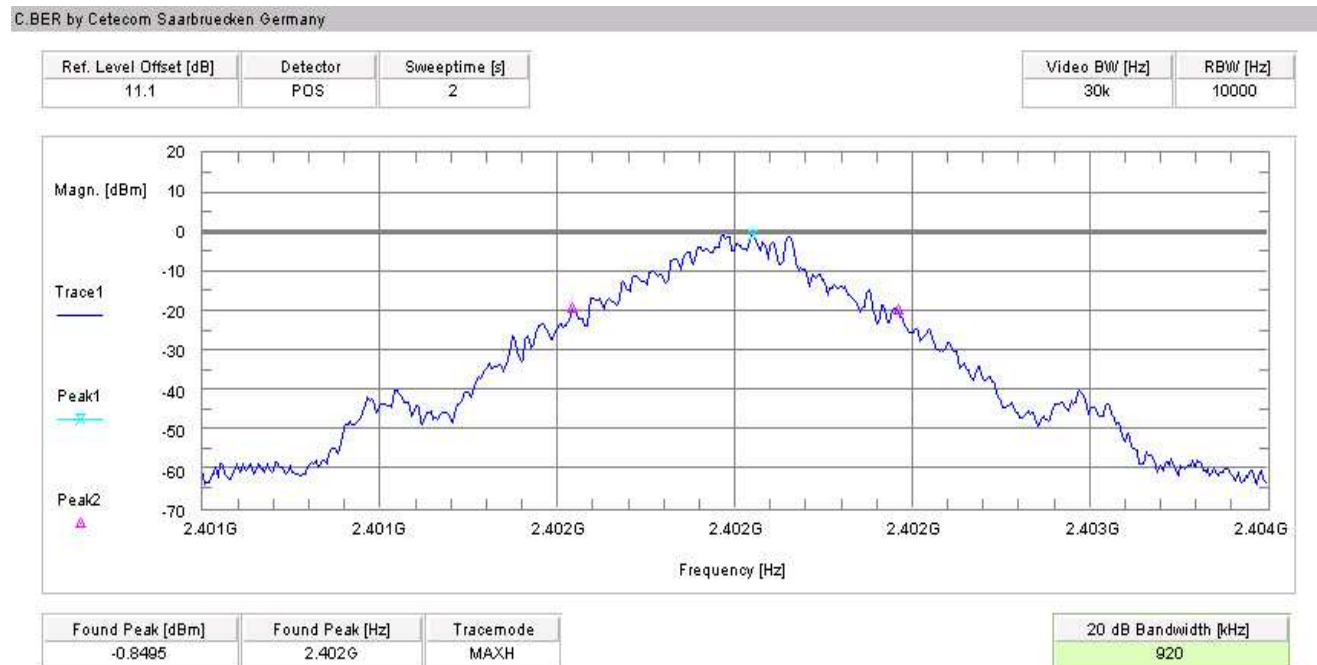
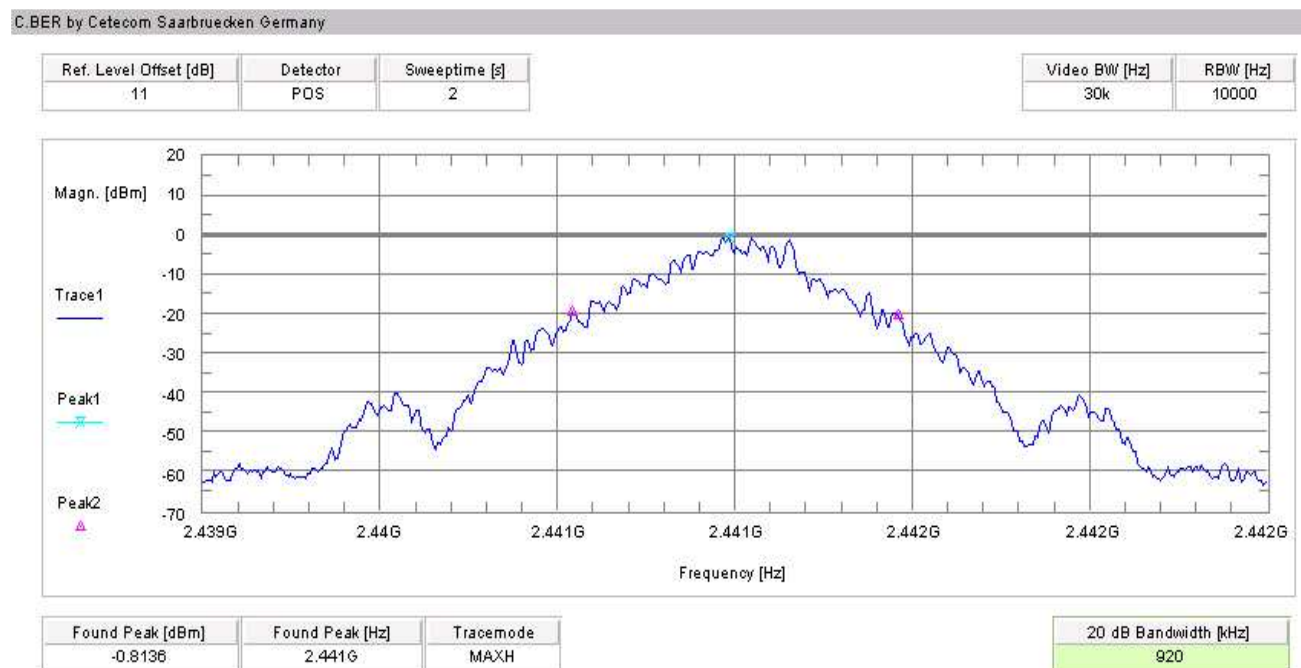
Not mandatory for FHSS system!

Plot 1 of 1:

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

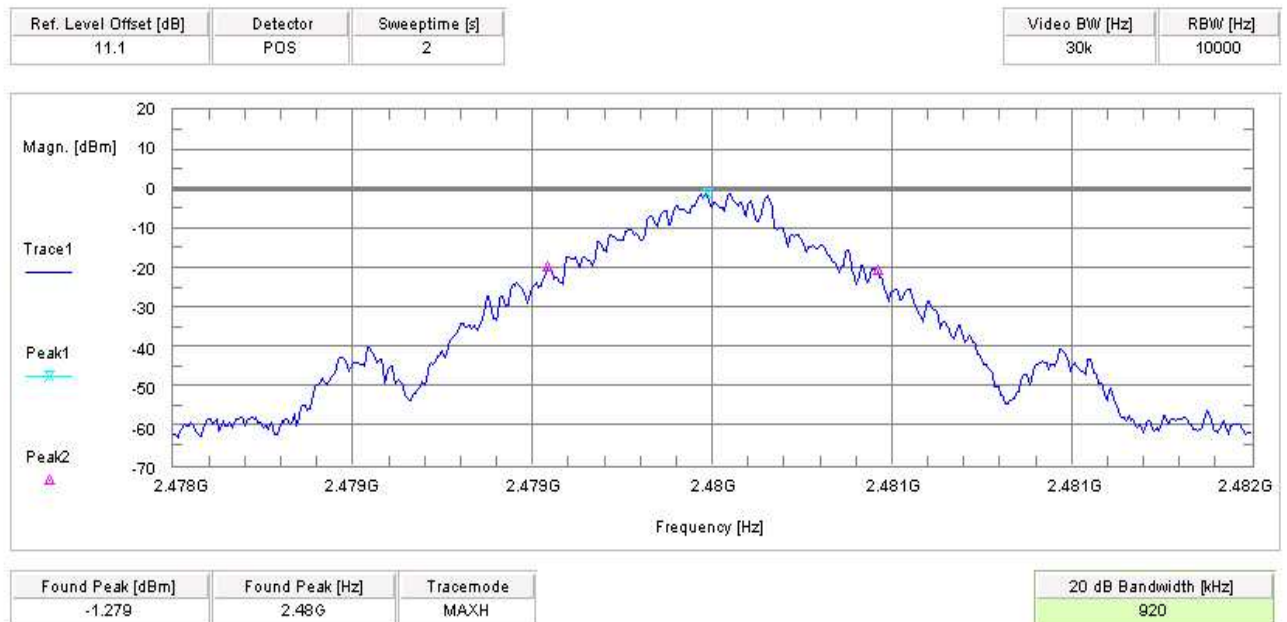
Limits:

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
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5.9 Spectrum Bandwidth of a FHSS System / 20dB Bandwidth §15.247(a)(1)**Plot 1: GFSK, low channel (00)****Plot 2: GFSK, mid channel (39)**

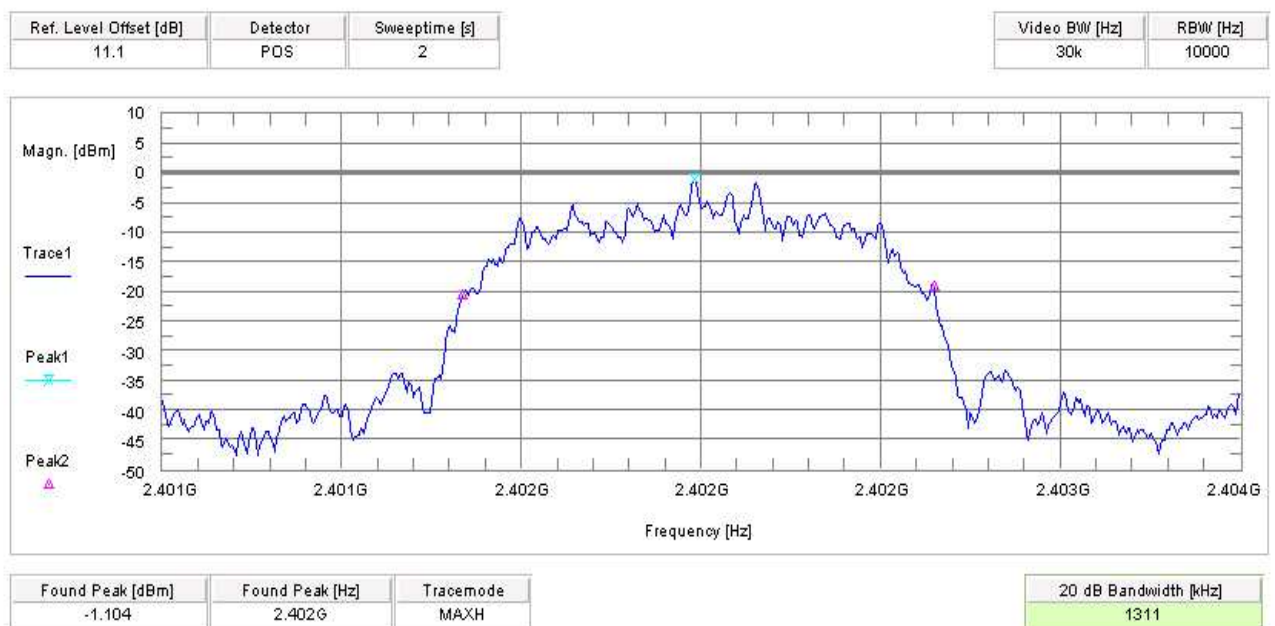
Plot 3: GFSK, high channel (78)

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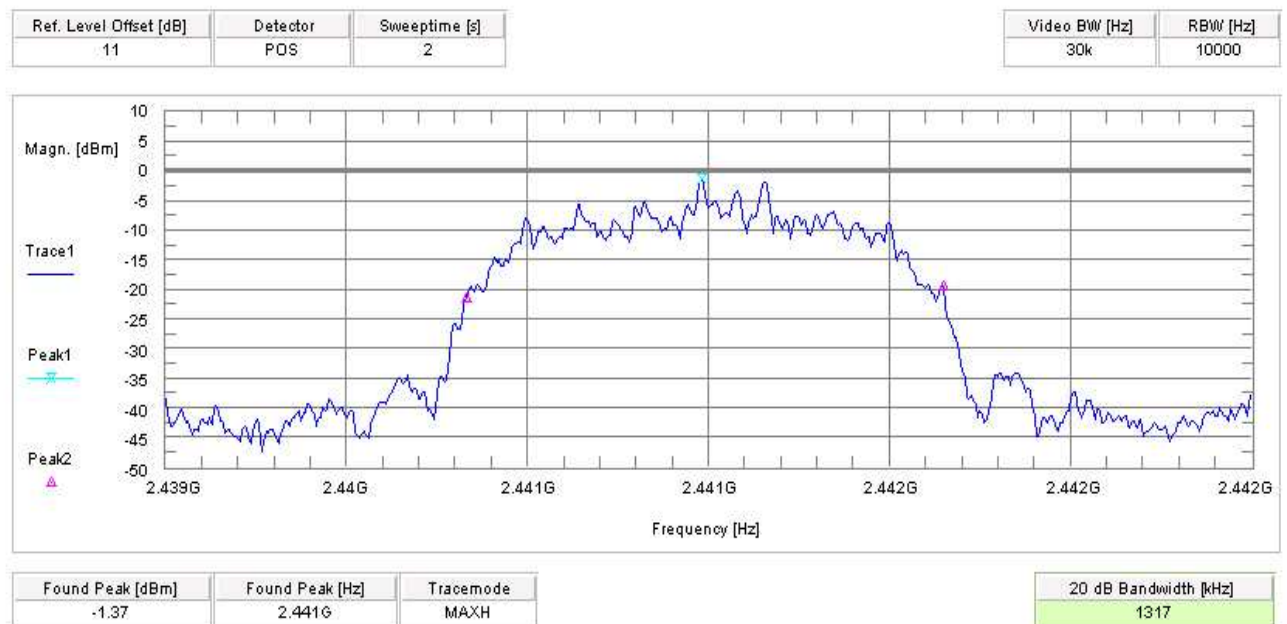
Plot 4: Pi/4 DQPSK, low channel (00)

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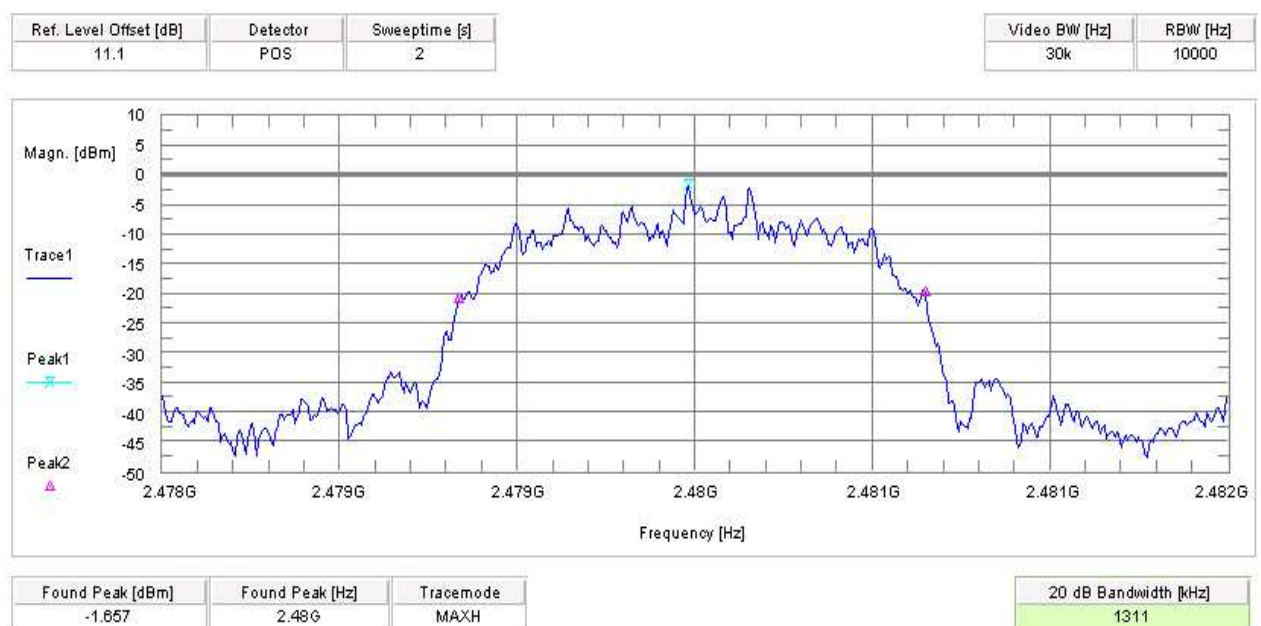
Plot 5: Pi/4 DQPSK, mid channel (39)

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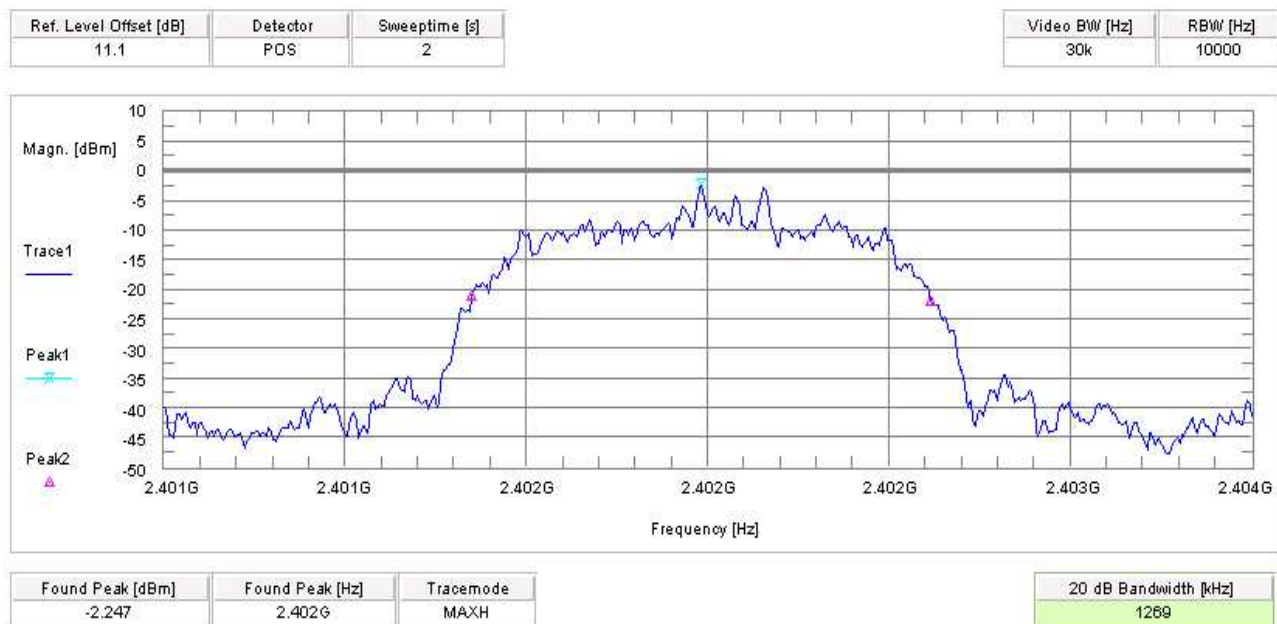
Plot 6: Pi/4 DQPSK, high channel (78)

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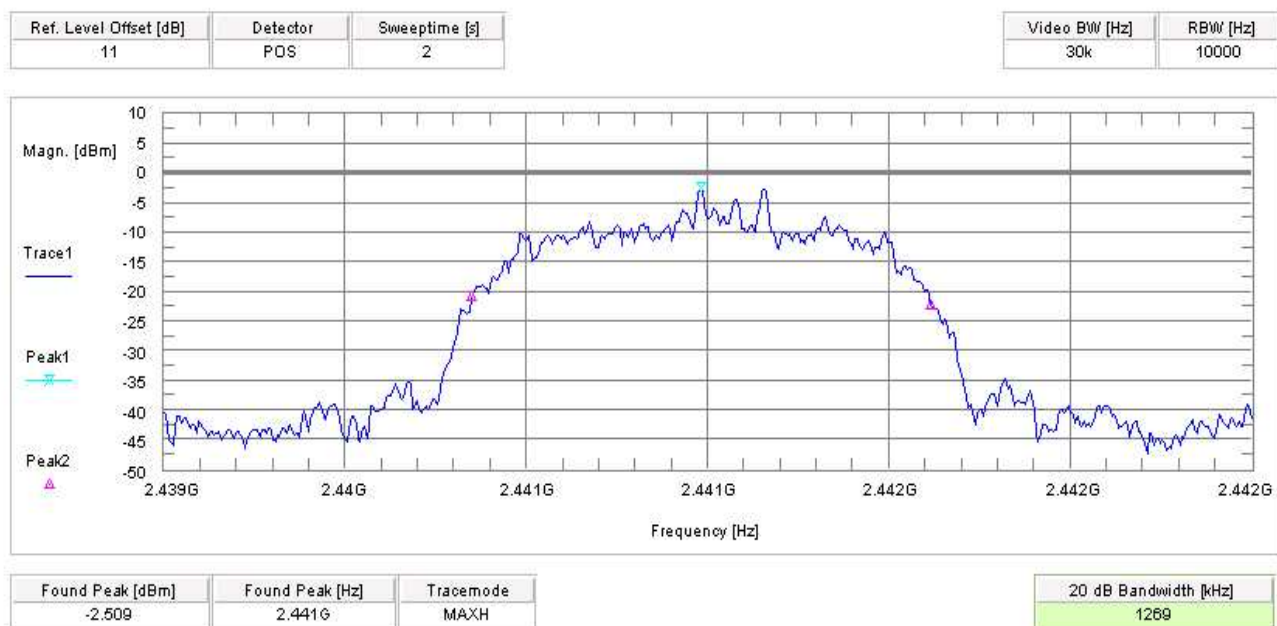
Plot 7: 8DPSK, low channel (00)

C.BER by Cetecom Saarbruecken Germany

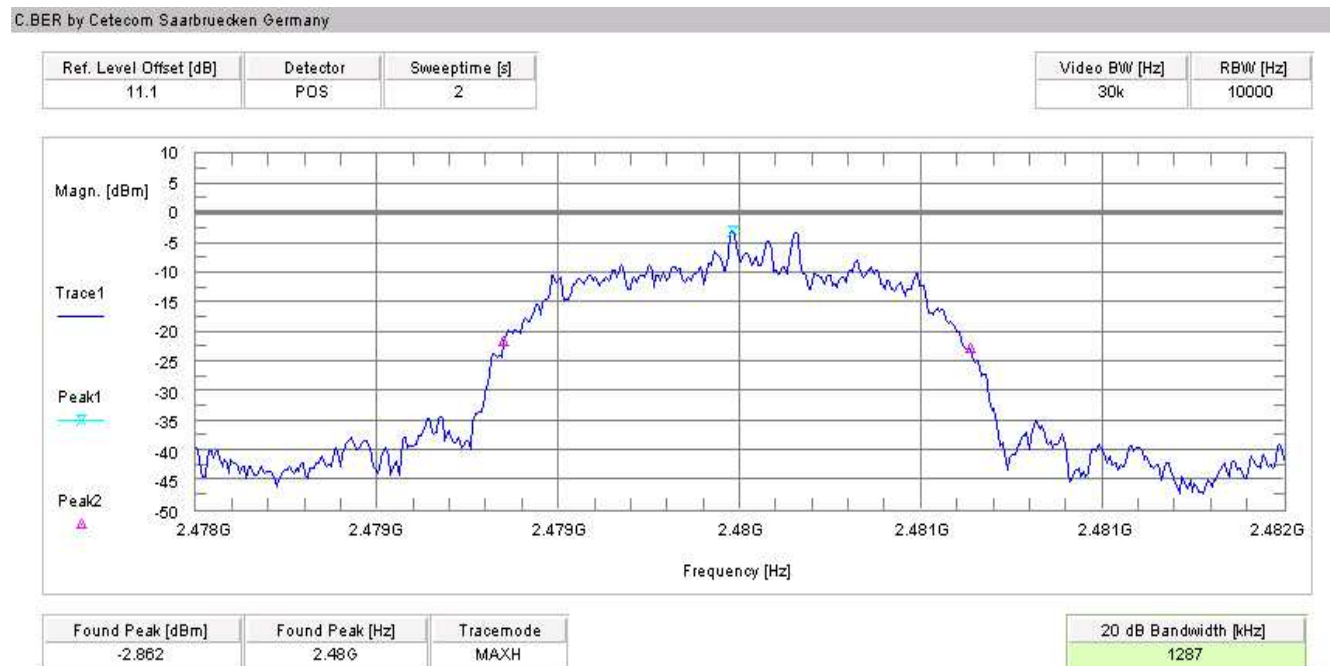


Plot 8: 8DPSK, mid channel (39)

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Plot 9: 8DPSK, high channel (78)



Results:

Modulation	20 dB BANDWIDTH [kHz]		
	2402	2441	2480
Frequency [MHz]			
GFSK	920	920	920
Pi/4 DQPSK	1311	1317	1311
8DPSK	1269	1269	1287
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
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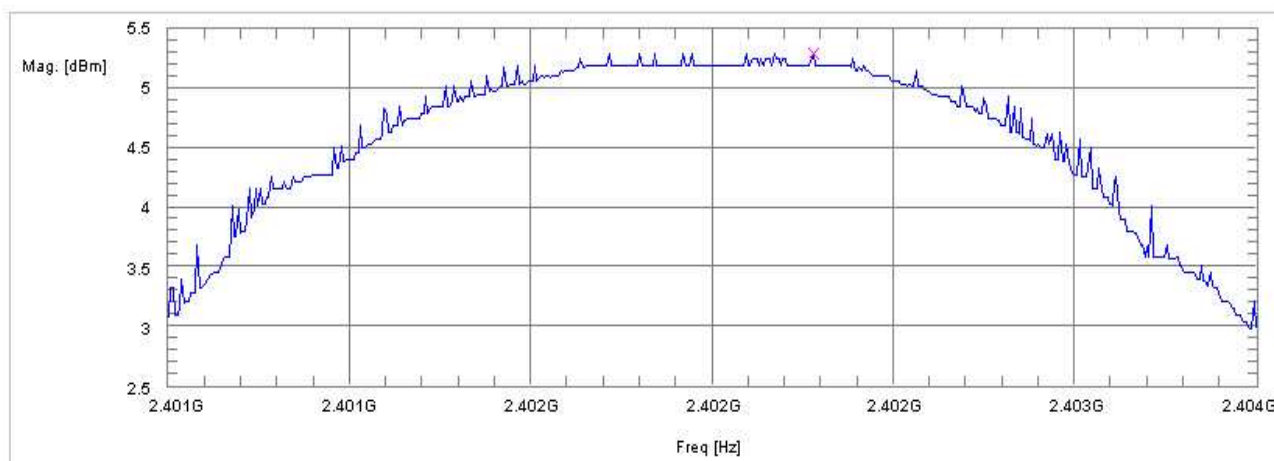
5.10 Maximum output power (conducted) § 15.247 (b)(1)

