

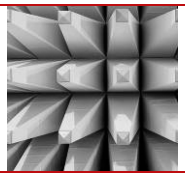

CETECOM™
CETECOM ICT Services
consulting - testing - certification

TEST REPORT

Deutscher Akkreditierungs Rat DAR

Test report no.: 1-1954-45-02/10-B

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Straße 6 – 10
66117 Saarbruecken / Germany
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Accredited test laboratory:
The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025
DAR registration number: DGA-PL-176/94-D1

Area of Testing: Radio/Satellite Communications

Applicant

Sony Ericsson Mobile Communications AB
Nya Vattentornet
22188 Lund / Sweden
Phone: +46 46 19 30 00
Fax: +46 46 19 32 95
Contact: Johan Wedin
e-mail: johan.wedin@sonyericsson.com
Phone: +46 70 71 95 73 6

Manufacturer

Sony Ericsson Mobile Communications AB
Nya Vattentornet
22188 Lund / Sweden

Test standard/s

47 CFR Part 15	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	Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

For further applied test standards please refer to section 3 of this test report.

Test item

Kind of test item:	BT Notifier BT2.1 + EDR
Model name:	DGA-0004001
FCC ID:	PY7DGA-4001
IC:	4170B-DGA4001
Frequency [MHz]:	2400 MHz – 2483.5 MHz (channel 00 – 2402 MHz; channel 78 – 2480 MHz)
Power supply:	3.7V DC by power supply / charger + battery
Temperature range:	-20 °C to +55 °C

Test performed:

2010-09-30 Marco Bertolino

Test report authorised:

2010-09-30 Stefan Bös

1 Table of contents

2 General information

2.1 Notes

The test results of this test report relate exclusively to the test item specified in this test report. 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 CETECOM ICT Services GmbH.

2.2 Application details

Date of receipt of order:	2010-07-21
Date of receipt of test item:	2010-09-15
Start of test:	2010-09-15
End of test:	2010-09-27
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Version	Test standard description
47 CFR Part 15	2009-10	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

4 Test environment

Temperature:	T_{nom}	+20 °C during room temperature tests
	T_{max}	+55 °C during high temperature test
	T_{min}	-20 °C during low temperature test
Relative humidity content:		50 %
Air pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	3.7 V DC by power supply / charger + battery
	V_{max}	4.2 V
	V_{min}	3.4 V
Used Charger:		**CCA-0004001-BV (Spurious radiated measurements)** **EP800 CAA-0002016-BV + EC700 USB-cable (AC-conducted)**

5 Test item

Kind of test item	:	BT Notifier BT2.1 + EDR
Type identification	:	DGA-0004001
S/N serial number	:	#18964, #18965 radiated #18976, #18977 conducted
HW hardware status	:	AP1.2
SW software status	:	bttest-1.0.A.0.1
Frequency band [MHz]	:	2400 MHz – 2483.5 MHz (channel 00 – 2402 MHz; channel 78 – 2480 MHz)
Type of modulation	:	FHSS technology with GFSK; Pi/4 DQPSK and 8DPSK modulation
Number of channels	:	79 (channel 00 to channel 78)
Antenna	:	Integrated antenna → for more information, please take a look at the annex C – internal photos of the EUT
Power supply	:	3.7 V DC by power supply / charger + battery
Temperature range	:	-20°C to +55 °C

6 Test laboratories sub-contracted

None

7 Summary of measurement results

☒	**No deviations from the technical specifications were ascertained**
☐	There were deviations from the technical specifications ascertained