Plot 1: GFSK, low channel (00)

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Ref. Level Offset [dB]	Detector	Sweep time [s]
11.1	POS	5m

Video BW [Hz]	RBW [Hz]
3M	3000000



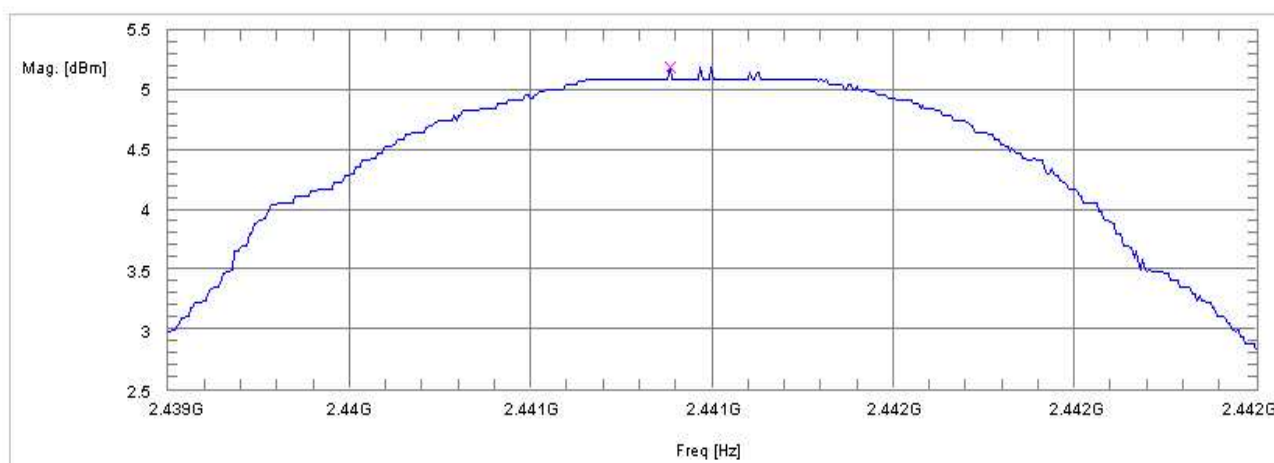
Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.401G	2.404G	MAXH	5.299	2.402G

Plot 2: GFSK, mid channel (39)

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Ref. Level Offset [dB]	Detector	Sweep time [s]
11	POS	5m

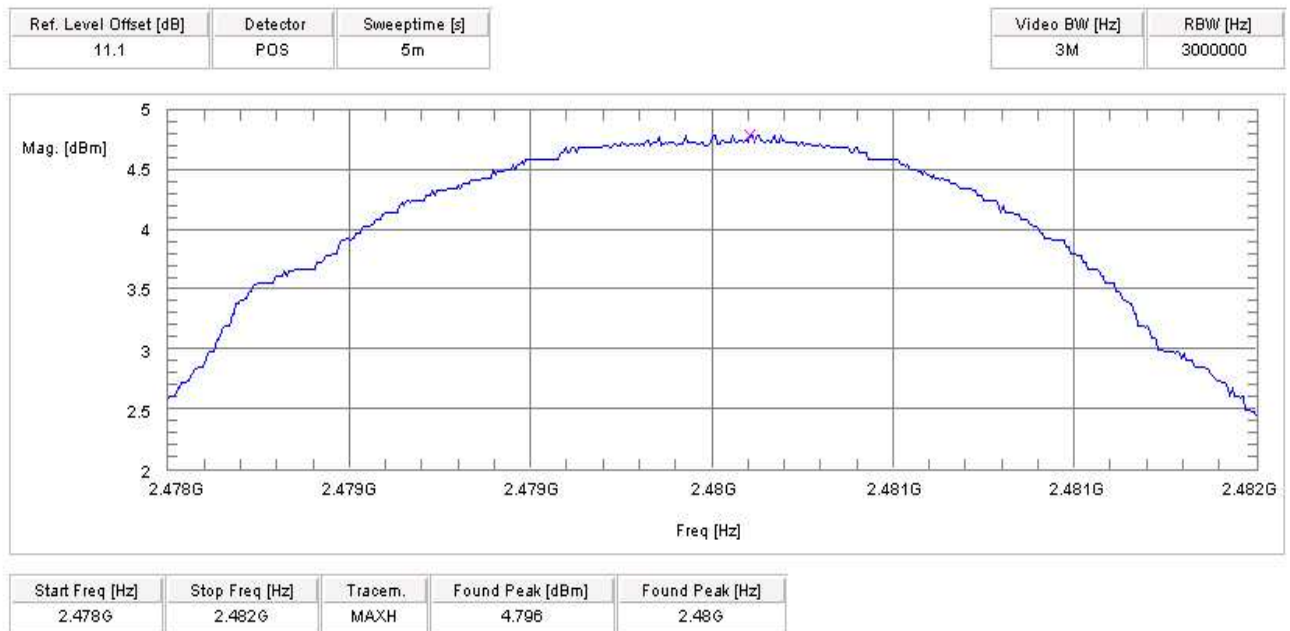
Video BW [Hz]	RBW [Hz]
3M	3000000



Start Freq [Hz]	Stop Freq [Hz]	Tracem.	Found Peak [dBm]	Found Peak [Hz]
2.439G	2.442G	MAXH	5.194	2.441G

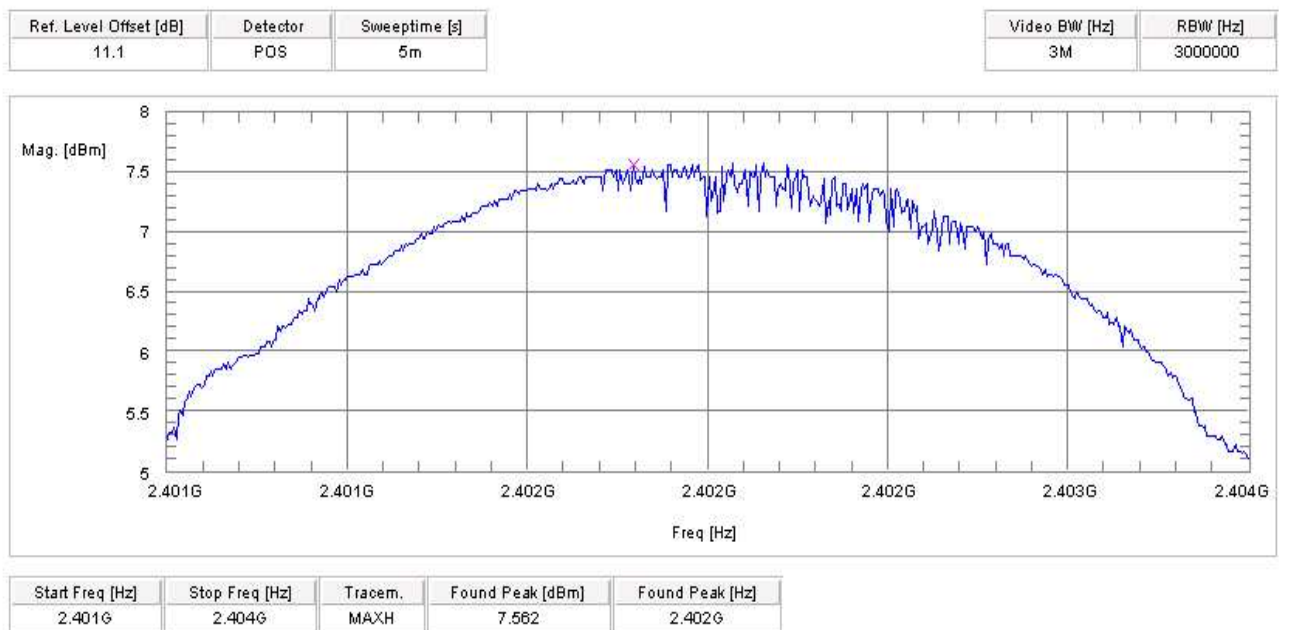
Plot 3: GFSK, high channel (78)

C.BER by Cetecom Saarbruecken Germany



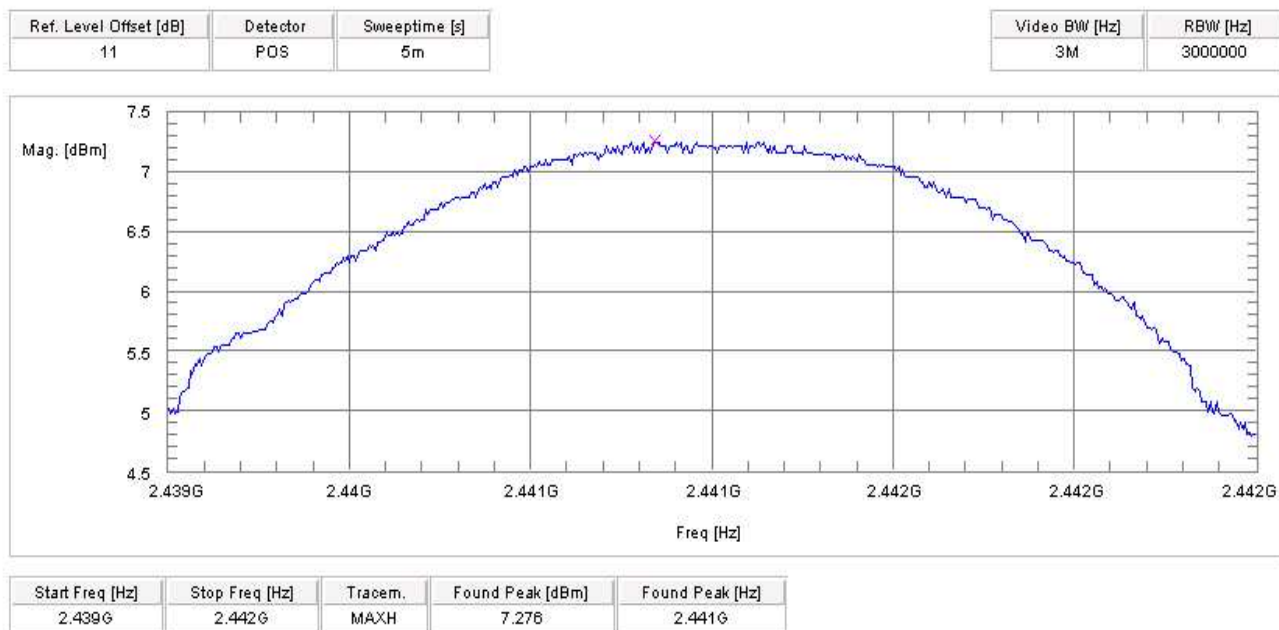
Plot 4: Pi/4 DQPSK, low channel (00)

C.BER by Cetecom Saarbruecken Germany



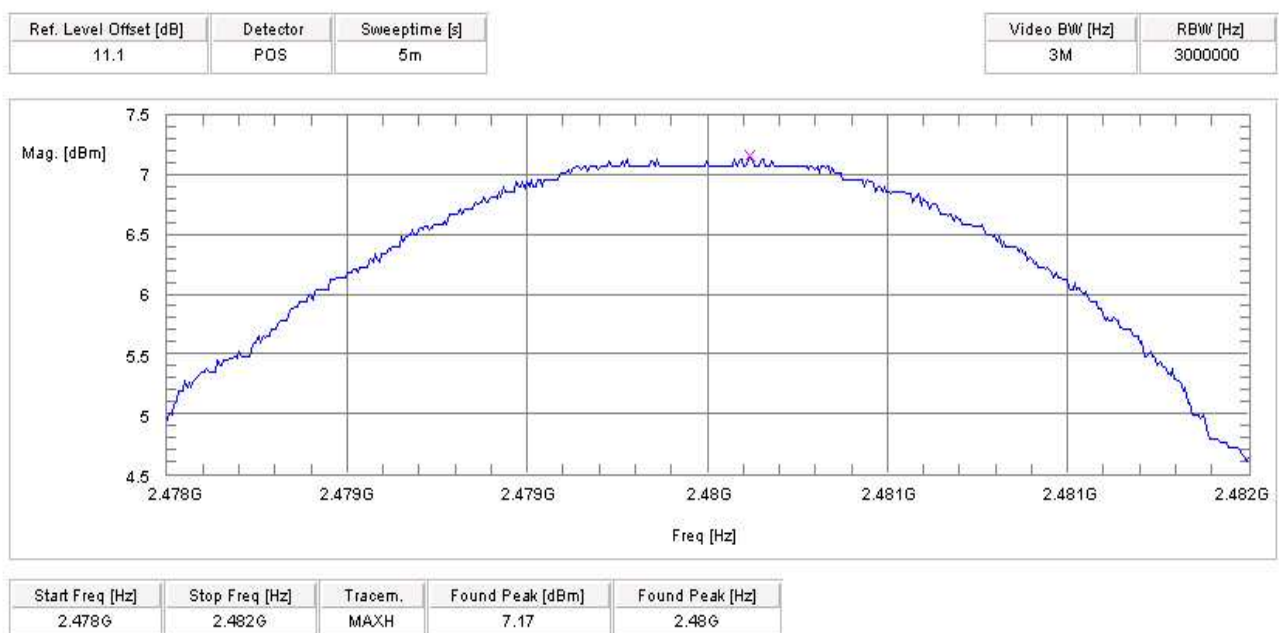
Plot 5: Pi/4 DQPSK, mid channel (39)

C.BER by Cetecom Saarbruecken Germany

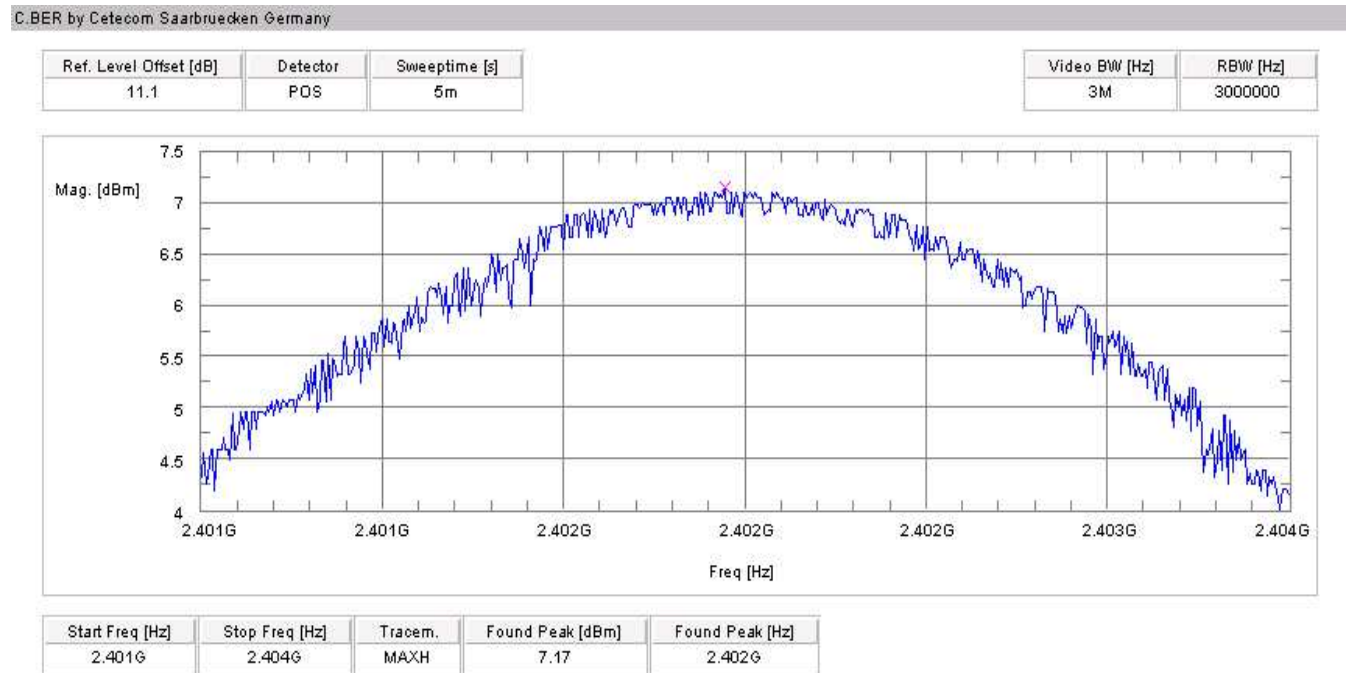


Plot 6: Pi/4 DQPSK, high channel (78)

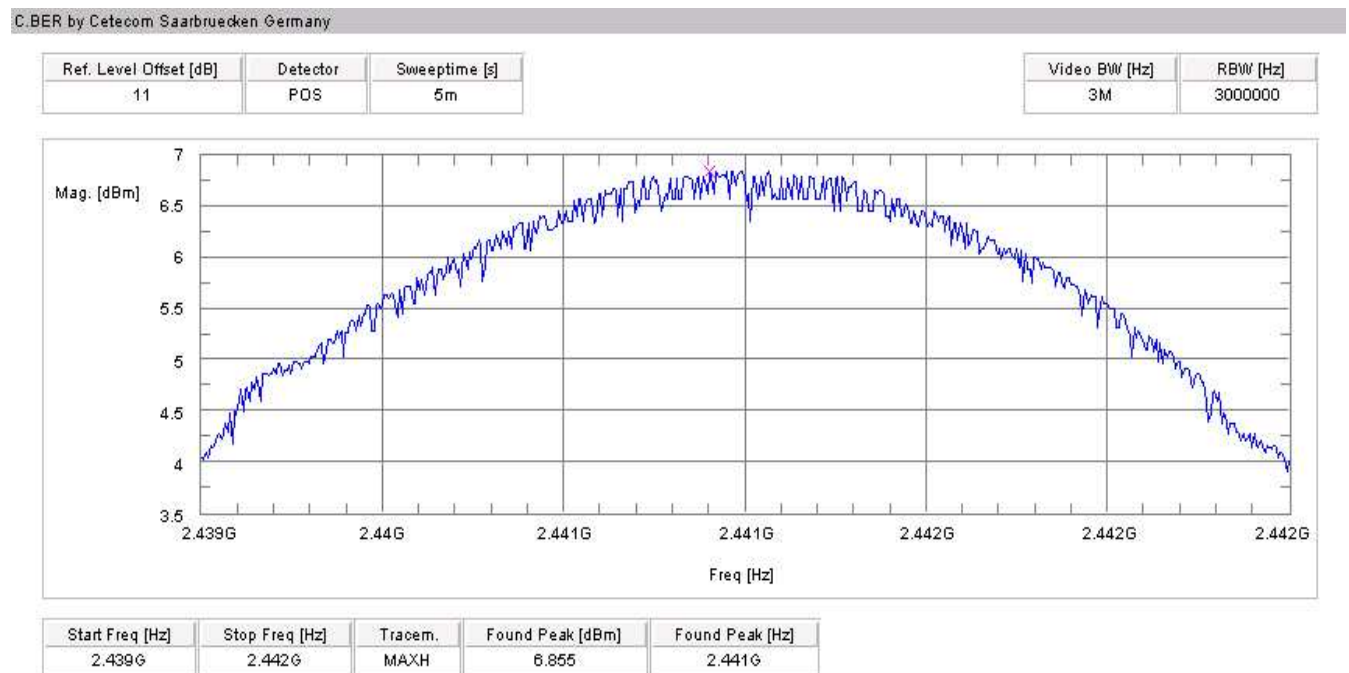
C.BER by Cetecom Saarbruecken Germany



Plot 7: 8DPSK, low channel (00)

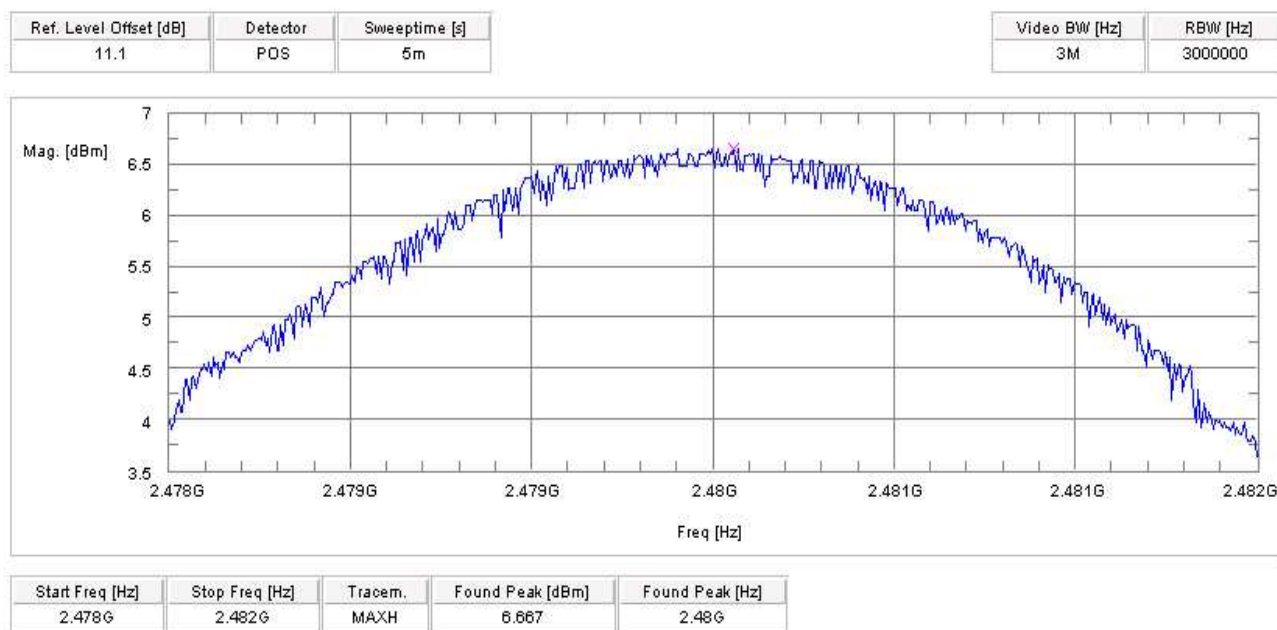


Plot 8: 8DPSK, mid channel (39)



Plot 9: 8DPSK, high channel (78)

C.BER by Cetecom Saarbruecken Germany



Results: positive peak values

Modulation Frequency [MHz]	Max. peak output power [dBm]		
	2402	2441	2480
GFSK	5.30	5.19	4.80
Pi/4 DQPSK	7.56	7.28	7.17
8DPSK	7.17	6.86	6.67
Measurement uncertainty	±2dB		

RBW / VBW: 3 MHz

Results: average values (measured with R&S NRP power meter)

Modulation Frequency [MHz]	Max. peak output power [dBm]		
	2402	2441	2480
GFSK	2.6	2.4	1.9
Pi/4 DQPSK	2.3	2.2	1.7
8DPSK	1.2	1.2	0.5
Measurement uncertainty	±2dB		

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: positive peak values

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T _{nom}	V _{nom}	6.21	5.26	5.06
Measurement uncertainty		±3dB		

Modulation: Pi/4 DQPSK

Results: positive peak values

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T _{nom}	V _{nom}	8.47	7.35	7.43
Measurement uncertainty		±3dB		

Modulation: 8 DPSK

Results: positive peak values

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T _{nom}	V _{nom}	8.08	6.93	6.93
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
--	---------------

Modulation: GFSK**Results: average values (calculated with the antenna gain and the conducted average power)**

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T _{nom}	V _{nom}	3.51	2.47	2.16
Measurement uncertainty		±3dB		

Modulation: Pi/4 DQPSK**Results: average values (calculated with the antenna gain and the conducted average power)**

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T _{nom}	V _{nom}	3.21	2.27	1.96
Measurement uncertainty		±3dB		

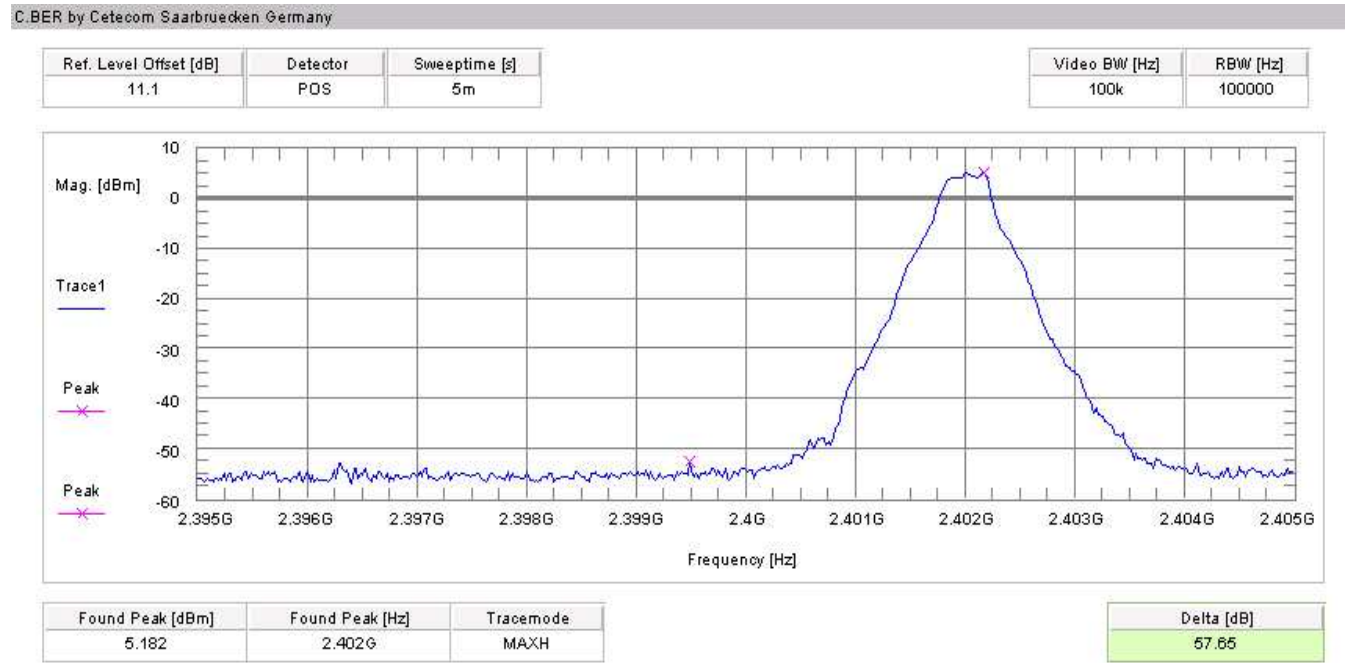
Modulation: 8 DPSK**Results: average values (calculated with the antenna gain and the conducted average power)**

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T _{nom}	V _{nom}	2.11	1.27	0.76
Measurement uncertainty		±3dB		

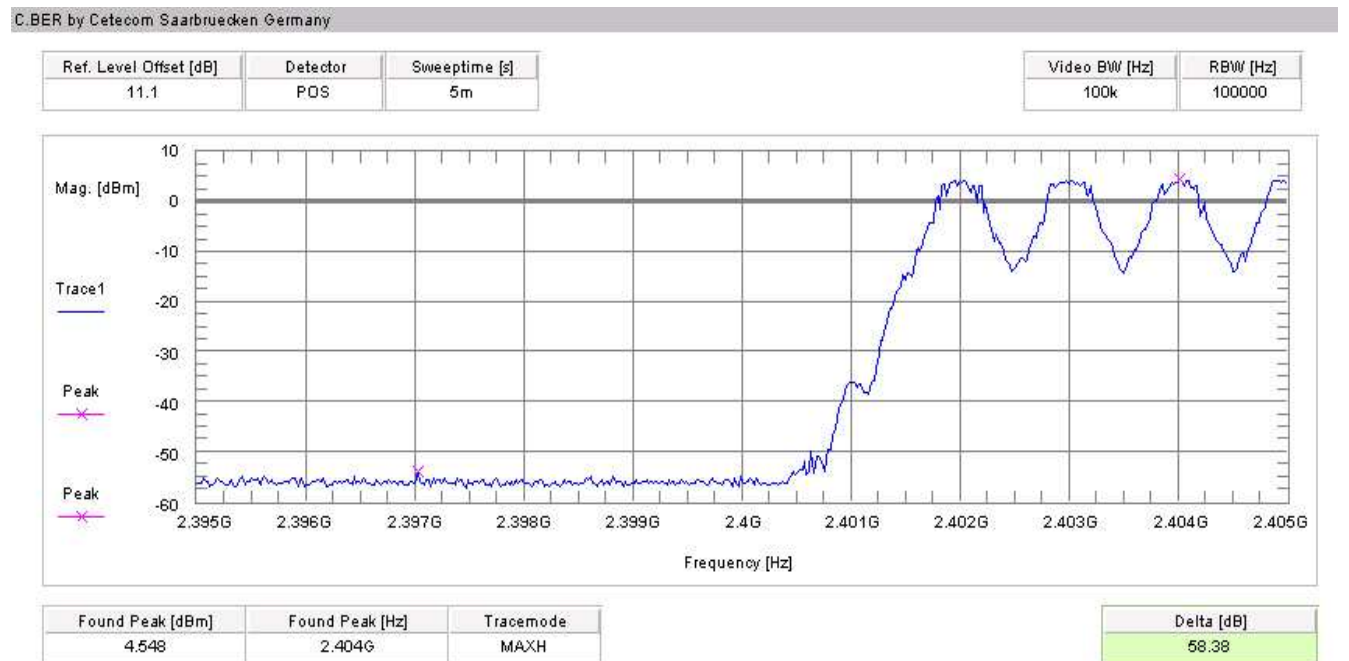
5.12 Band-edge compliance of conducted emissions §15.247 (d)

Modulation: GFSK

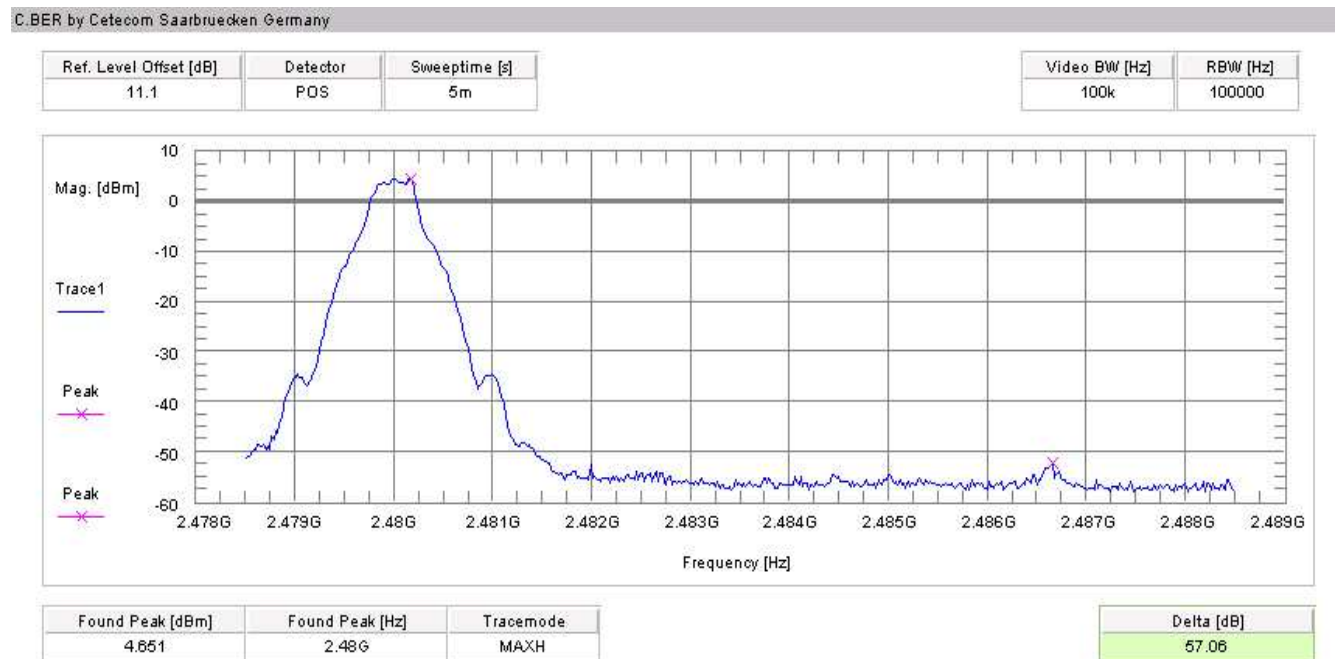
Plot 1 of 4 (hopping off, lowest frequency):



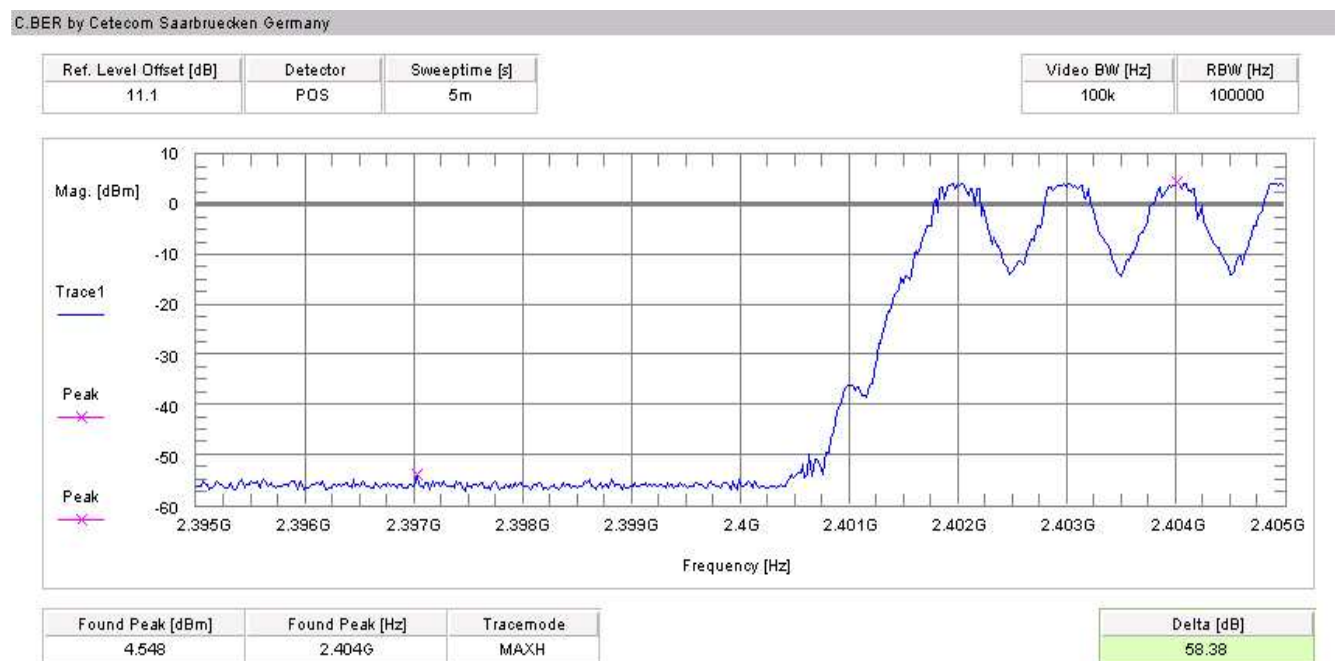
Plot 2 of 4 (hopping on, lowest frequency):



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



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



Results:

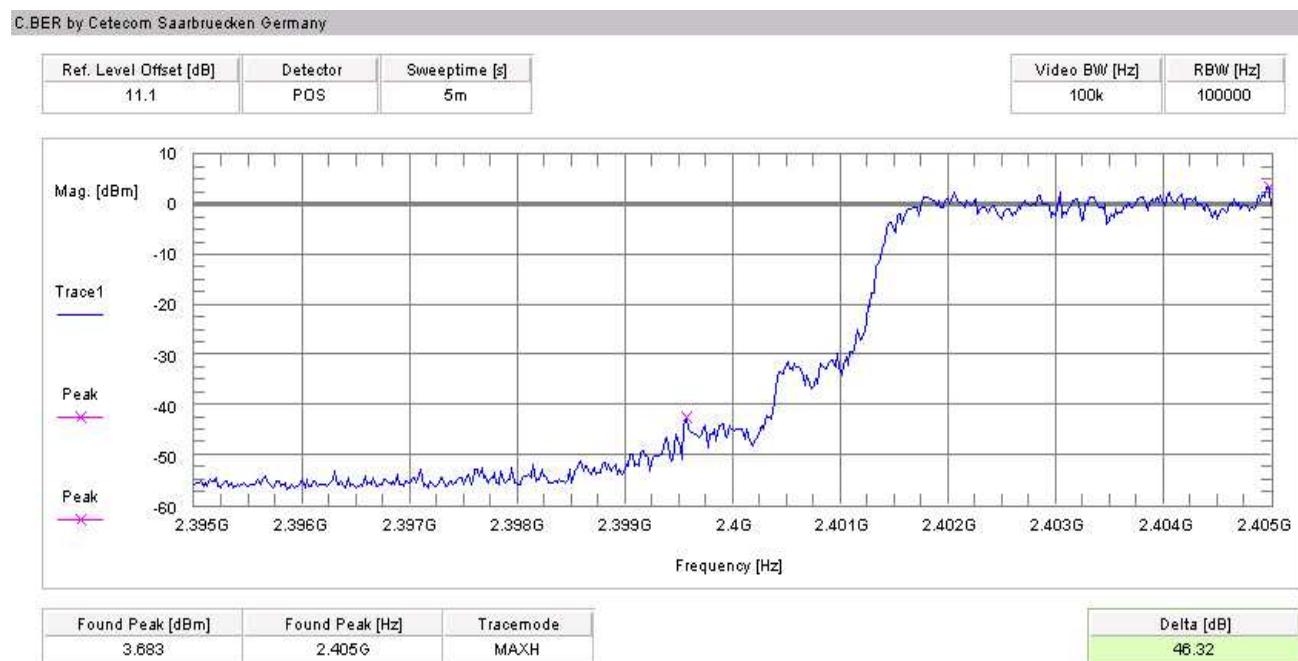
SZENARIO	DELTA VALUE [DB]
hopping off, lowest frequency	> 20 dB
hopping on, lowest frequency	> 20 dB
hopping off, highest frequency	> 20 dB
hopping on, highest frequency	> 20 dB
Measurement uncertainty	±1,5dB

Modulation: Pi/4 DQPSK

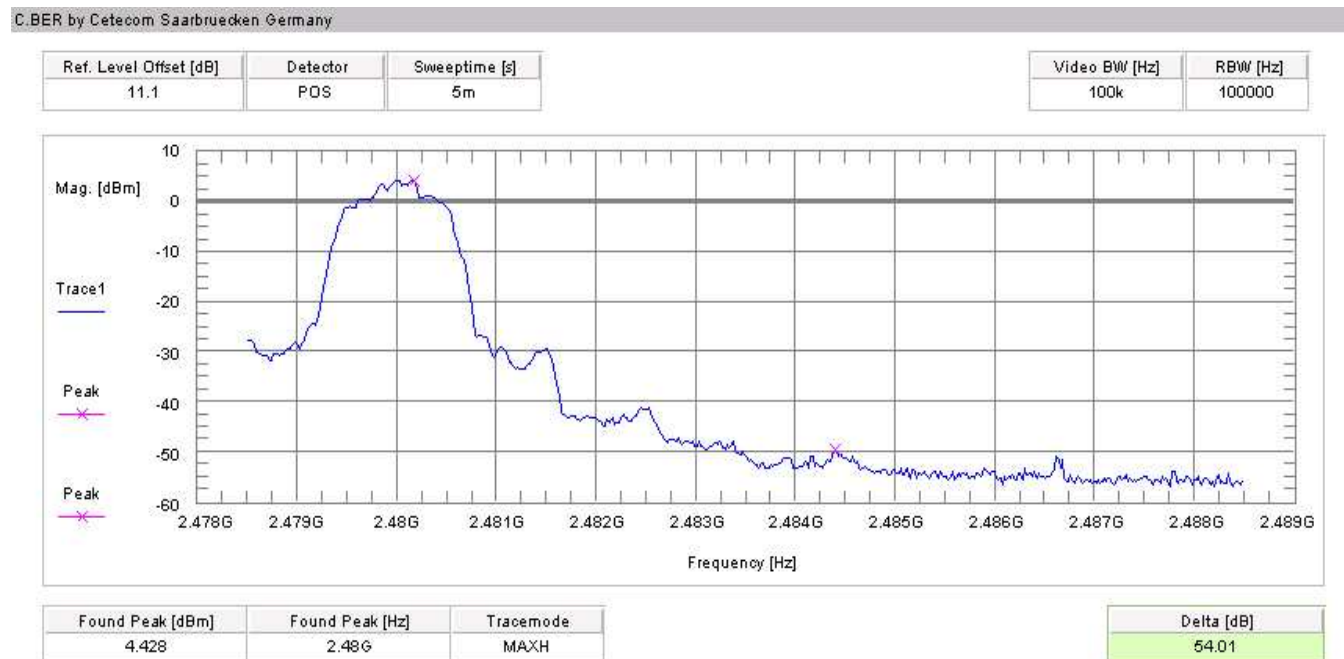
Plot 1 of 4 (hopping off, lowest frequency):



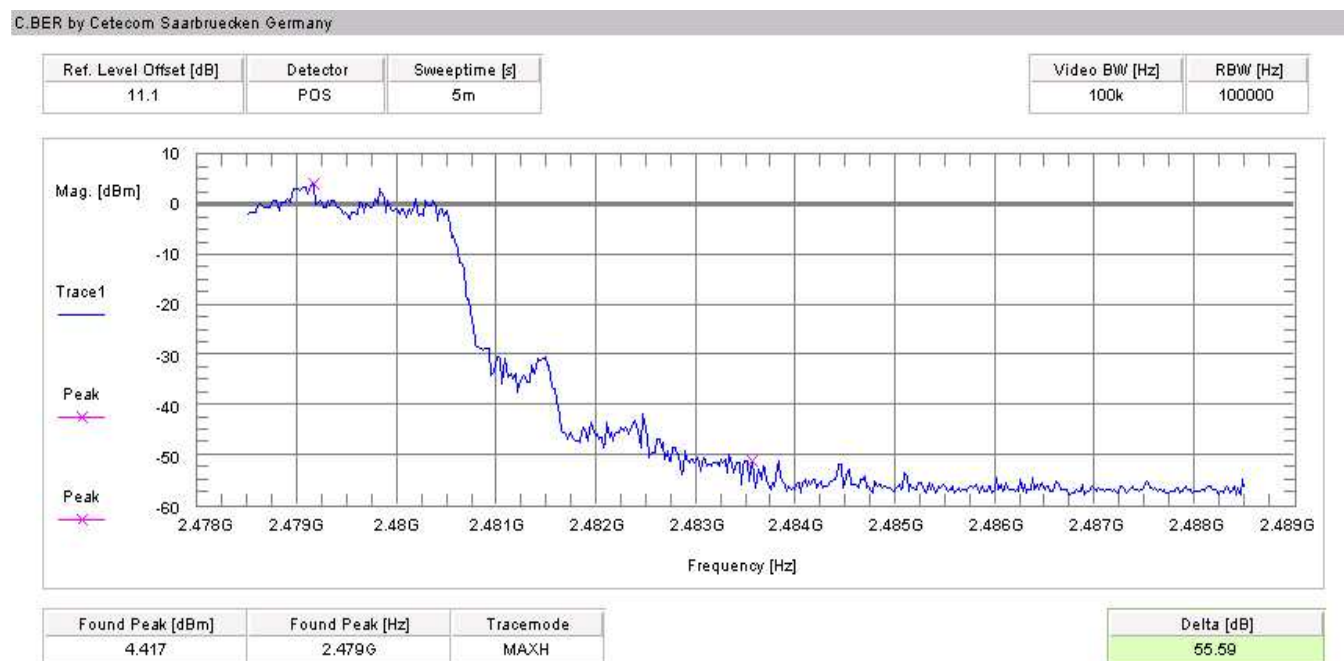
Plot 2 of 4 (hopping on, lowest frequency):



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

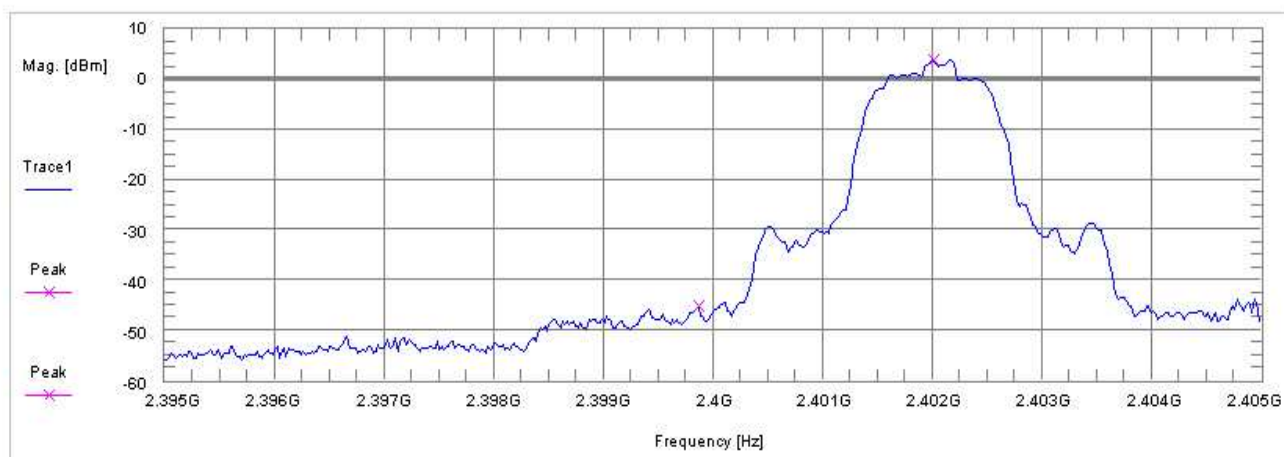
Modulation: 8 DPSK

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

C.BER by Cetecom Saarbruecken Germany

Ref. Level Offset [dB]	Detector	Sweeptime [s]
11.1	POS	5m

Video BW [Hz]	RBW [Hz]
100k	100000



Found Peak [dBm]	Found Peak [Hz]	Tracemode
3.805	2.402 G	MAXH

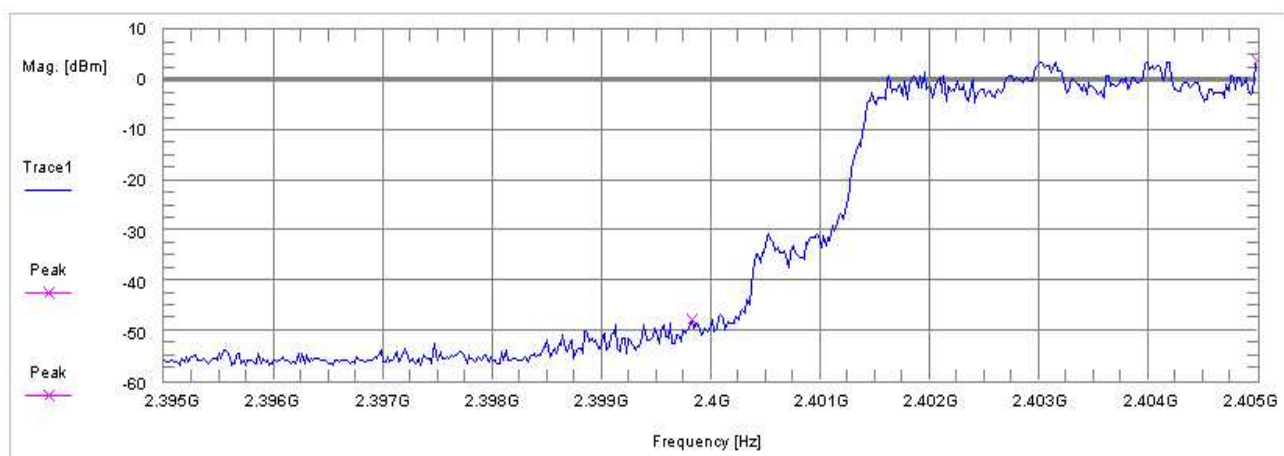
Delta [dB]
48.95

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

C.BER by Cetecom Saarbruecken Germany

Ref. Level Offset [dB]	Detector	Sweeptime [s]
11.1	POS	5m

Video BW [Hz]	RBW [Hz]
100k	100000

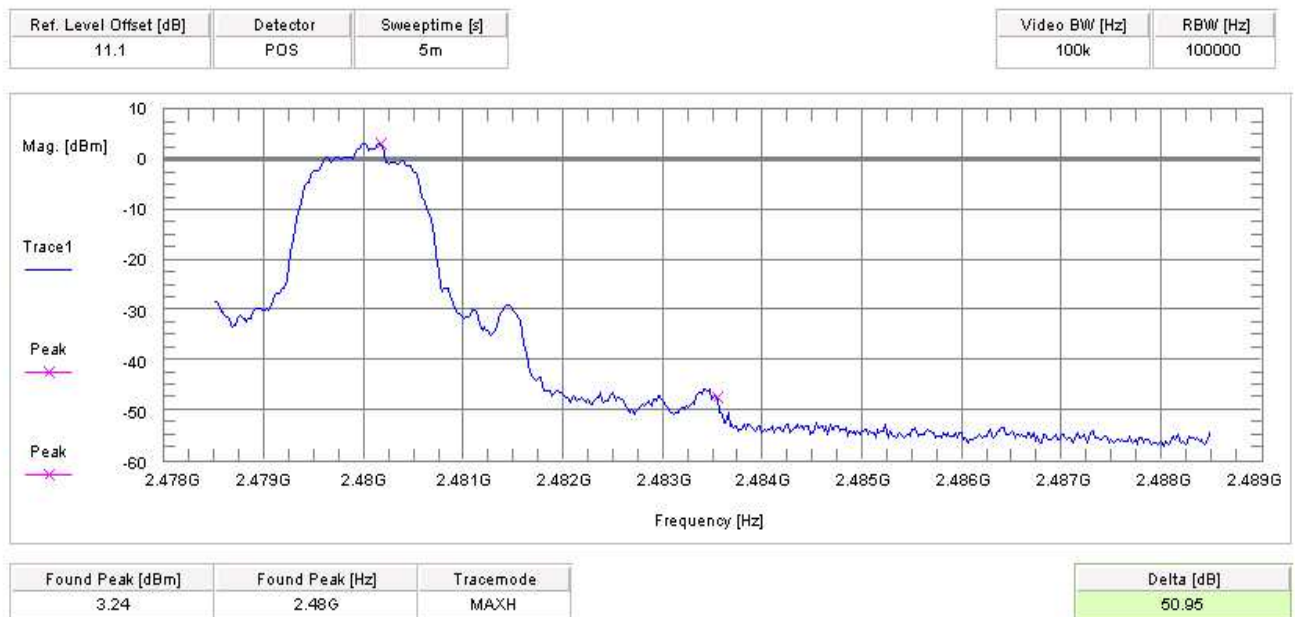


Found Peak [dBm]	Found Peak [Hz]	Tracemode
3.809	2.405 G	MAXH

Delta [dB]
51.78

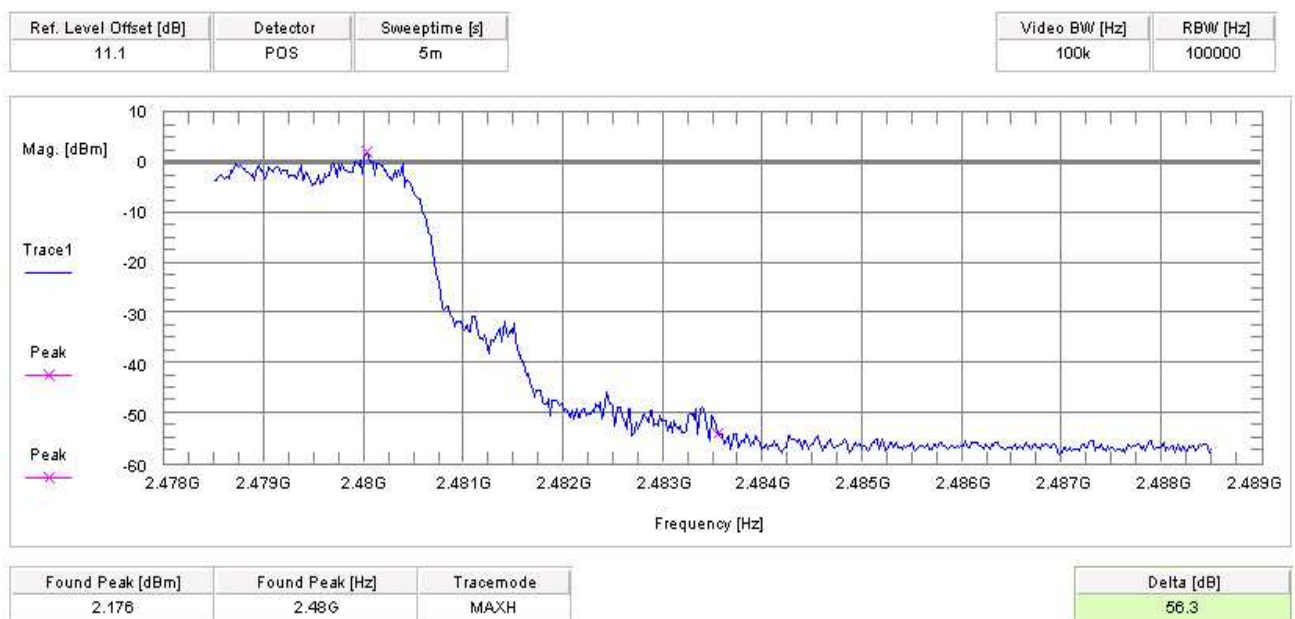
Plot 3 of 4 (hopping off, highest frequency):

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

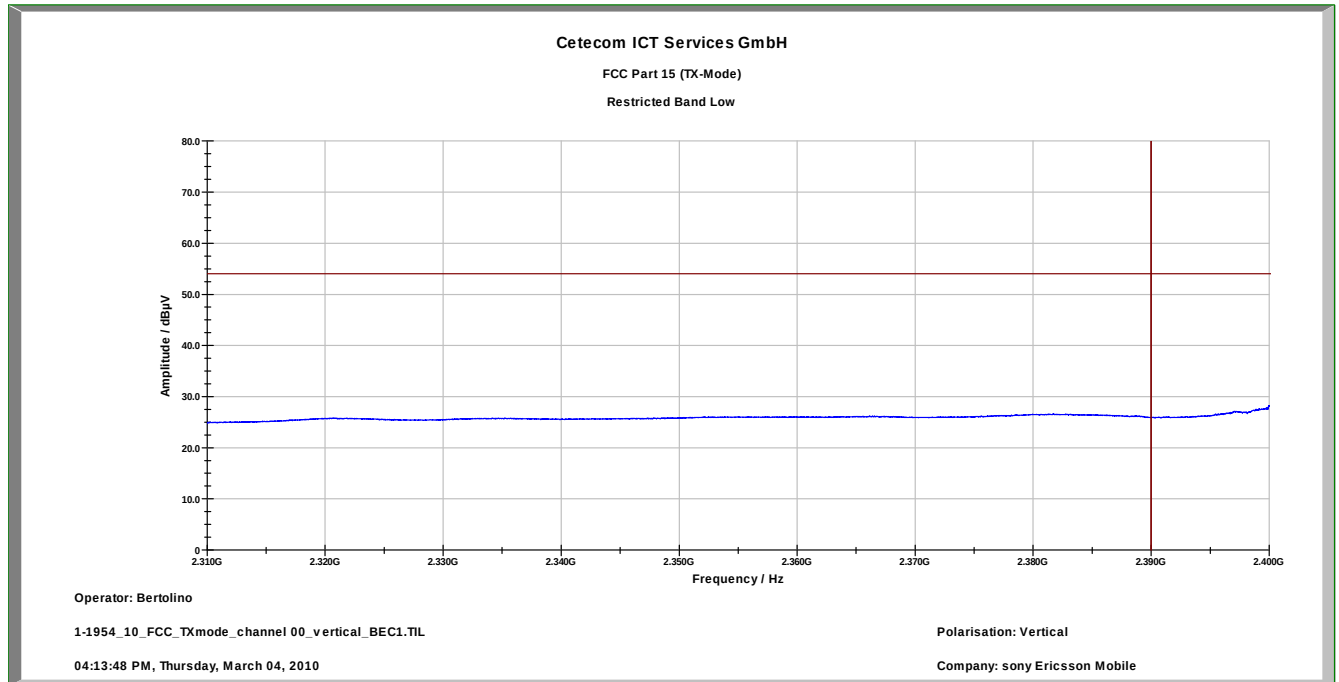
Limits:

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)).
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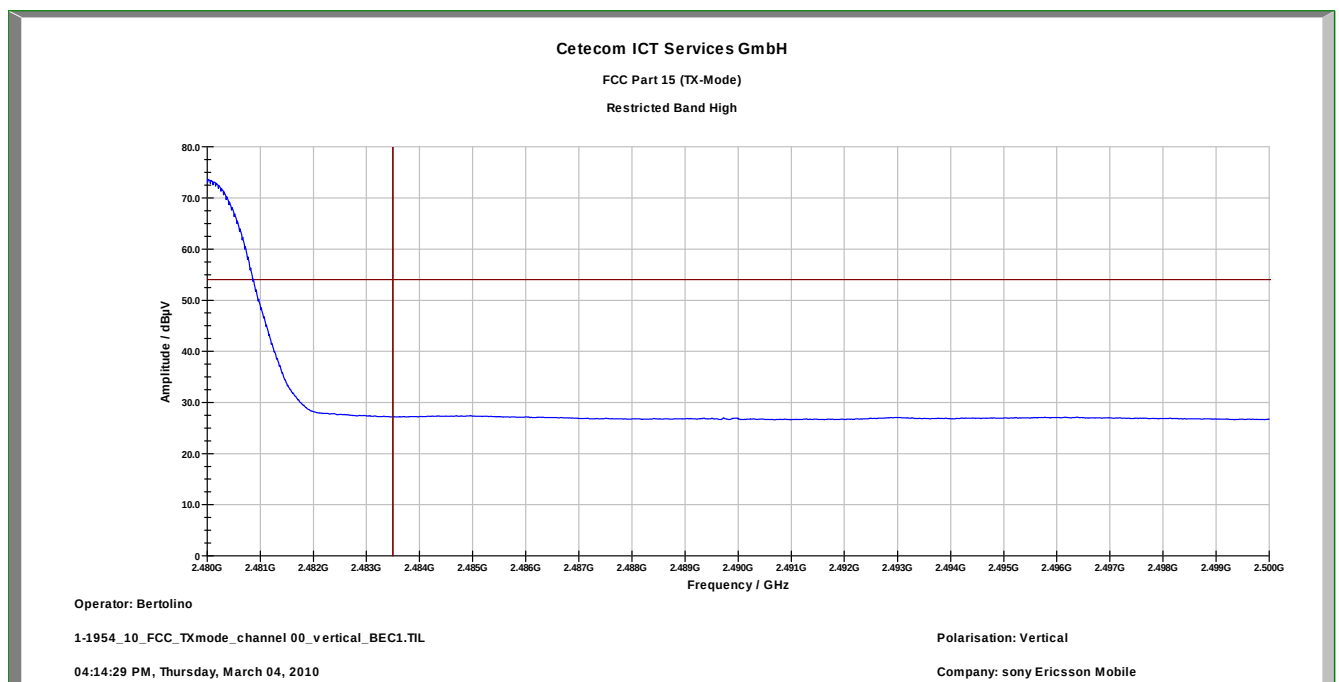
5.13 Band-edge compliance of radiated emissions §15.205

Modulation: GFSK

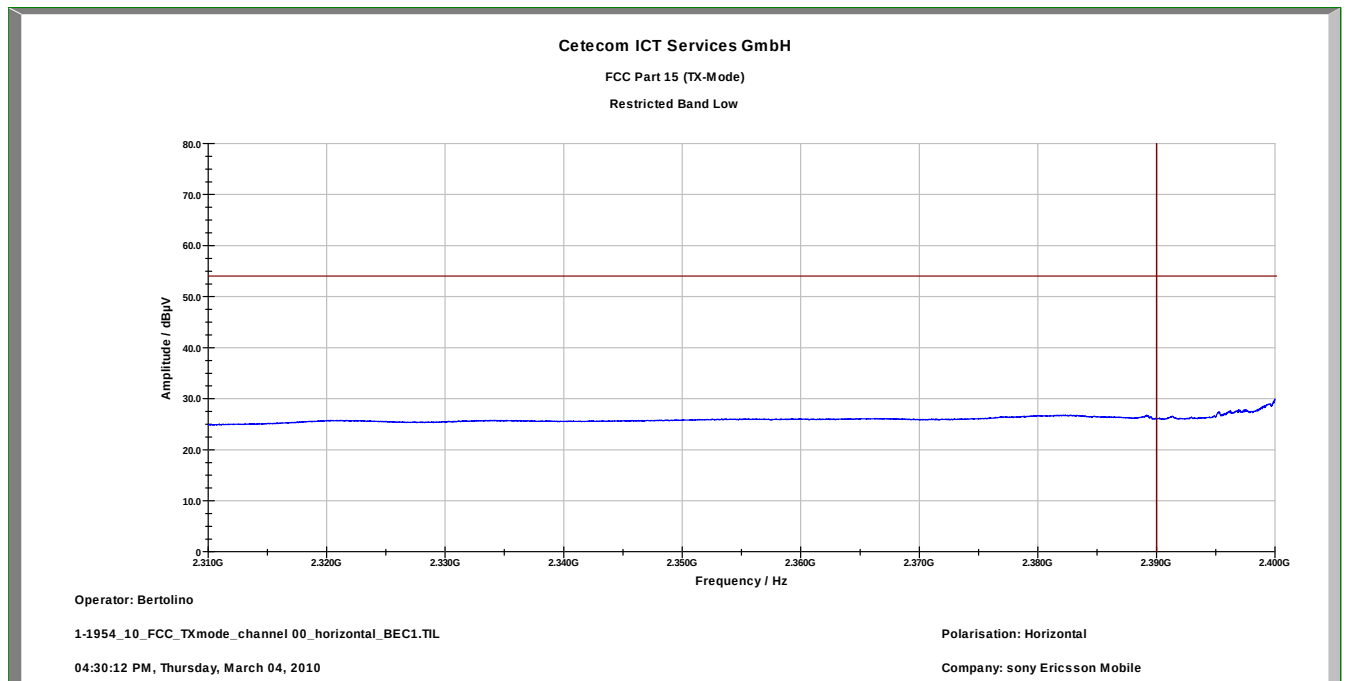
Plot 1: Restricted Bands low, vertical polarization



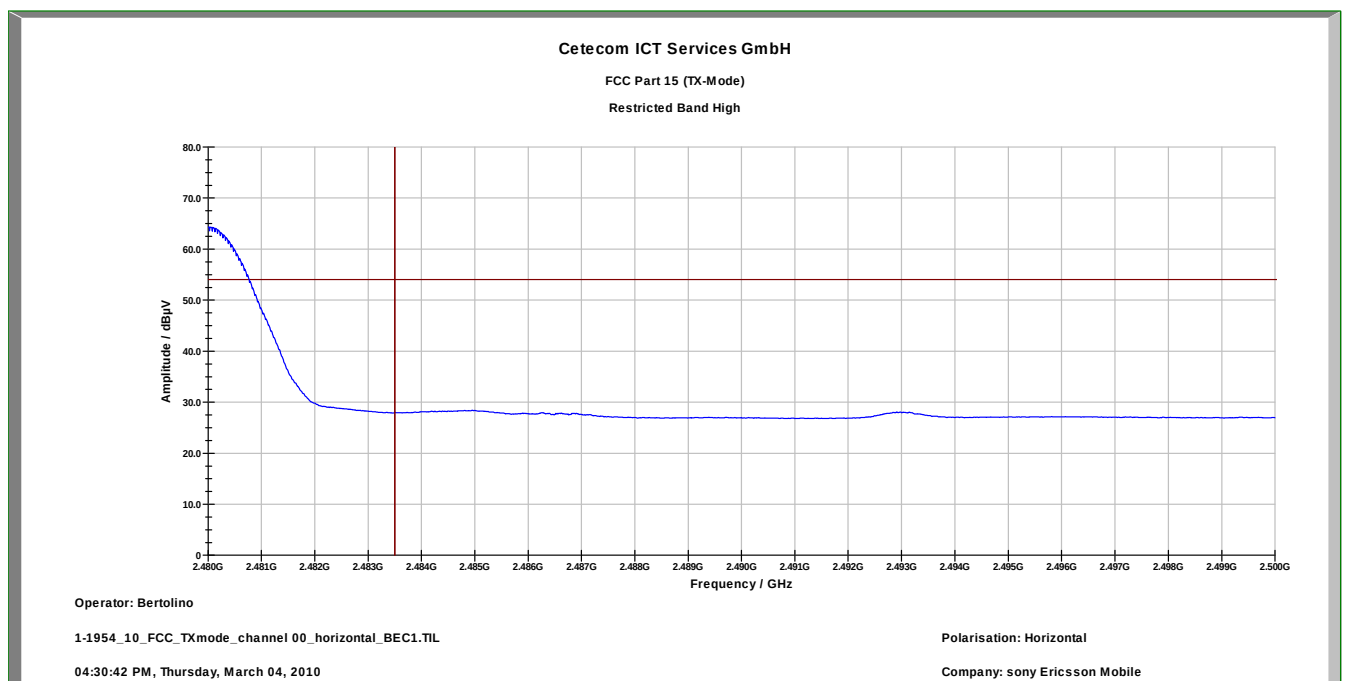
Plot 2: Restricted Bands high, vertical polarization



Plot 3: Restricted Bands low, horizontal polarization

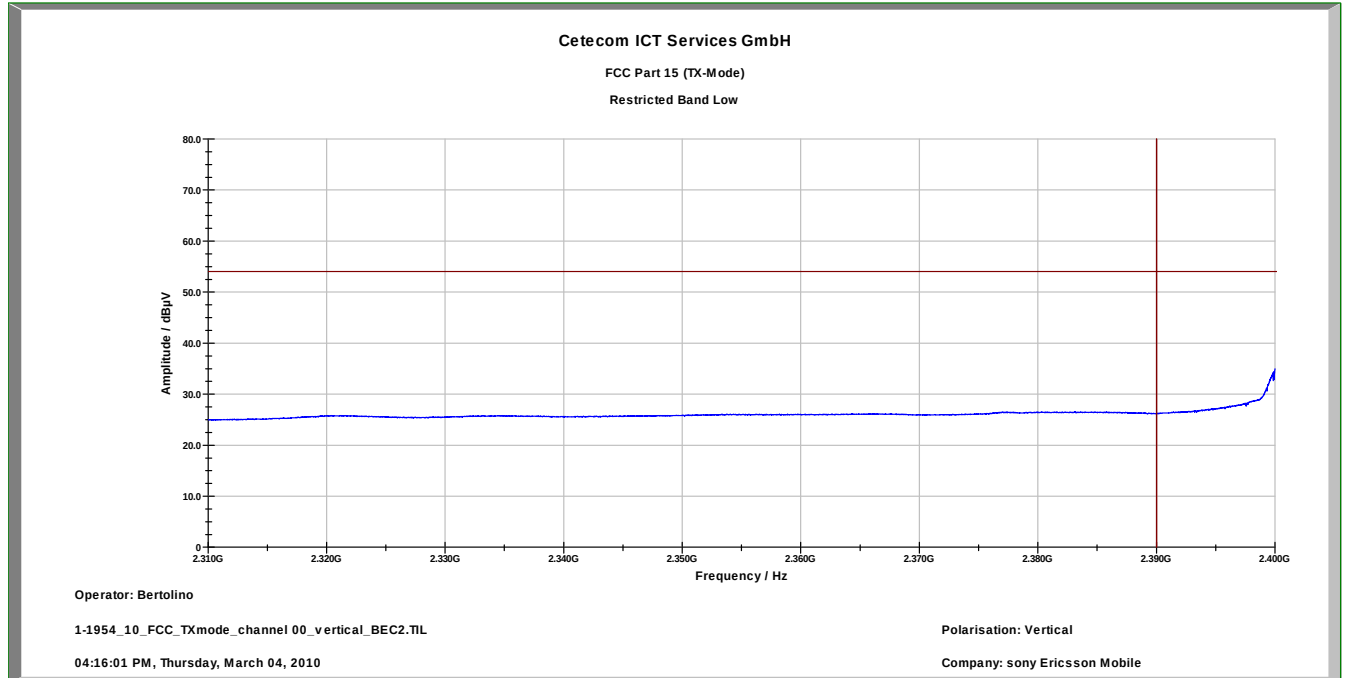


Plot 4: Restricted Bands high, horizontal polarization

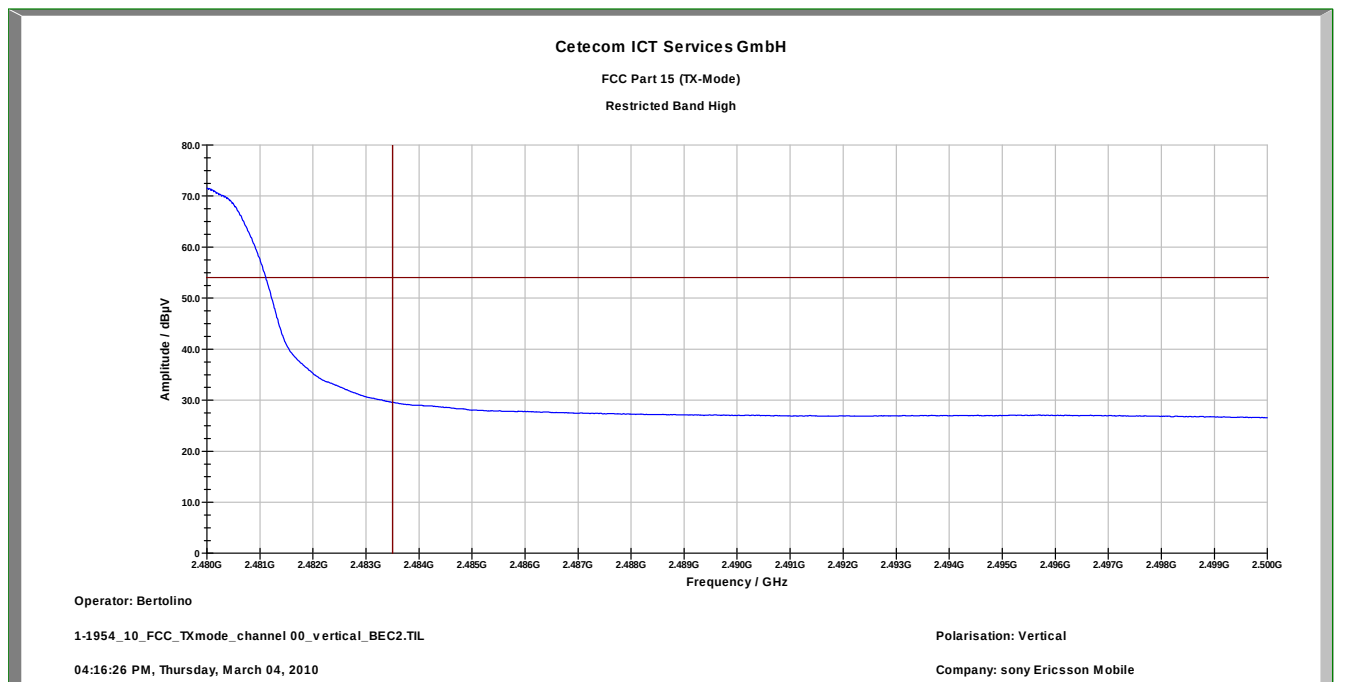


Modulation: Pi/4 DQPSK

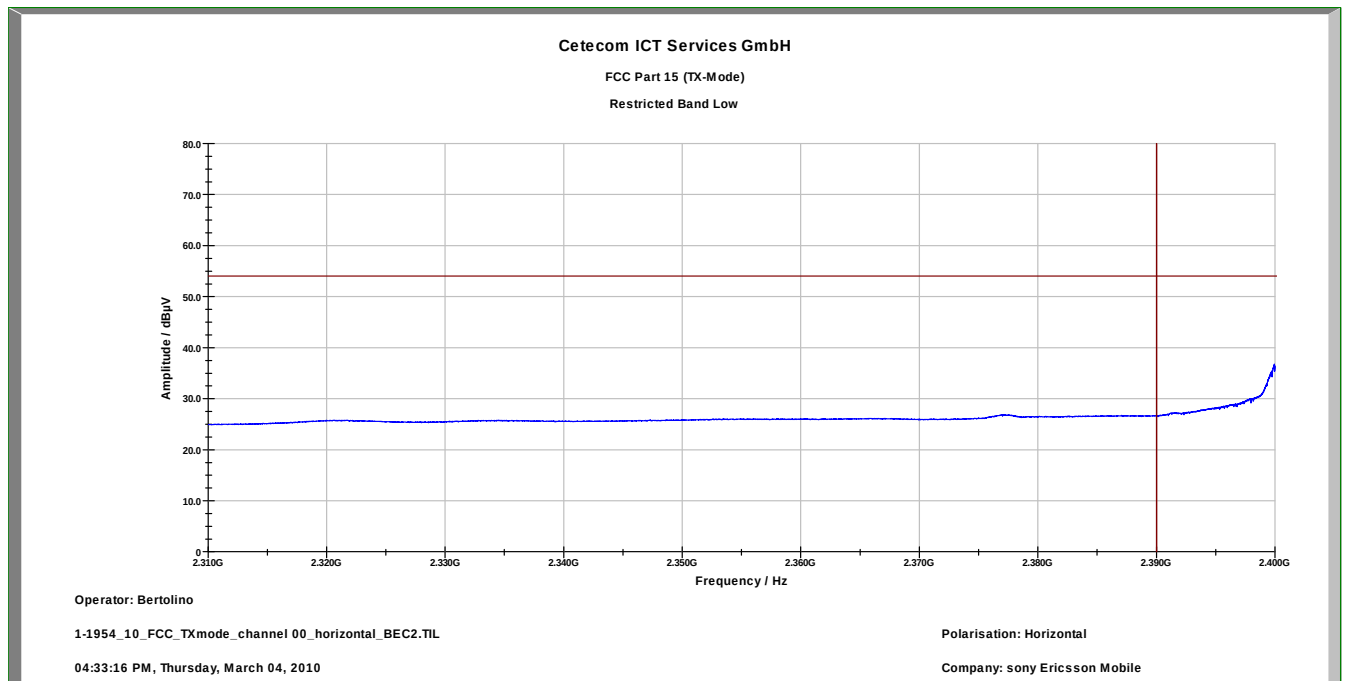
Plot 1: Restricted Bands low, vertical polarization



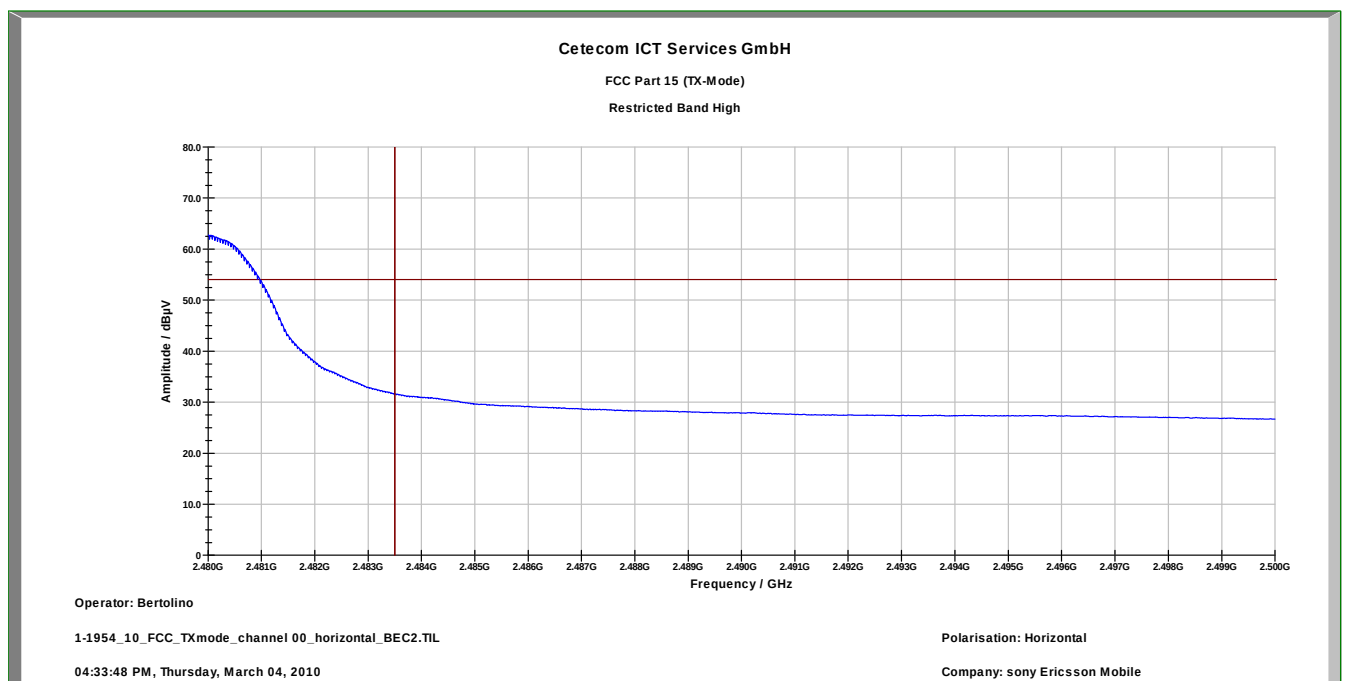
Plot 2: Restricted Bands high, vertical polarization



Plot 3: Restricted Bands low, horizontal polarization

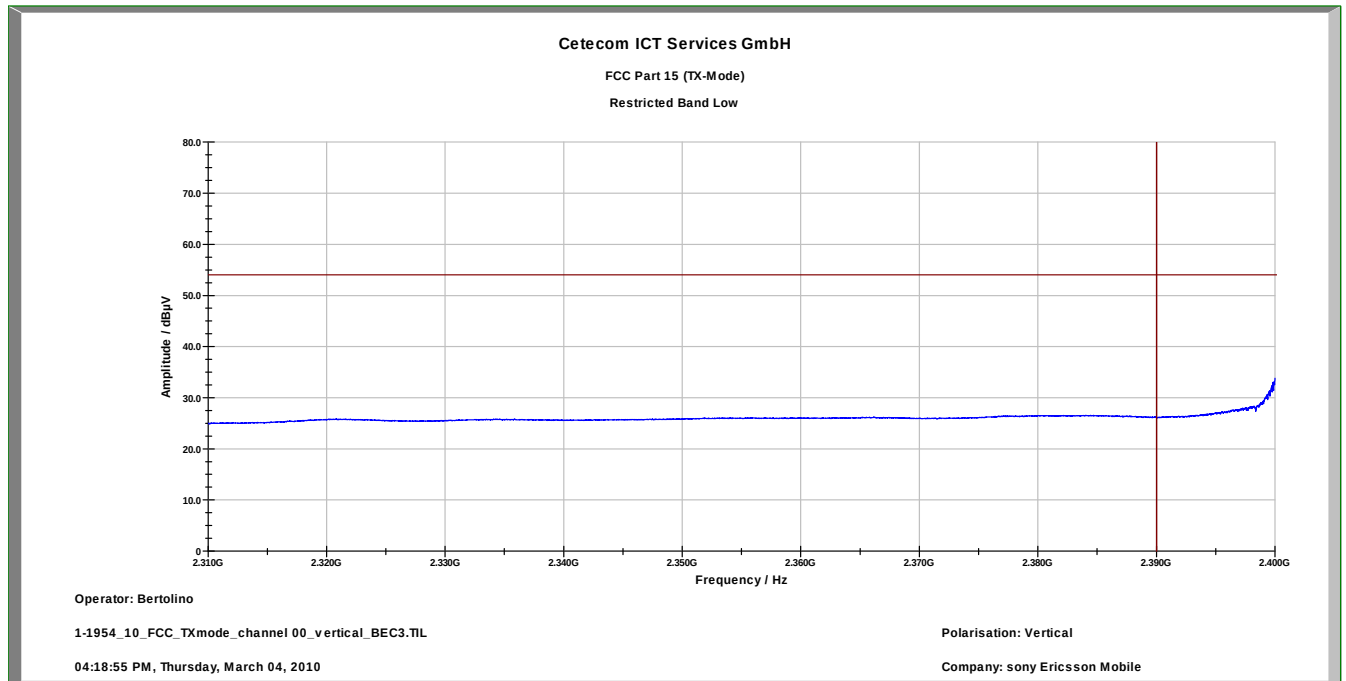


Plot 4: Restricted Bands high, horizontal polarization

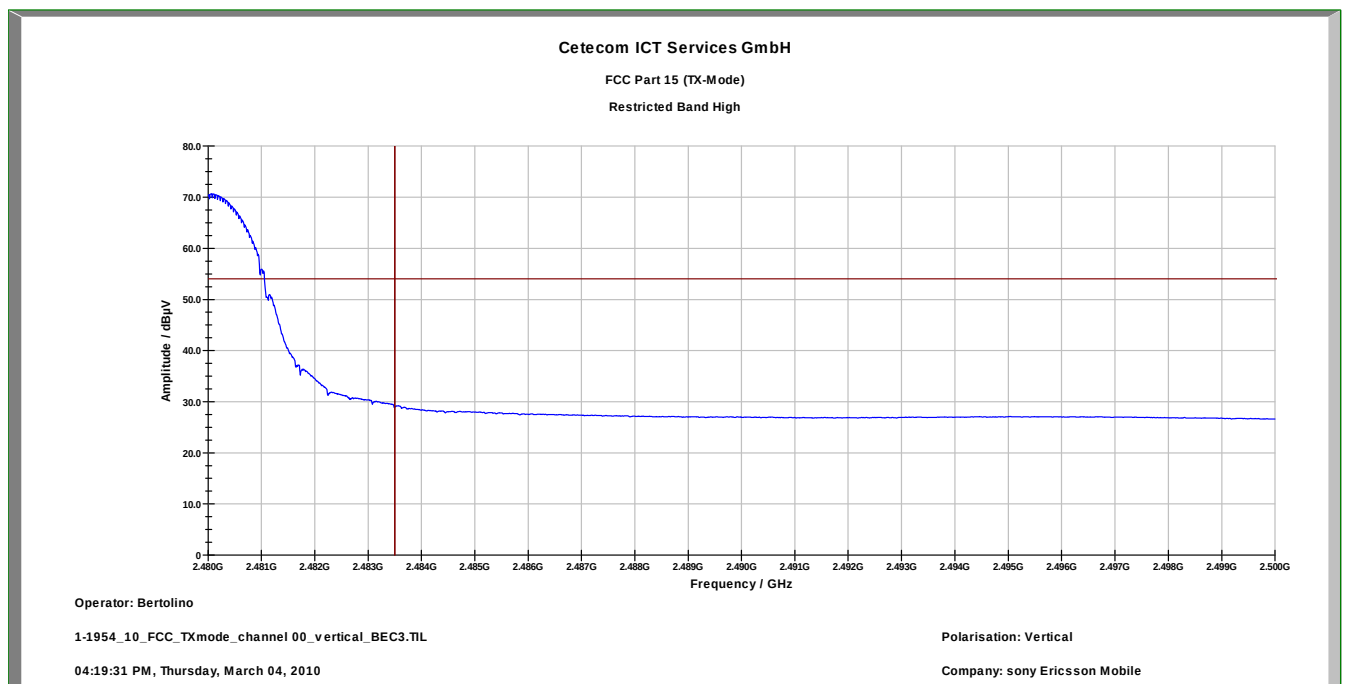


Modulation: 8 DPSK

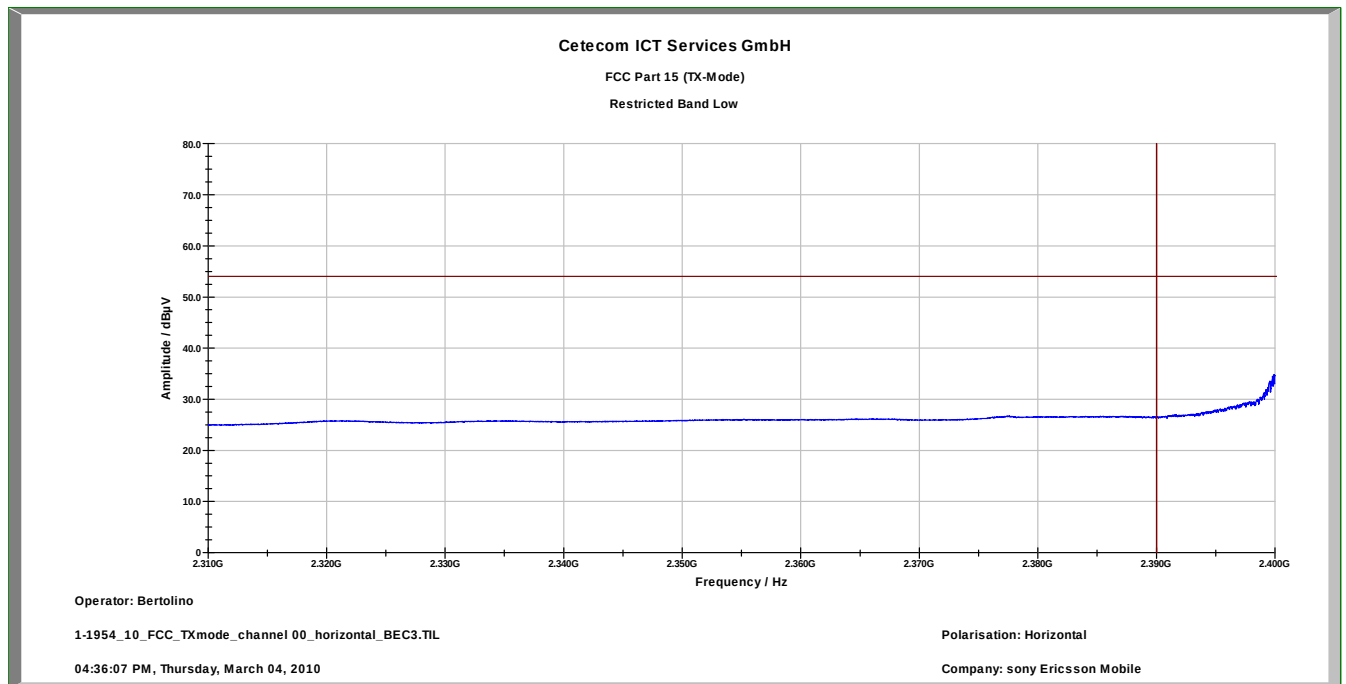
Plot 1: Restricted Bands low, vertical polarization



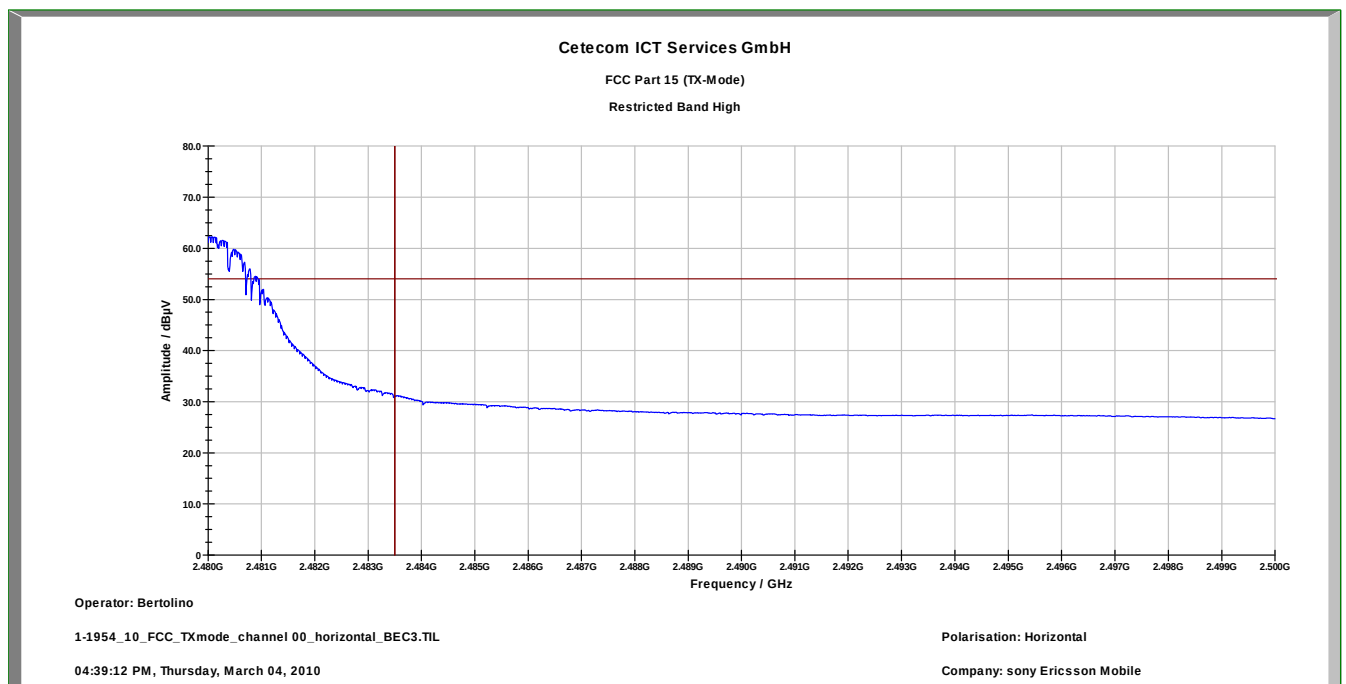
Plot 2: Restricted Bands high, vertical polarization



Plot 3: Restricted Bands low, horizontal polarization



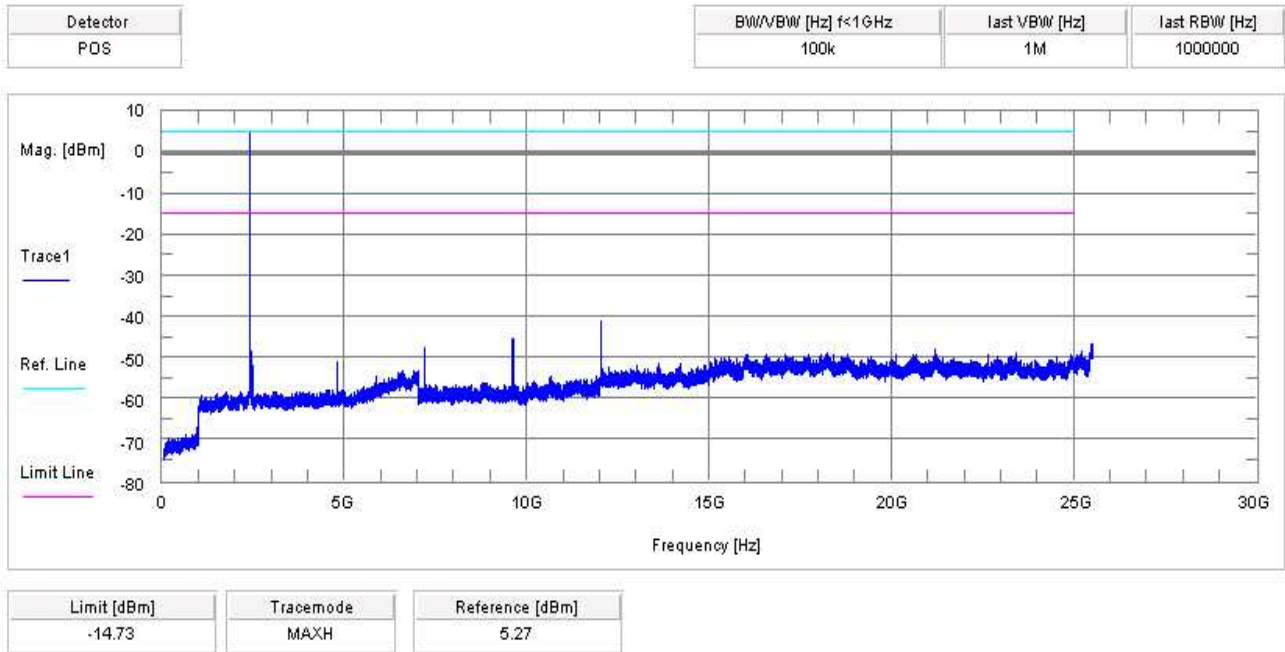
Plot 4: Restricted Bands high, horizontal polarization



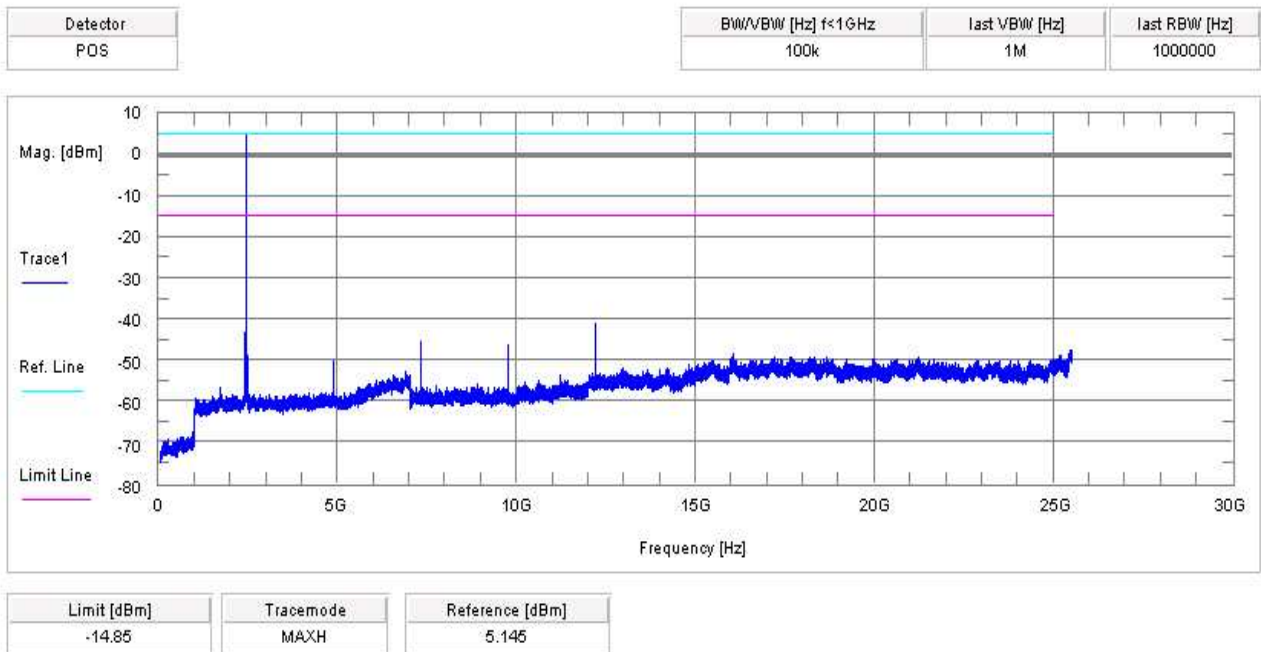
5.14 Spurious Emissions - conducted (Transmitter) § 15.247 (c)(1)

Modulation: GFSK

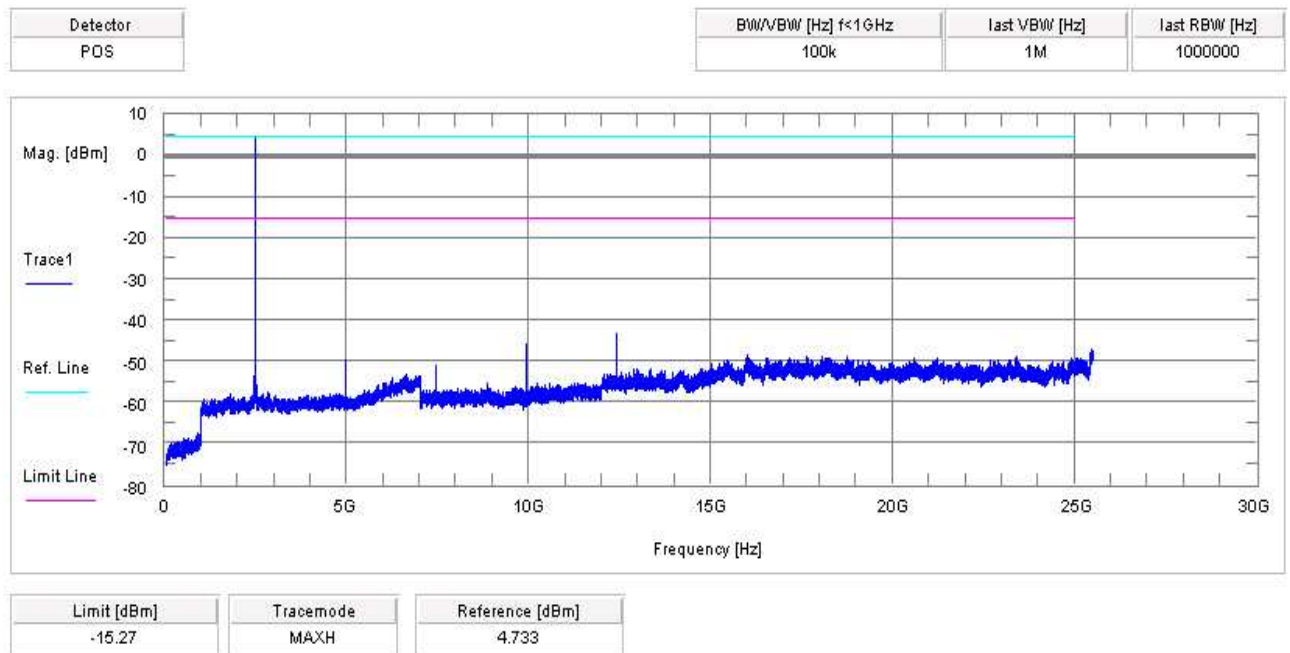
Plot 1 of 3: lowest channel (00)



Plot 2 of 3: middle channel (39)



Plot 3 of 3: highest channel (78)



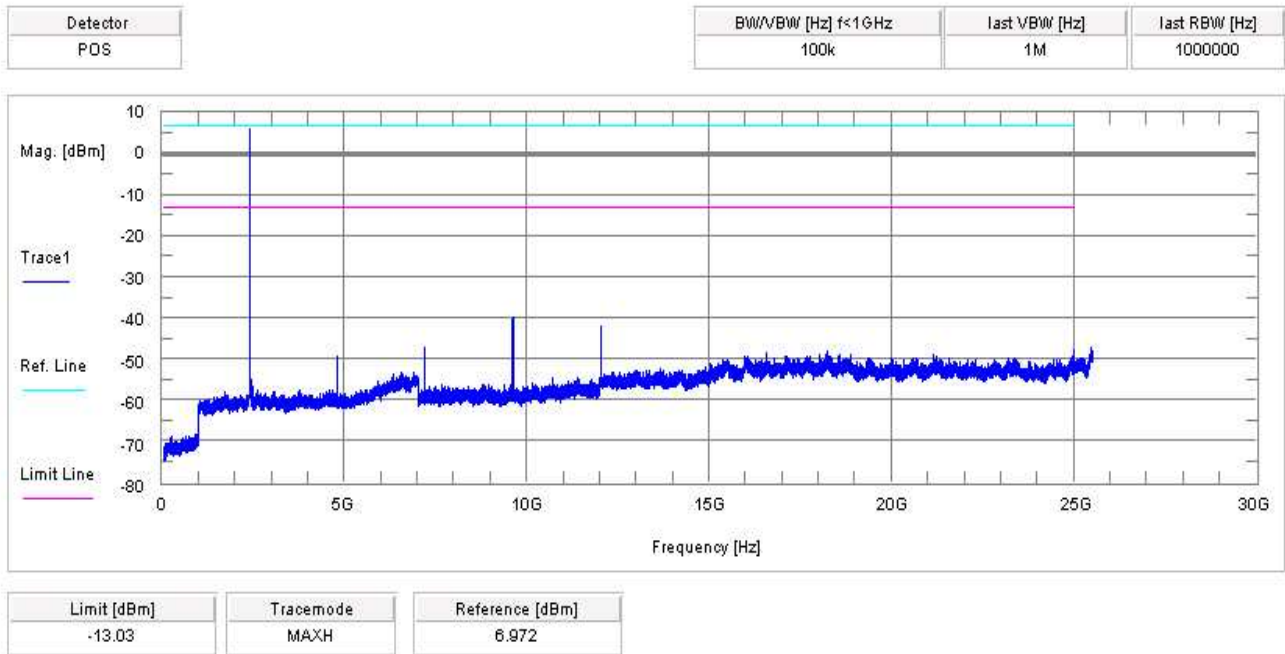
Result & Limits:

Emission Limitation					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		5.27	30 dBm		Operating frequency
No critical peaks detected. All spurious emissions are below the 20 dBc criteria.			-20 dBc		complies
2441		5.15	30 dBm		Operating frequency
No critical peaks detected. All spurious emissions are below the 20 dBc criteria.			-20 dBc		complies
2480		4.73	30 dBm		Operating frequency
No critical peaks detected. All spurious emissions are below the 20 dBc criteria.			-20 dBc		complies
Measurement uncertainty		± 3dB			

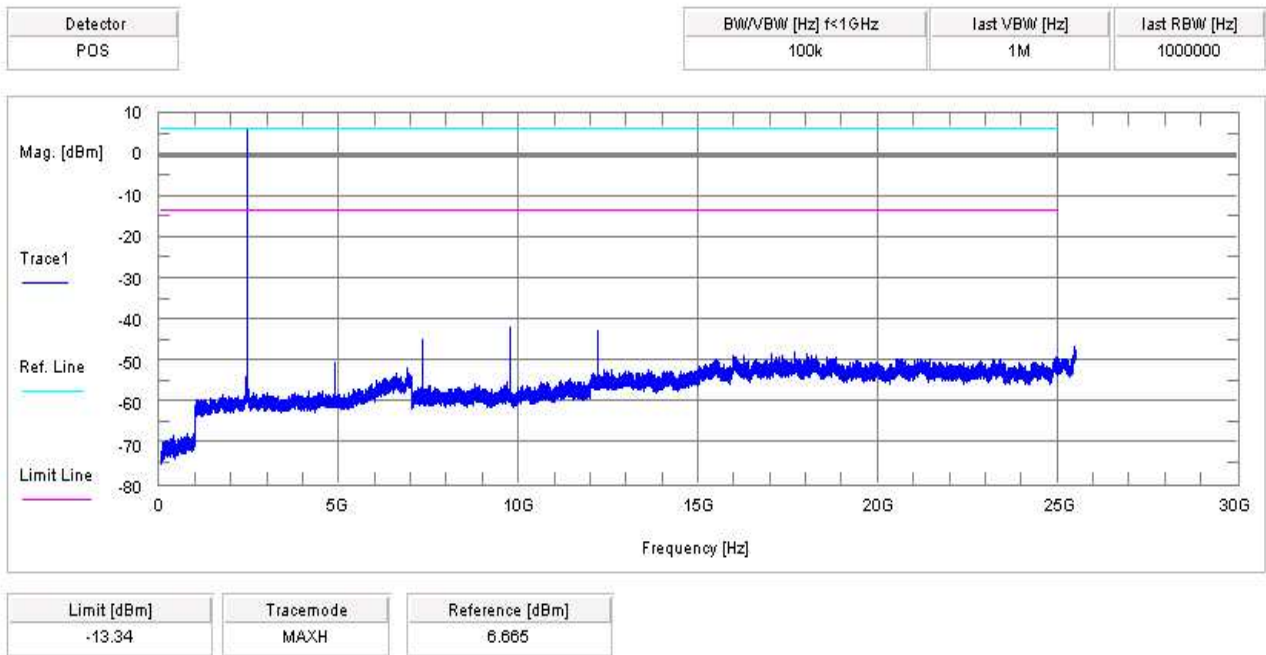
F < 1 GHz: RBW: 100 kHz VBW: 100 kHz
F > 1 GHz: RBW: 1 MHz VBW: 1 MHz

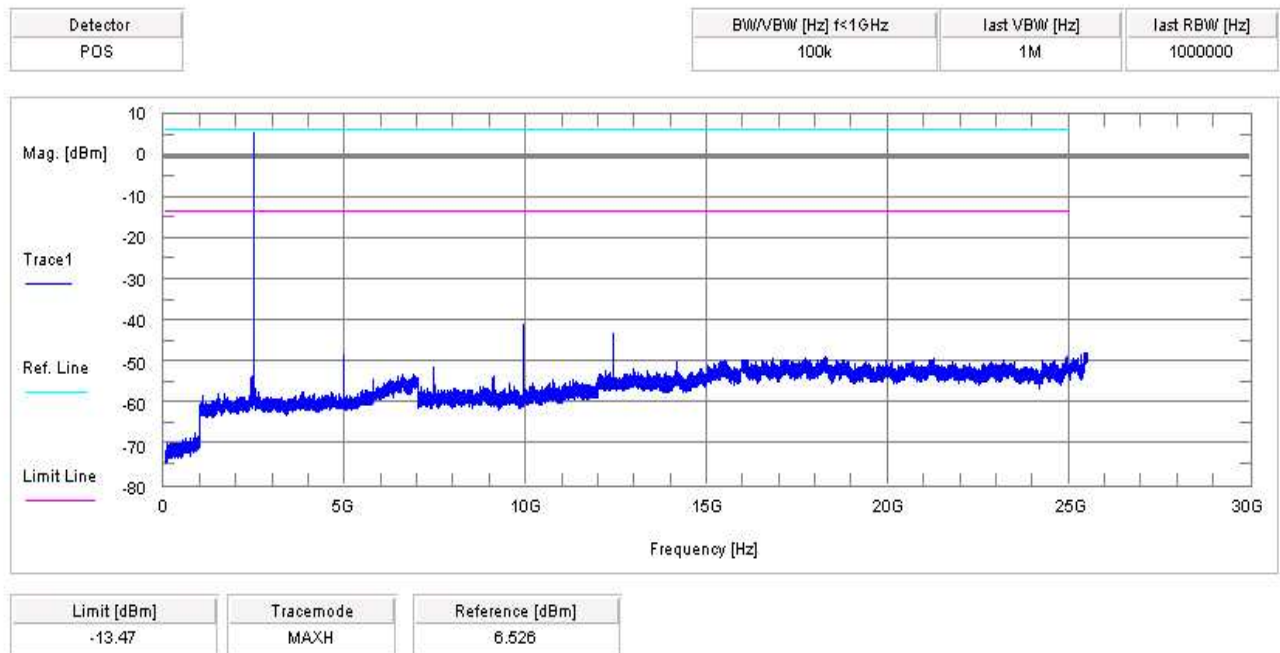
Modulation: Pi/4 DQPSK

Plot 1 of 3: lowest channel (00)



Plot 2 of 3: middle channel (39)



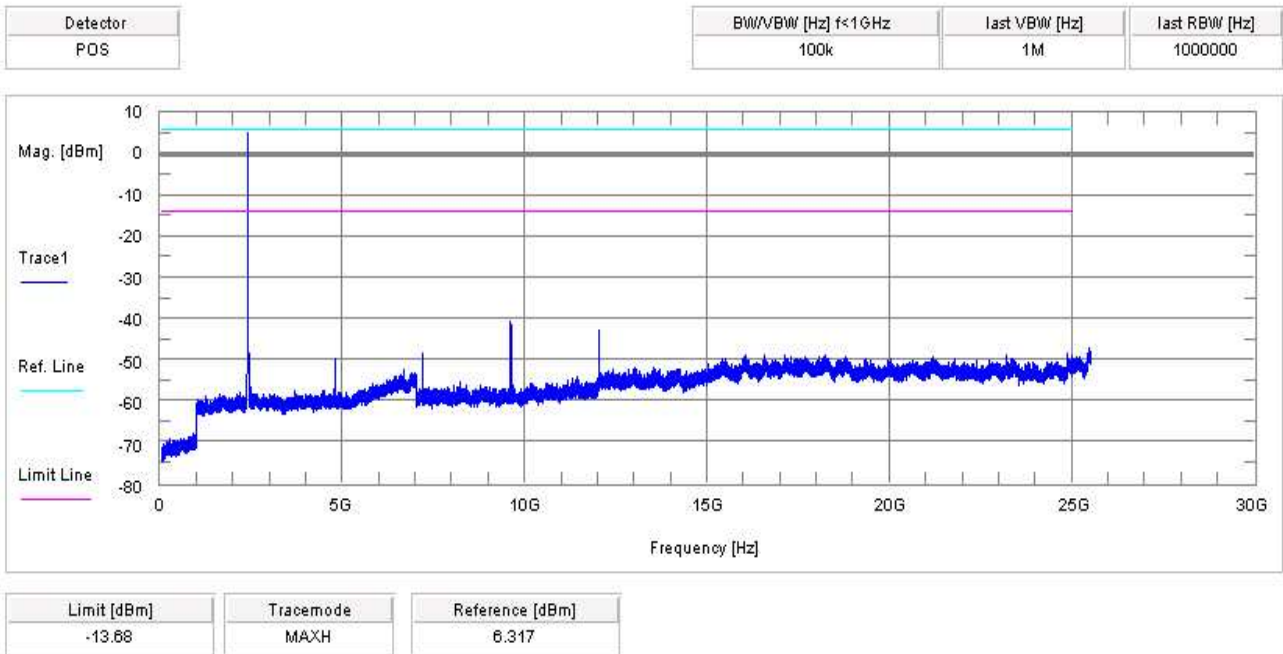
Plot 3 of 3: highest channel (78)**Result & Limits:**

Emission Limitation					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		6.97	30 dBm		Operating frequency
No critical peaks detected. All spurious emissions are below the 20 dBc criteria.			-20 dBc		complies
2441		6.67	30 dBm		Operating frequency
No critical peaks detected. All spurious emissions are below the 20 dBc criteria.			-20 dBc		complies
2480		6.53	30 dBm		Operating frequency
No critical peaks detected. All spurious emissions are below the 20 dBc criteria.			-20 dBc		complies
Measurement uncertainty		± 3dB			

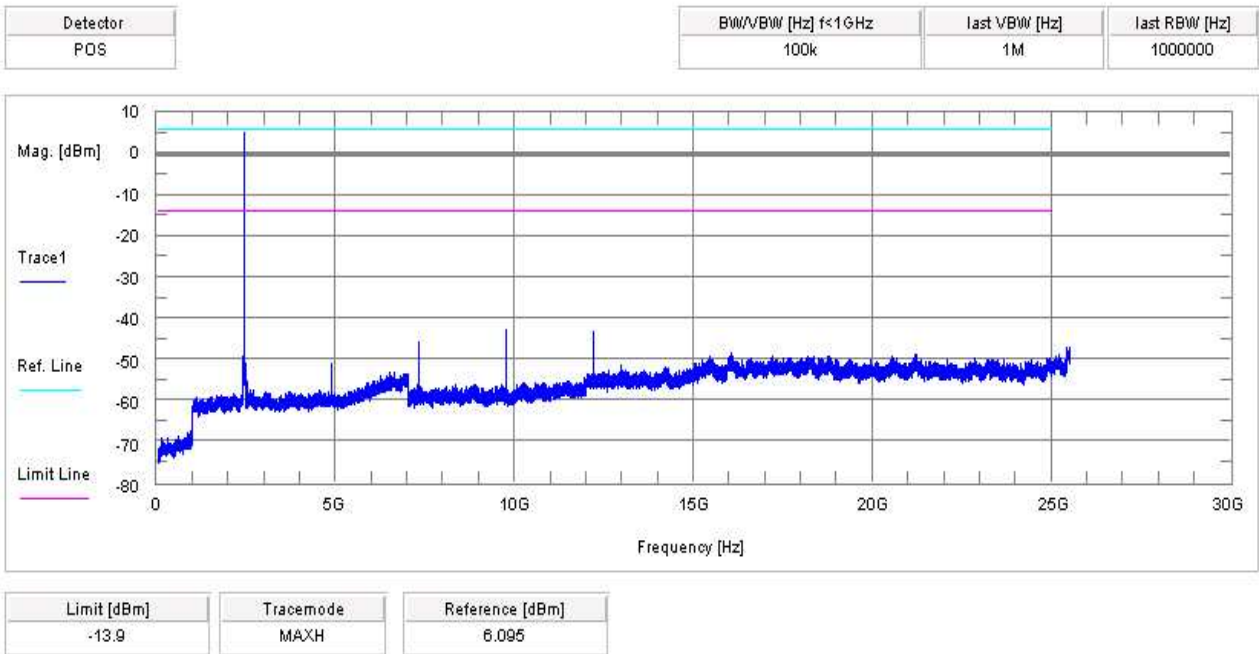
F < 1 GHz: RBW: 100 kHz VBW: 100 kHz
 F > 1 GHz: RBW: 1 MHz VBW: 1 MHz

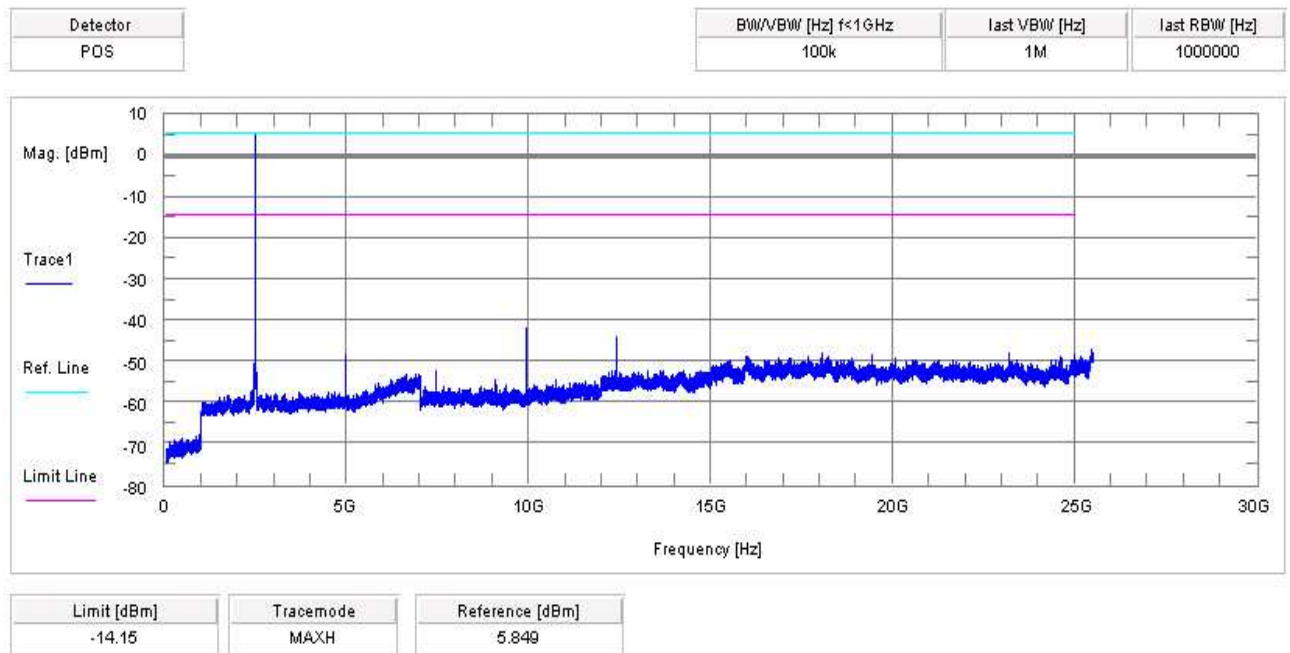
Modulation: 8 DPSK

Plot 1 of 3: lowest channel (00)



Plot 2 of 3: middle channel (39)



Plot 3 of 3: highest channel (78)**Result & Limits:**

Emission Limitation					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		6.32	30 dBm		Operating frequency
No critical peaks detected. All spurious emissions are below the 20 dBc criteria.			-20 dBc		complies
2441		6.10	30 dBm		Operating frequency
No critical peaks detected. All spurious emissions are below the 20 dBc criteria.			-20 dBc		complies
2480		5.85	30 dBm		Operating frequency
No critical peaks detected. All spurious 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)).
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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: Pi/4 DQPSK

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

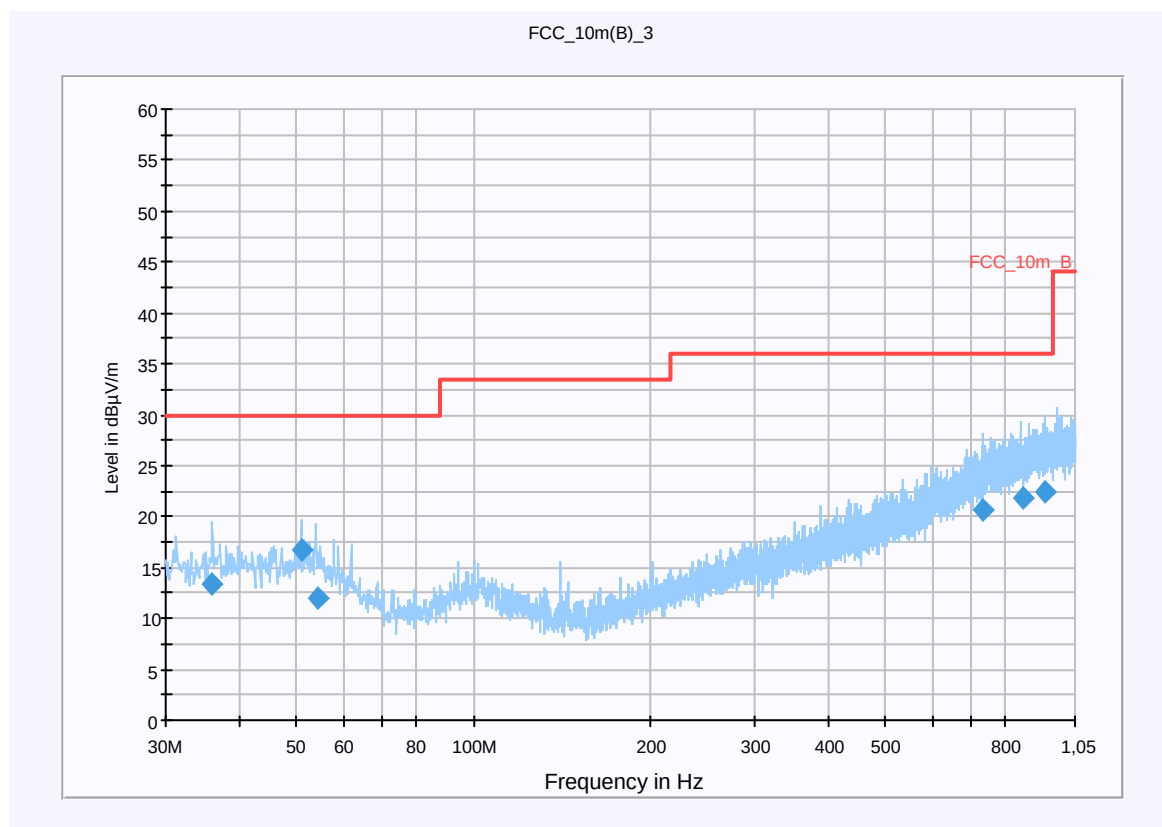
Common Information

EUT:	AAD-3880070-BV + CAA-0003005-BV
Serial Number:	IMEI: 00440214-025540-1 + 5908W49308170
Test Description:	FCC part 15 B @ 10 m
Operating Conditions:	BT TX Ch 0
Operator Name:	Klos
Comment:	powered with 115 V / 60 Hz

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

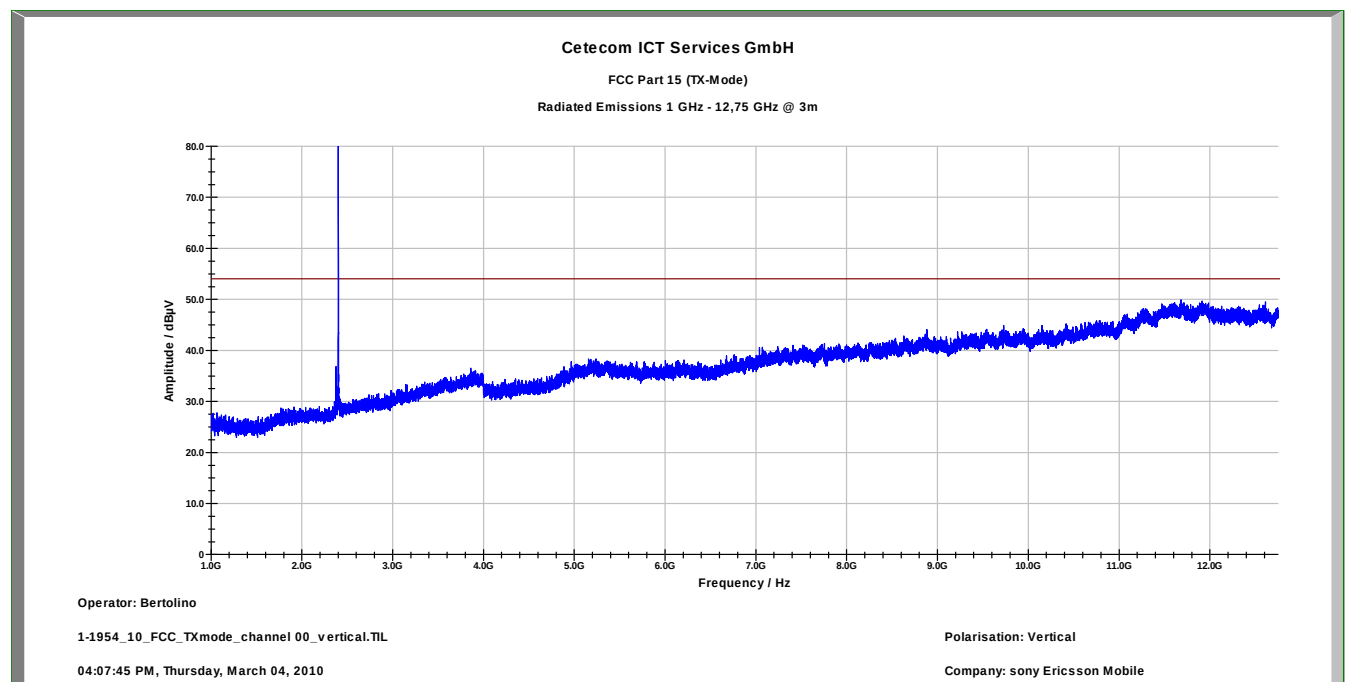
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
35.966850	13.5	15000.000	120.000	133.0	V	252.0	13.1	16.5	30.0	
51.006000	16.7	15000.000	120.000	98.0	V	129.0	13.3	13.3	30.0	
54.443550	11.9	15000.000	120.000	220.0	V	173.0	12.9	18.1	30.0	
733.587600	20.6	15000.000	120.000	200.0	H	304.0	23.2	15.4	36.0	
853.583550	21.8	15000.000	120.000	140.0	V	234.0	24.6	14.2	36.0	
931.883550	22.5	15000.000	120.000	127.0	V	42.0	25.3	13.5	36.0	

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

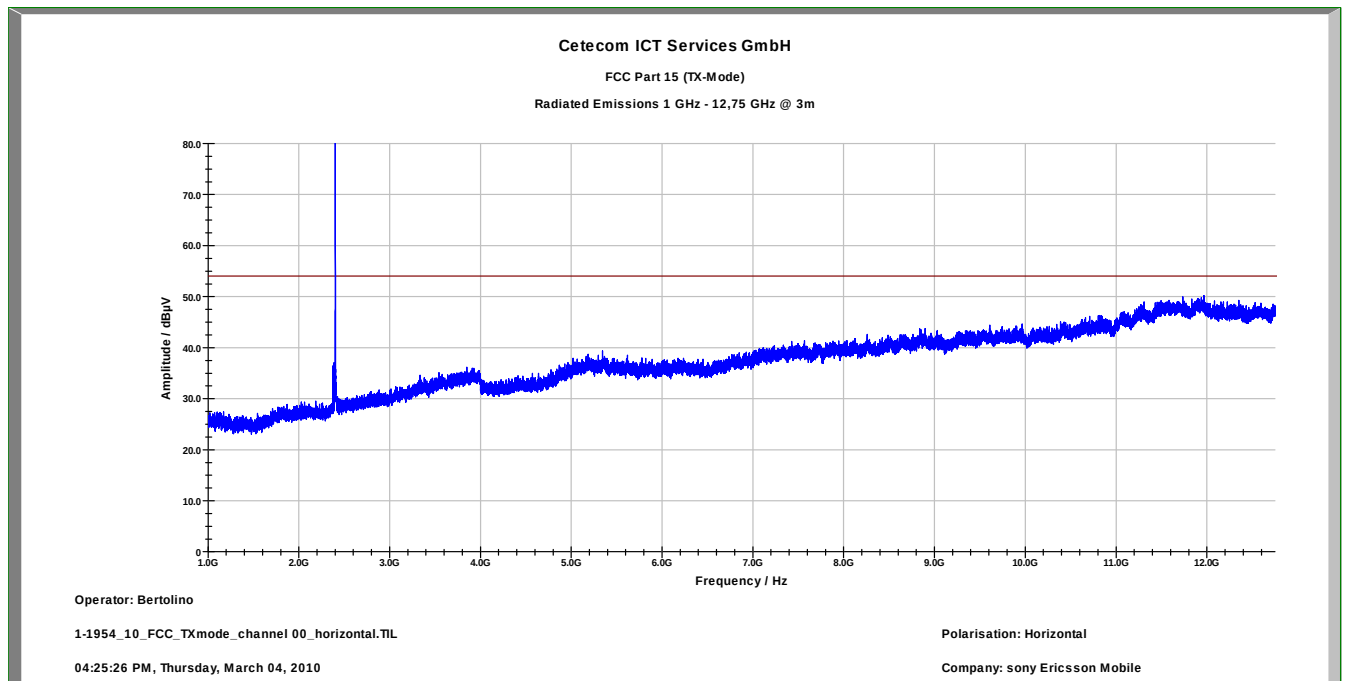
Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113
Antenna Tower:	Correction Table: Cable_EN_1GHz (0909) Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

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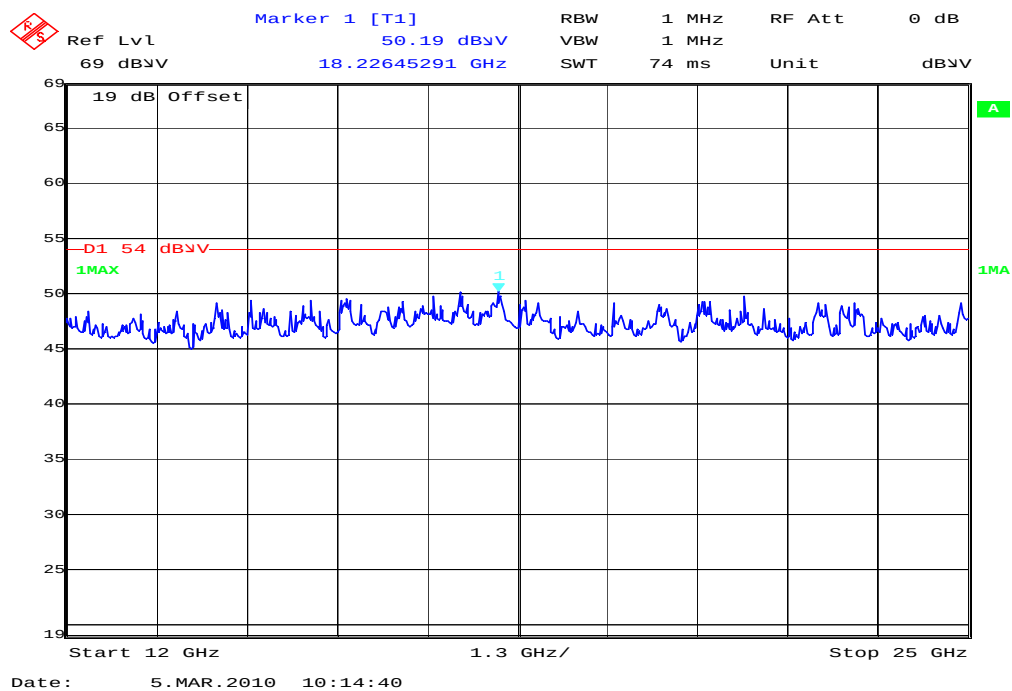
Plot 2: 1 – 12.75 GHz vertical polarization (lowest channel)



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



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



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

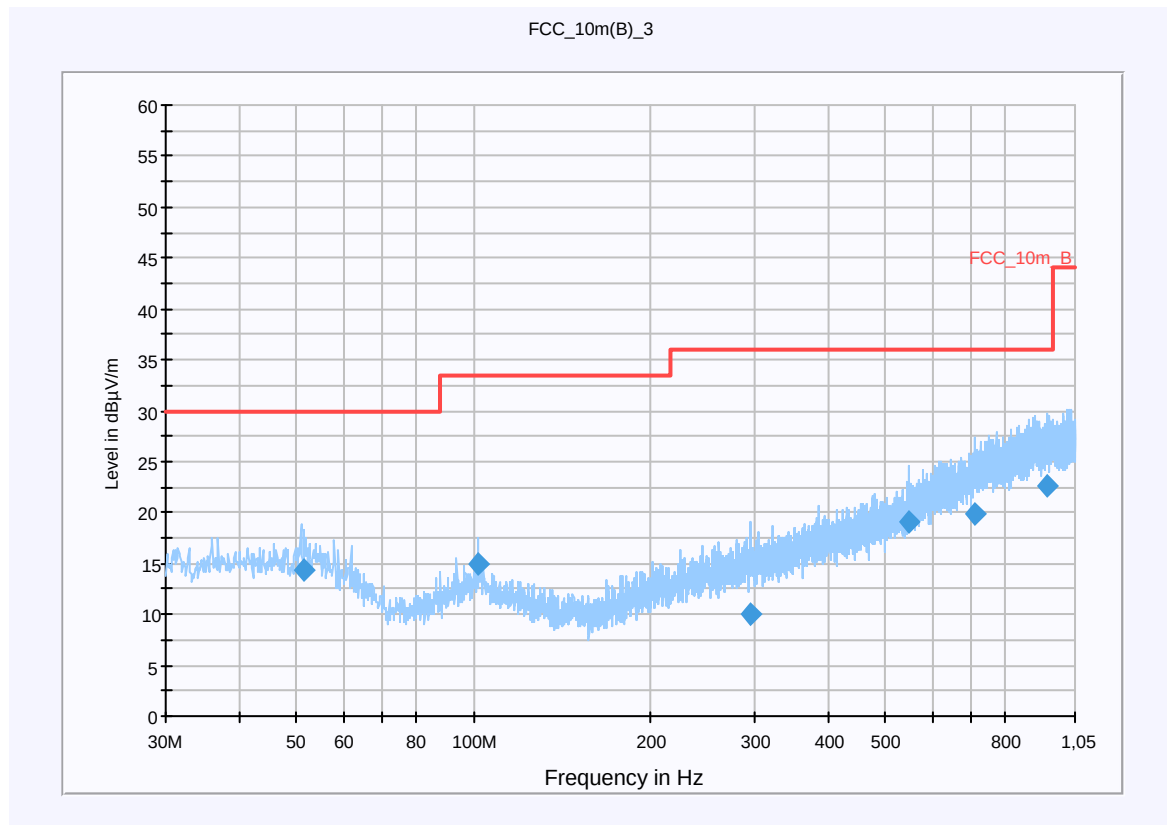
Common Information

EUT: AAD-3880070-BV + CAA-0003005-BV
Serial Number: IMEI: 00440214-025540-1 + 5908W49308170
Test Description: FCC part 15 B @ 10 m
Operating Conditions: BT TX Ch 39
Operator Name: Klos
Comment: powered with 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

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

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

**Final Result 1**

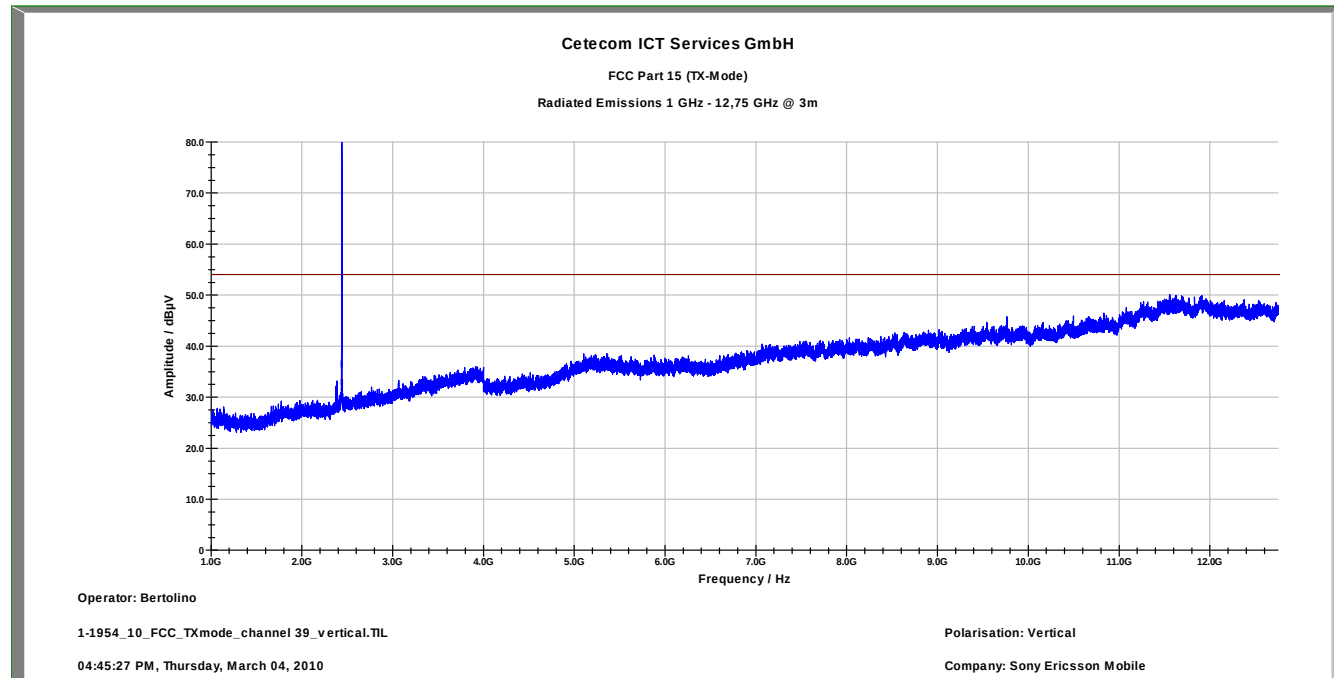
Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
51.597150	14.3	15000.000	120.000	198.0	V	14.0	13.2	15.7	30.0	
101.707350	15.0	15000.000	120.000	98.0	V	141.0	11.7	18.5	33.5	
294.798300	10.1	15000.000	120.000	210.0	H	22.0	14.3	25.9	36.0	
548.560500	19.0	15000.000	120.000	202.0	V	240.0	19.3	17.0	36.0	
709.860900	19.9	15000.000	120.000	220.0	V	-1.0	22.6	16.1	36.0	
940.957350	22.5	15000.000	120.000	220.0	H	73.0	25.3	13.5	36.0	

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

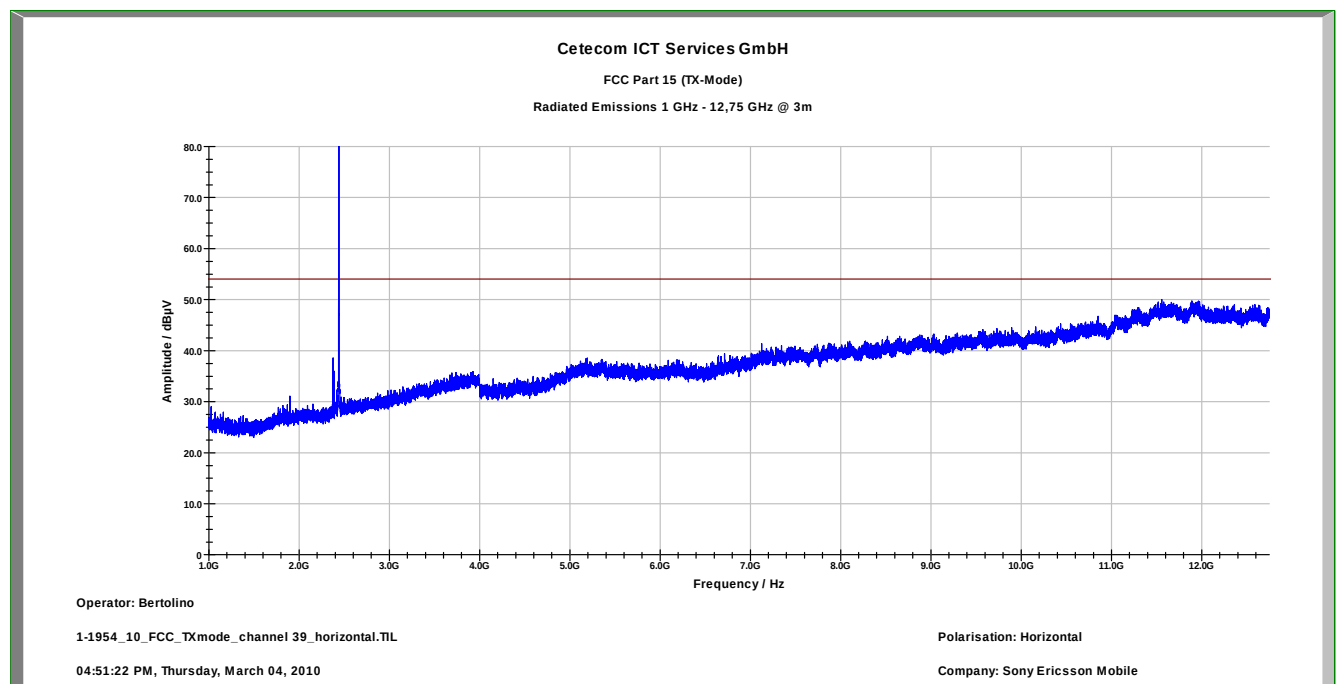
Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (0909)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

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



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



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

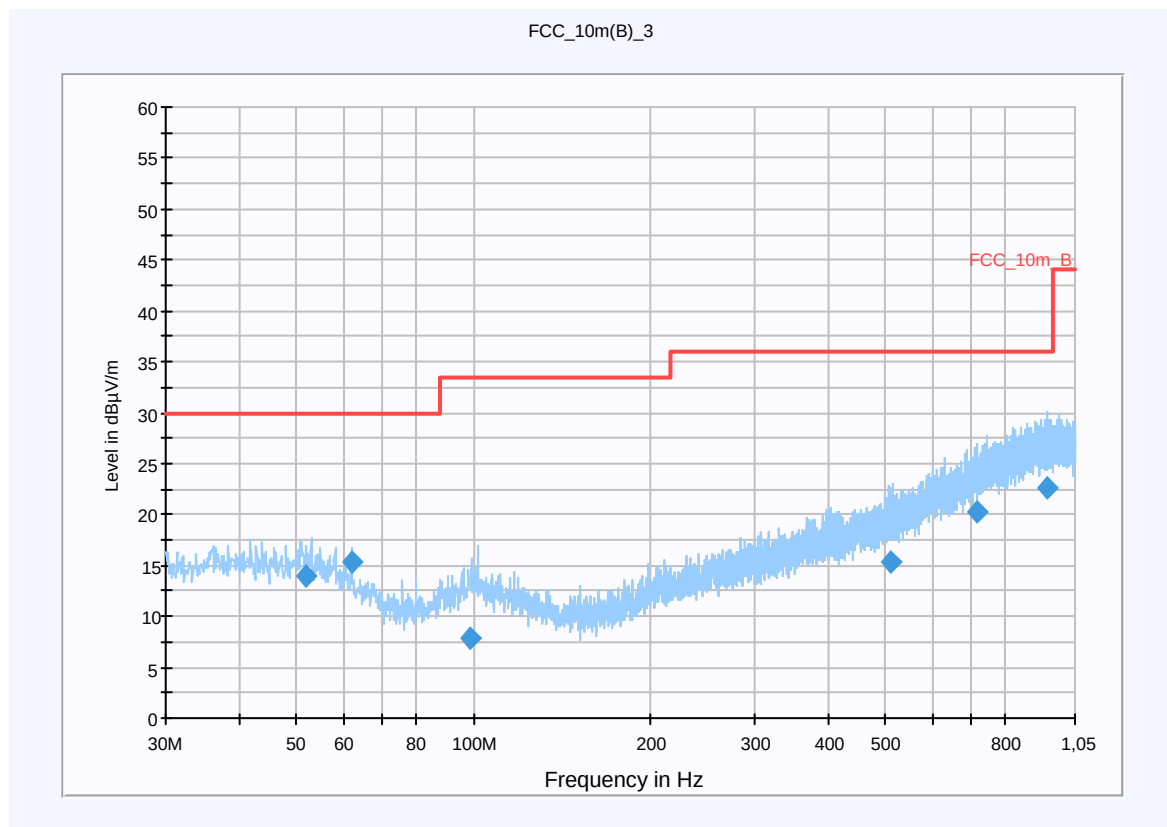
Common Information

EUT: AAD-3880070-BV + CAA-0003005-BV
Serial Number: IMEI: 00440214-025540-1 + 5908W49308170
Test Description: FCC part 15 B @ 10 m
Operating Conditions: BT TX Ch 78
Operator Name: Lang
Comment: powered with 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

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

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

**Final Result 1**

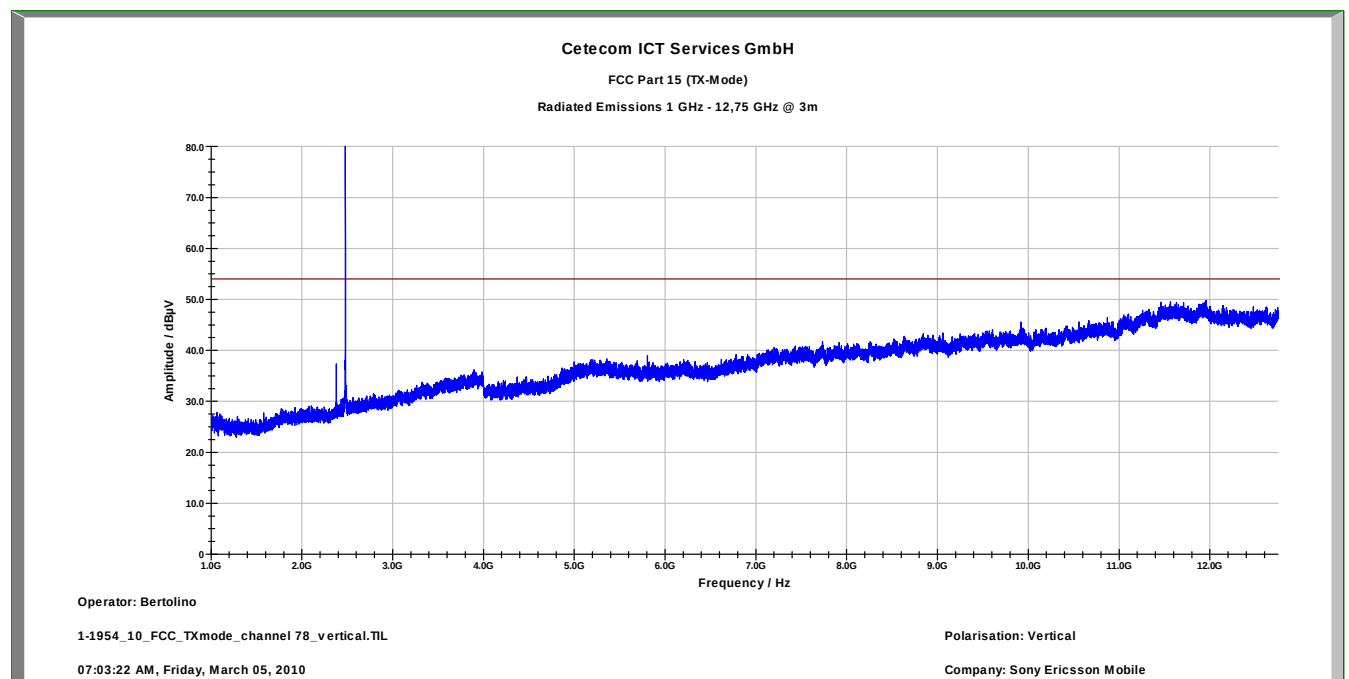
Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
51.988650	14.0	15000.000	120.000	220.0	V	324.0	13.2	16.0	30.0	
61.999350	15.3	15000.000	120.000	220.0	V	168.0	11.1	14.7	30.0	
98.974350	7.9	15000.000	120.000	220.0	H	-2.0	11.8	25.6	33.5	
512.082750	15.4	15000.000	120.000	220.0	H	300.0	18.9	20.6	36.0	
713.313150	20.2	15000.000	120.000	181.0	V	291.0	22.7	15.8	36.0	
942.044550	22.7	15000.000	120.000	220.0	V	17.0	25.3	13.3	36.0	

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

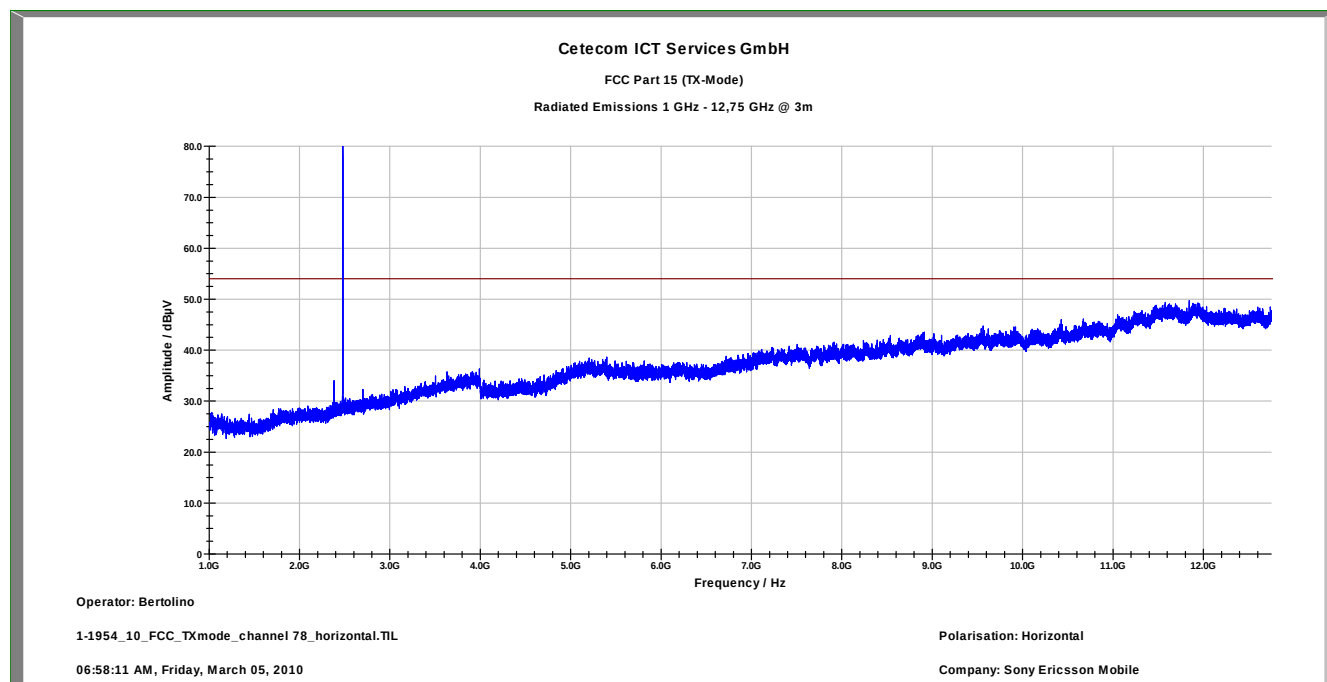
Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (0909)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

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



Plot 10: 1 – 12.75 GHz horizontal polarization (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 detected. All emissions are below the limit!			No critical peaks detected. All emissions are below the limit!			No critical peaks detected. All emissions are below the limit!		
Measurement uncertainty			± 3 dB					

$f < 1$ GHz : RBW/VBW: 100 kHz

$f \geq 1$ GHz : 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 [μ V/m]	Measurement distance (m)
30 - 88	100 (40 dB μ V/m)	3
88 - 216	150 (43.5 dB μ V/m)	3
216 - 960	200 (46 dB μ V/m)	3
above 960	500 (54 dB μ V/m)	3

5.16 Spurious Emissions - radiated (Receiver) § 15.109

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

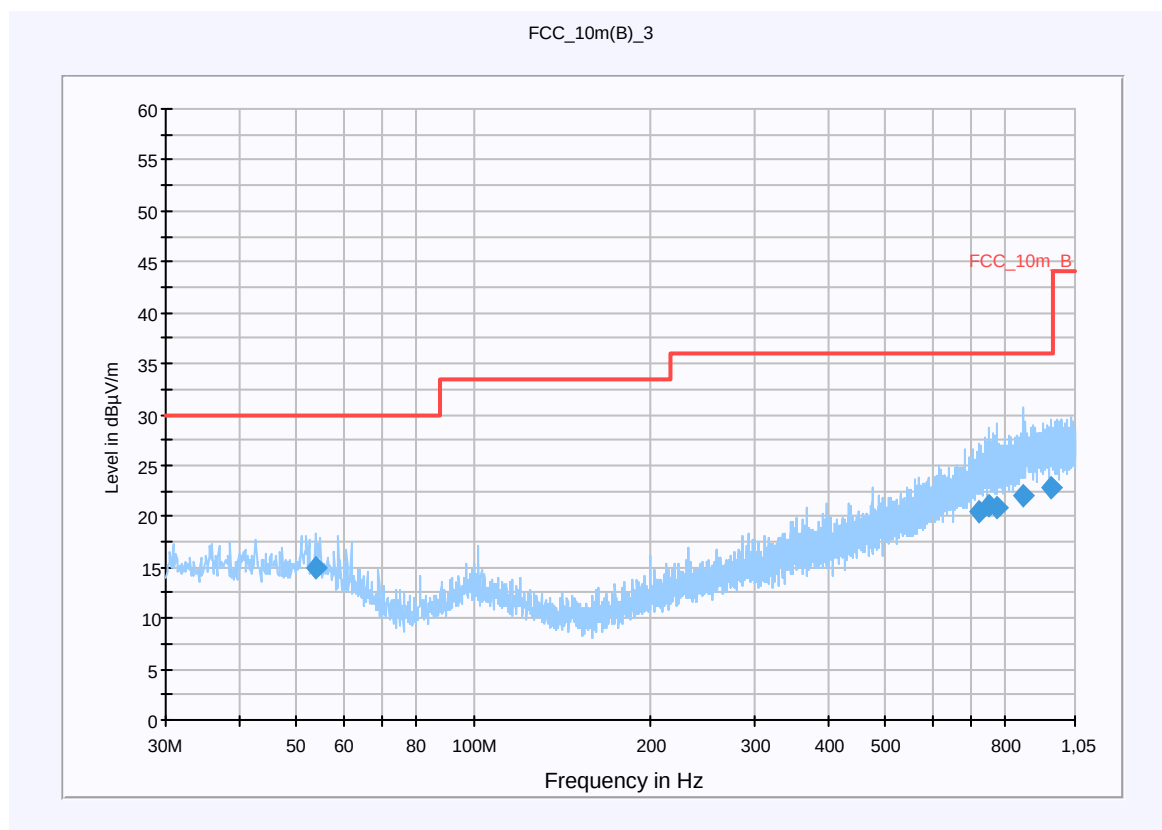
Common Information

EUT: AAD-3880070-BV + CAA-0003005-BV
Serial Number: IMEI: 00440214-025540-1 + 5908W49308170
Test Description: FCC part 15 B @ 10 m
Operating Conditions: BT RX Mode
Operator Name: Lang
Comment: powered with 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

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

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

**Final Result 1**

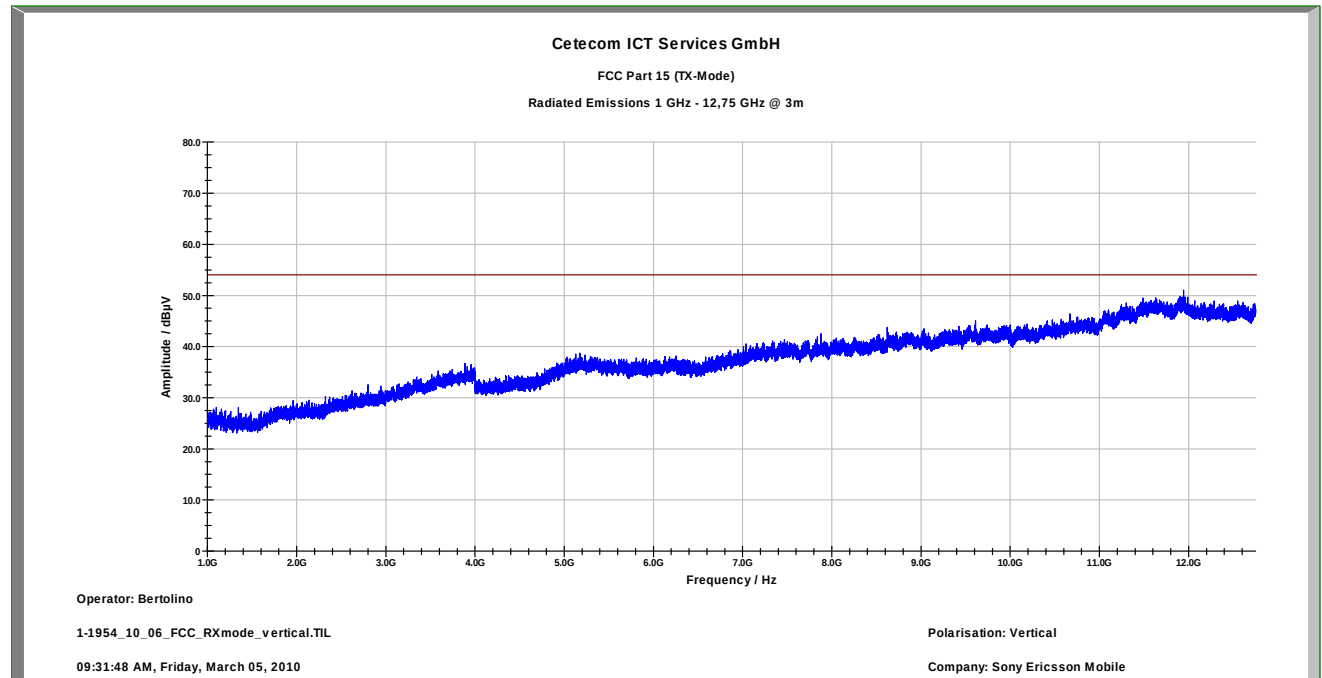
Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
54.017250	15.0	15000.000	120.000	211.0	V	14.0	13.0	15.0	30.0	
723.279150	20.4	15000.000	120.000	220.0	H	51.0	23.0	15.6	36.0	
752.583150	21.0	15000.000	120.000	124.0	H	219.0	23.6	15.0	36.0	
772.615200	20.9	15000.000	120.000	154.0	V	10.0	23.7	15.1	36.0	
858.867150	22.1	15000.000	120.000	129.0	H	155.0	24.7	13.9	36.0	
954.146850	22.9	15000.000	120.000	220.0	H	109.0	25.4	13.1	36.0	

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

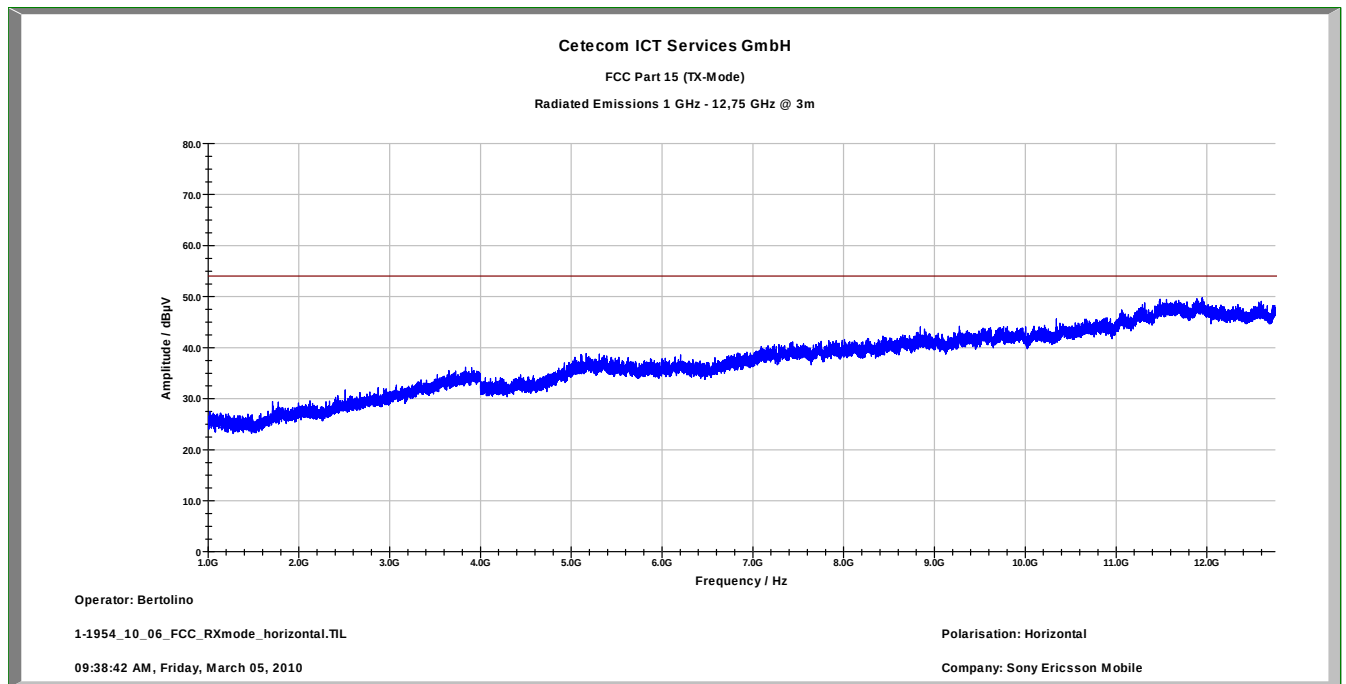
Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (0909)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

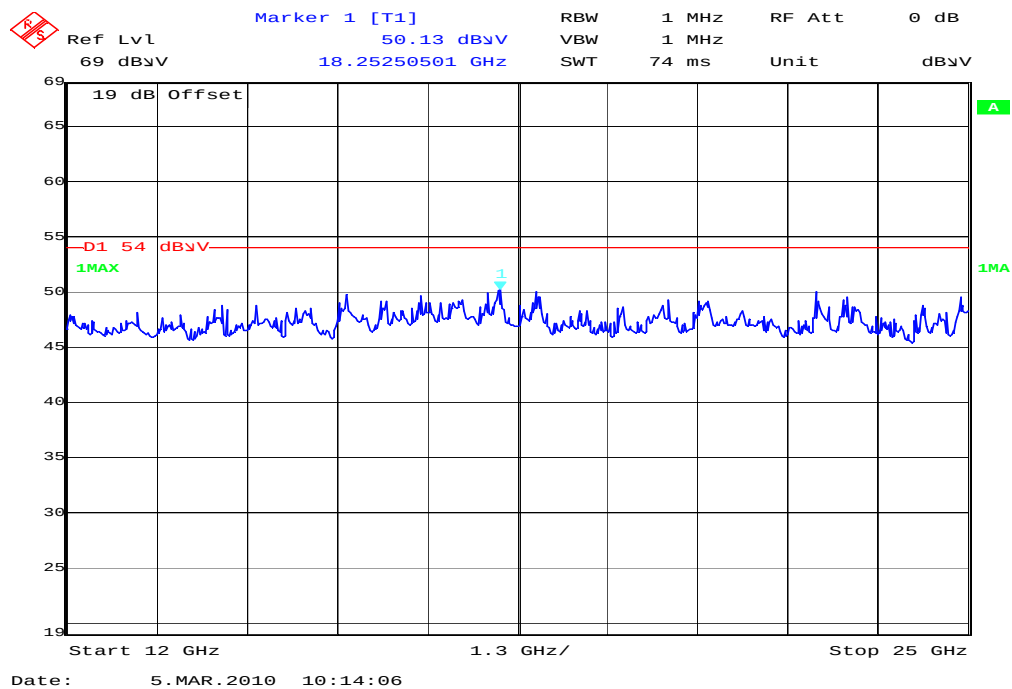
Plot 2: 1 – 12.75 GHz vertical polarization (receiver)



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



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



Results:

Spurious Emissions level [dB μ V/m]		
f[MHz]	Detector	Level [dB μ V/m]
No critical peaks detected. All emissions are below the limit!		
Measurement uncertainty		± 3 dB

f < 1 GHz: RBW/VBW: 100 kHz

f $\geq$ 1GHz : RBW/VBW: 1 MHz

See above plots

Measurement distance see table

Limits: § 15.109

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

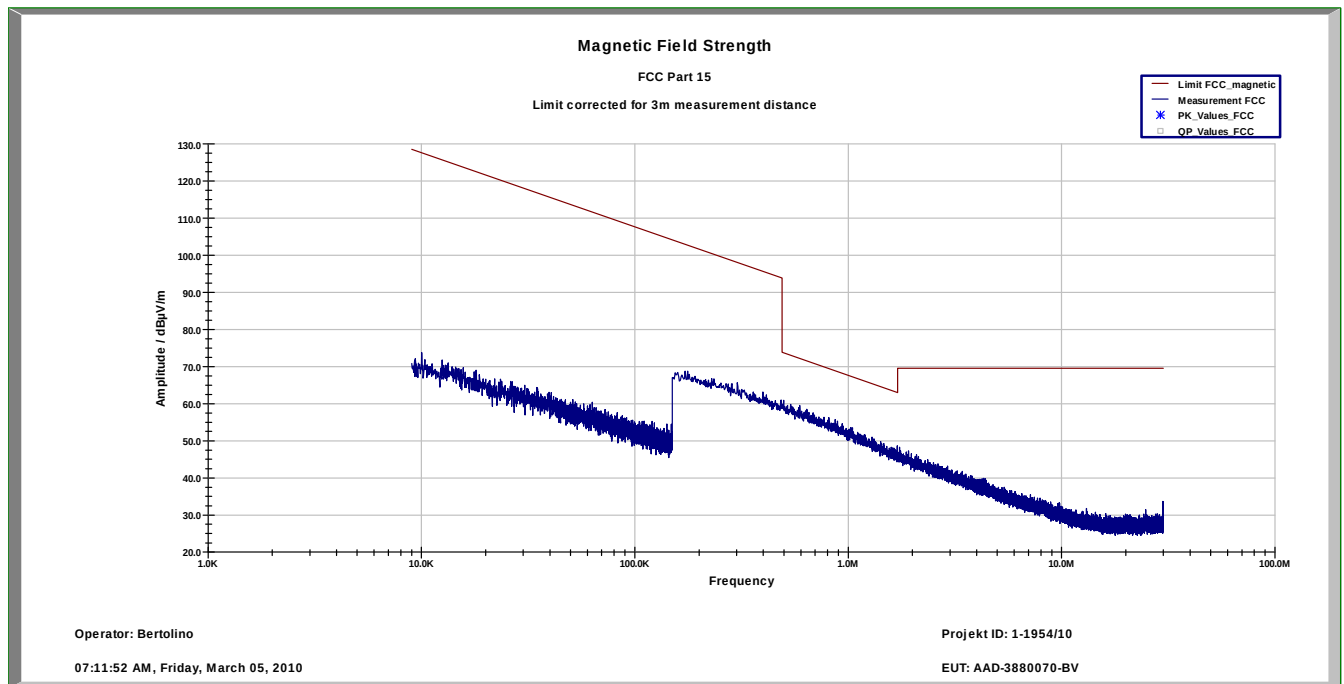
5.17 Spurious Emissions < 30 MHz - Transmitter radiated § 15.209

Modulation: Pi/4 DQPSK

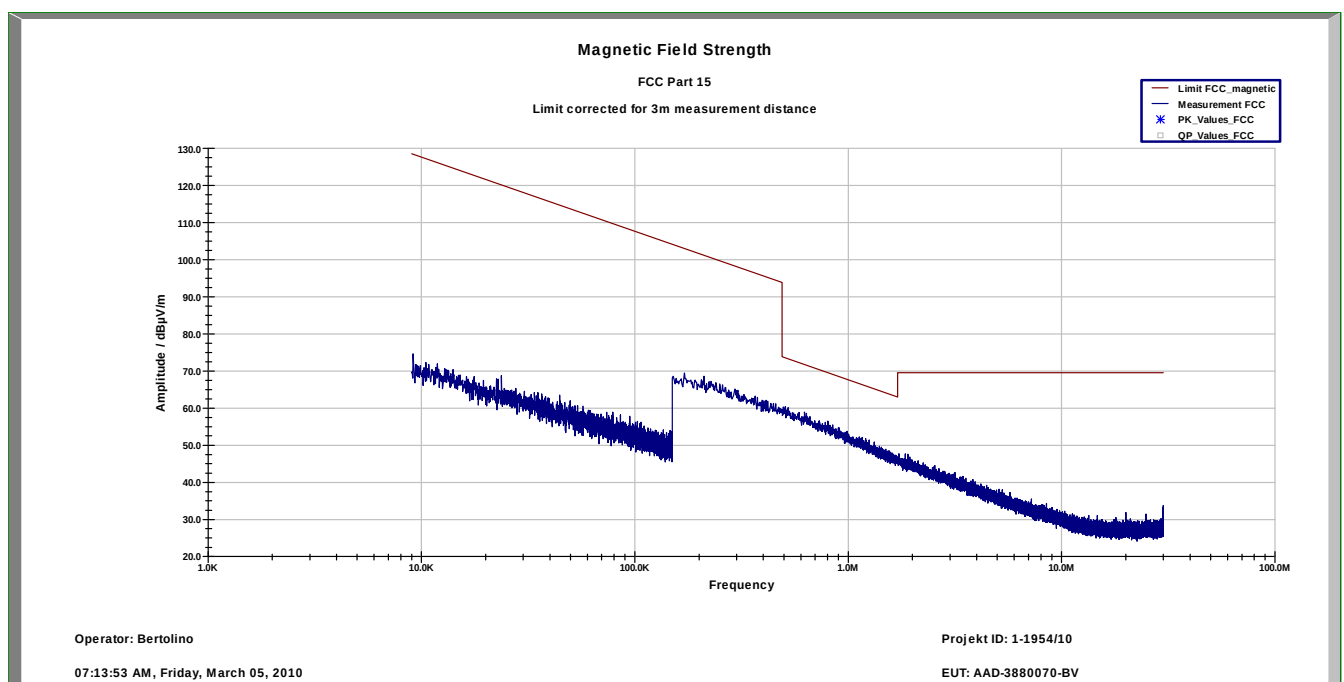
Measured at 10 m distance.

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

Plot 1: TX mode



Plot 2: RX mode



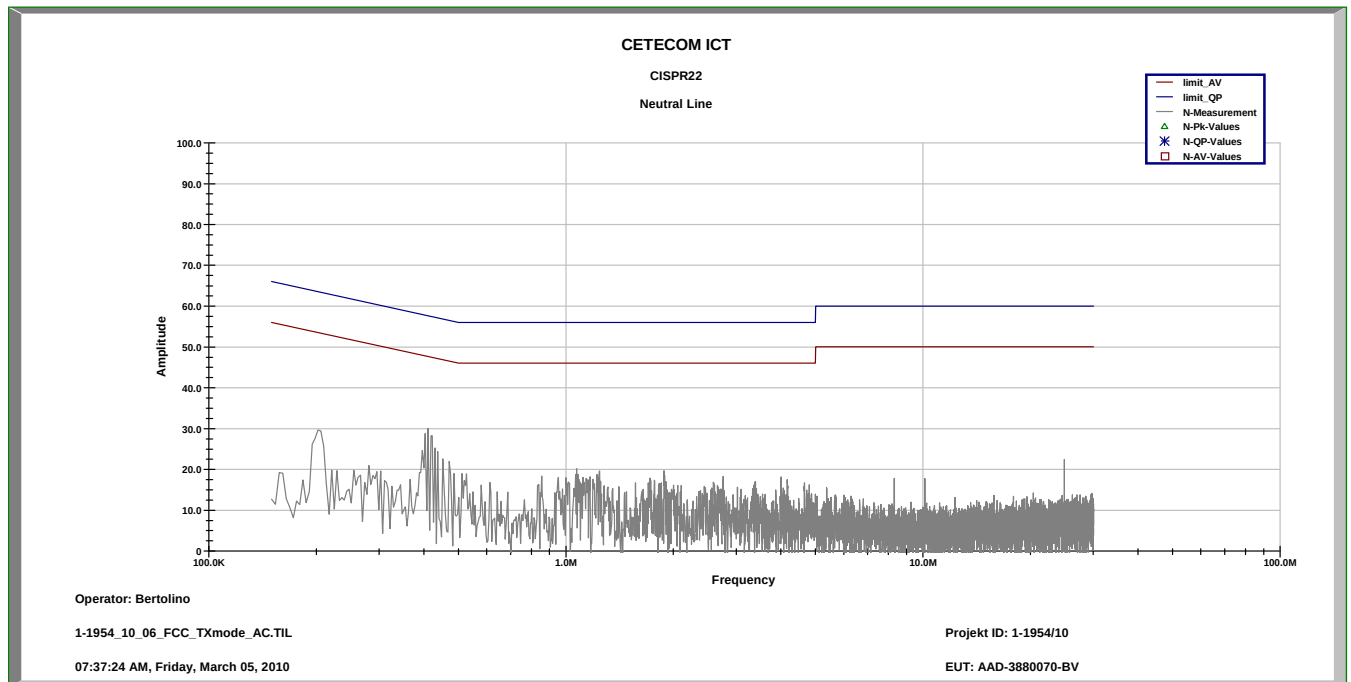
Limits:

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30 / 29.5 dB $\mu\text{V/m}$	30

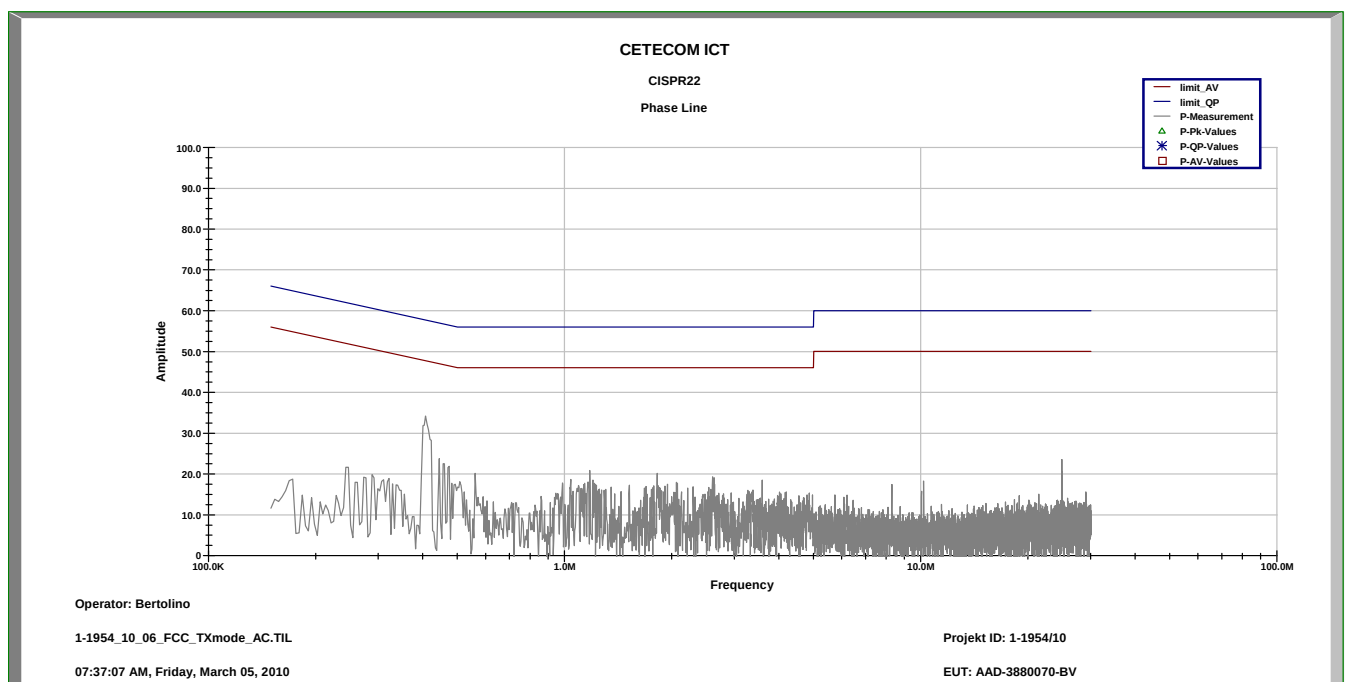
5.18 Conducted Emissions <30 MHz § 15.107/207

Modulation: Pi/4 DQPSK

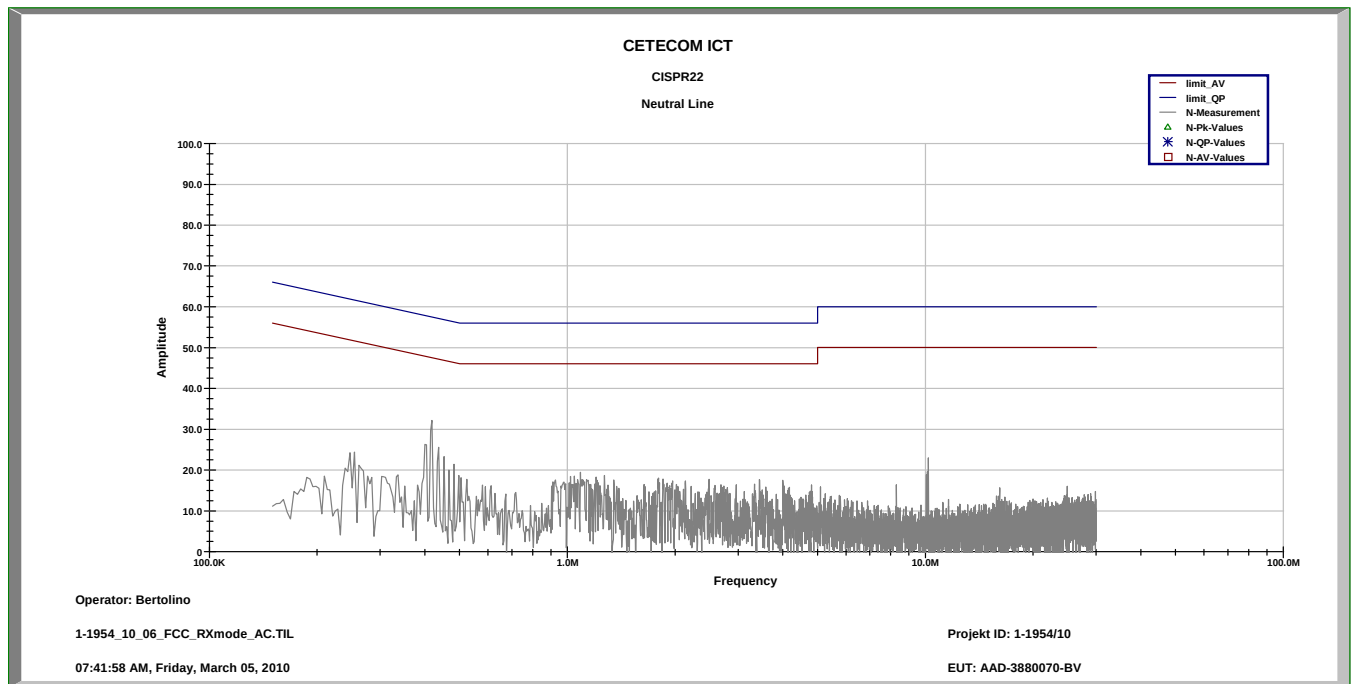
Plot 1: TX mode, neutral line



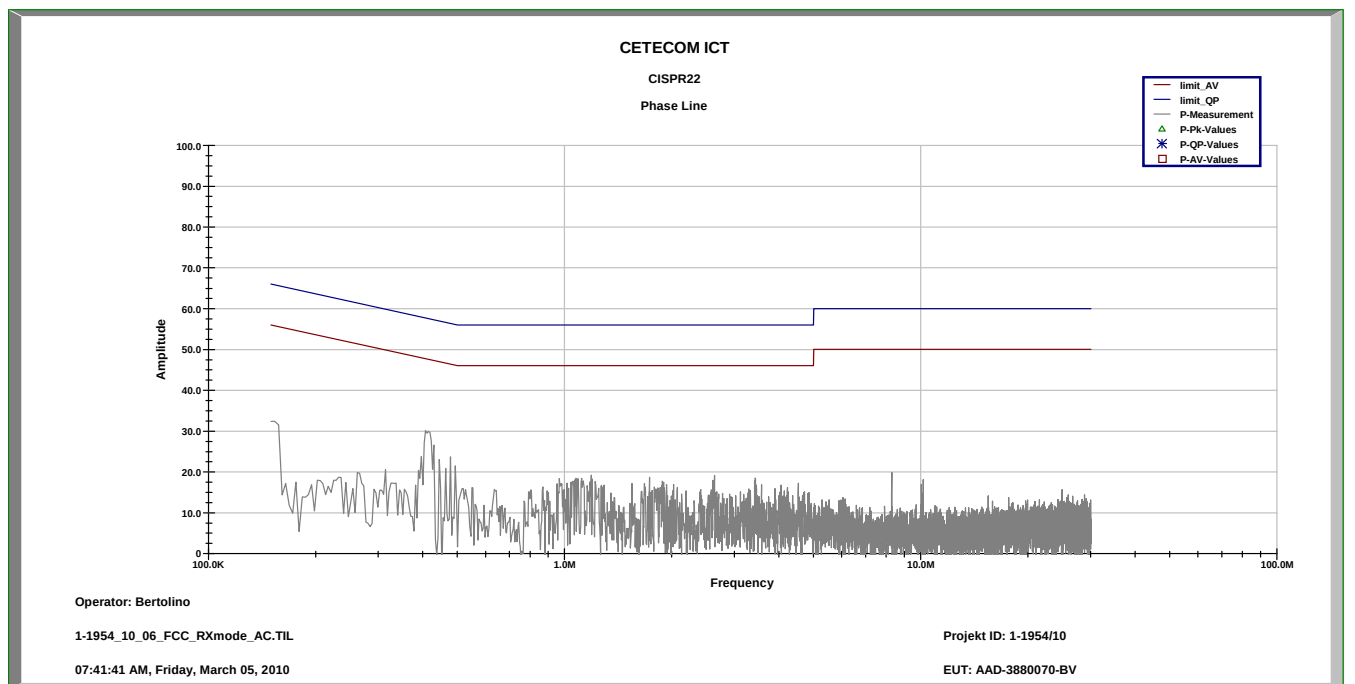
Plot 2: TX mode, phase line



Plot 3: RX mode, neutral line



Plot 4: RX mode, phase line



Limits:

Under normal test conditions only	See plots
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6 Test equipment and ancillaries used for tests

In order to simplify the identification of the equipment used at each specific test, each item of test equipment and ancillaries are provided with an identifier or number in the equipment list below.

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

N o.	Lab/Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kal. Art	Last Calibration	Next Calibration
1	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
2	50	Netzgerät	6032A	HP Meßtechnik	2920A04466	300000580	k	06.01.09	06.01.11
3	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B5979	300000210	k	03.09.01	03.09.03
4	n. a.	EMI-Messempfänger	ESCI 1166.5950.03	R&S	100083	300003312	k	08.01.10	08.01.12
5	n. a.	Analysator-Referenz-System (Harmonics u. Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	06.06.07	06.06.09
6	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
7	n. a.	Antennen mast	Model 2175	ETS-LINDGREN	64762	300003745	iz w		
8	n. a.	Steuergerät	Model 2090	ETS-LINDGREN	64672	300003746	iz w		
9	n. a.	Interface-Box für Drehtisch	Model 105637	ETS-LINDGREN	44583	300003747	iz w		
10	n. a.	Breitband antenne	VULB9163	Schwarzbeck	295	300003787	k	01.04.08	01.04.10
11	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	08.01.10	08.01.12
12	n. a.	Horn Antenne 1-26.5GHz	3115	EMCO	8812-3088	300001032	vl KI !	05.03.09	05.03.11
13	n. a.	Active Loop Antenne	6502	EMCO	2210	300001015	ne		
14	n. a.	Busisolator		Kontron		300001056	g		
15	n. a.	Absorberhalle		MWB	87400/02	300000996			
16	Spec .A. 2_2e	System-Rack	85900	HP I.V.	*	300000222	ne		
17	9	Netznachbildung Artificial Mains 9 kHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.10	06.01.12

		to 30 MHz								
18	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne			
19	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne			
20	n. a.	Trenntrafo	RT5A	Grundig	9242	300001263	ne			
21	n. a.	Leitungsteiler	11850C	HP Meßtechnik		300000997	ne			
22	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne			
23	n. a.	Band Reject filter	WRCG240 0/2483- 2375/2505- 50/10SS Quantum Change, Modell TILE- ICS/FULL	Wainwright	11	300003351	ev			
24	n. a.	TILE- Software Emission	Modell TILE- ICS/FULL	EMCO	none	300003451	ne			
25	n. a.	Hochpass filter	WHKX2.9/ 18G-12SS	Wainwright	1	300003492	ev			
26	n. a.	Hochpassfilter	WHK1.1/1 5G-10SS	Wainwright	3	300003255	ev			
27	n. a.	Hochpass filter	WHKX7.0/ 18G-8SS	Wainwright	18	300003789	ne			
28	n. a.	PSA- Spektrumanalysator 3 Hz - 26,5 GHz	E4440A	Agilent Vertr. Bad Hom	MY48250080	300003812	k	05.08. 08	05.08. 10	
29	n. a.	Microwave Analog Signal Generator	N5183A	Agilent Vertr. Bad Hom	MY47420220	300003813	k	06.08. 08	06.08. 10	
30	n. a.	EMI Preselector 9kHz - 1 GHz	N9039A	Agilent Vertr. Bad Hom	MY48260003	300003825	vl KI !	19.08. 08	19.08. 10	
31	n. a.	TRILOG Super Breitband Antenne	VULB916 3	Schwarzbeck	371	300003854	vl KI !	17.12. 08	17.12. 10	
32	n. a.	Switch / Control Unit Signal	3488A	HP Meßtechnik		300000929	ne			
33	n. a.	Analyzer 20Hz- 26,5GHz-150 to + 30 DBM	FSIQ26	R&S	835540/018	300002681 -0005	k	07.01. 10	07.01. 12	
34	n. a.	CBT (Bluetooth EDR Signal isierung)	CBT 1153.9000 K35, CBT- B55, CBT- K55	R&S	100313	300003516	k	03.09. 2008	03.09. 10	
35	n. a.	Power Supply 0-20V; 0-5A	6632B	HP	US37478366	400000117	k	28.08. 08	28.08. 10	