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	CFR Part 15 RSS 210, Issue 7, Annex 8	Passed	2010-09-30	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	Mode	Pass	Fail	NA	NP	Results (max.)
§15.247(b)(4) RSS 210 / A8.4(2)	Antenna gain	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.247(e) RSS 210 / A8.2(b)	Power spectral density	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☐	☐	☒	☐	
§15.247(a)(1) RSS 210 / A8.1(b)	Carrier frequency separation	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.247(a)(1) RSS 210 / A8.1(d)	Number of hopping channels	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.247(a)(1) (iii) RSS 210 / A8.3(1)	Time of occupancy (dwell time)	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☒	☐	☐	☐	complies
§15.247(a)(1) RSS 210 / A8.2(a)	Spectrum bandwidth of a FHSS system 20dB bandwidth	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	complies
§15.247(b)(1) RSS-210 / A8.4(2)	Maximum output power	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	complies
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	complies
§15.205 RSS-210 / A8.5	Band edge compliance radiated	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	Nominal	Nominal	GFSK Pi/4 DQPSK 8 DPSK	☒ ☒ ☒	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	Nominal	Nominal	8DPSK	☒	☐	☐	☐	complies
§15.109 RSS-Gen.	RX spurious emissions radiated	Nominal	Nominal	-/-	☒	☐	☐	☐	complies
§15.209(a) RSS-Gen	TX spurious emissions radiated < 30 MHz	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies
§15.107(a)	Conducted emissions < 30 MHz	Nominal	Nominal	GFSK	☒	☐	☐	☐	complies

Note: NA = Not Applicable; NP = Not Performed

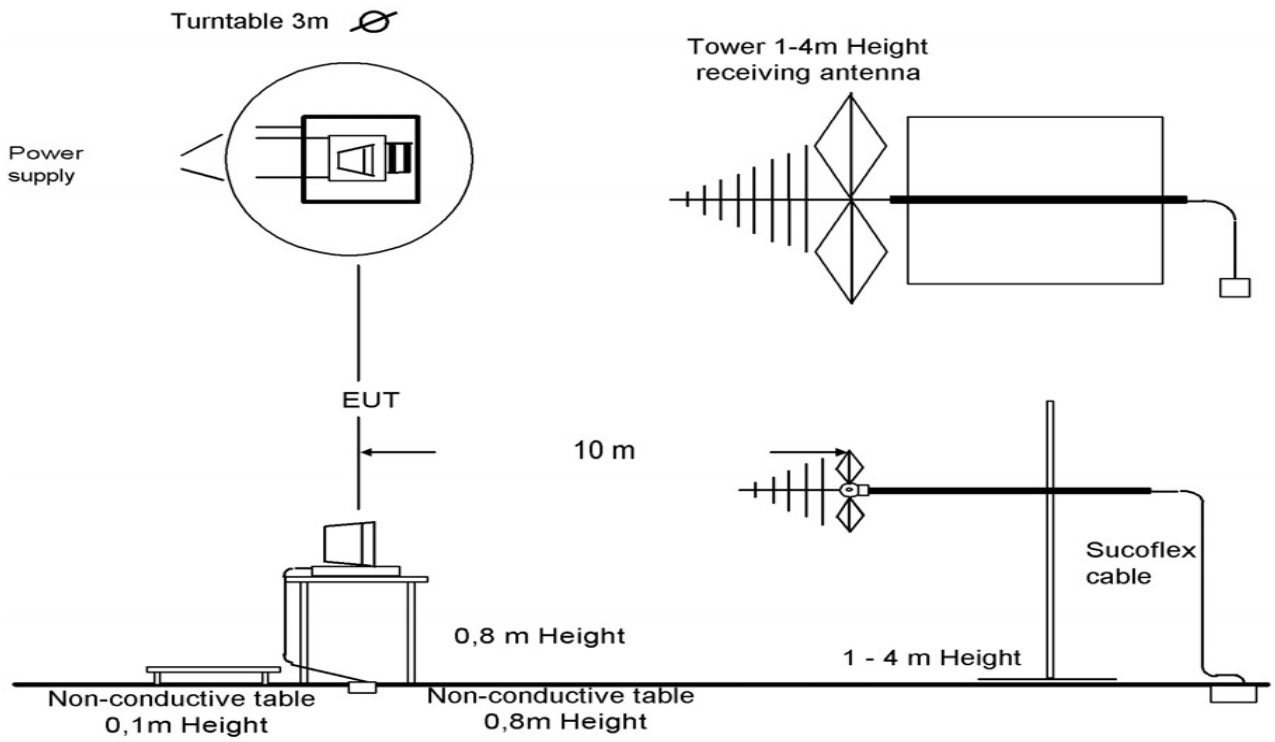
8 RF measurement testing

8.1 Description of test setup

8.1.1 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 C63.4-2009 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 C63-4-2009 clause 4.2.
Antennas are confirmed with ANSI C63.2-1996 item 15.

Semi anechoic chamber



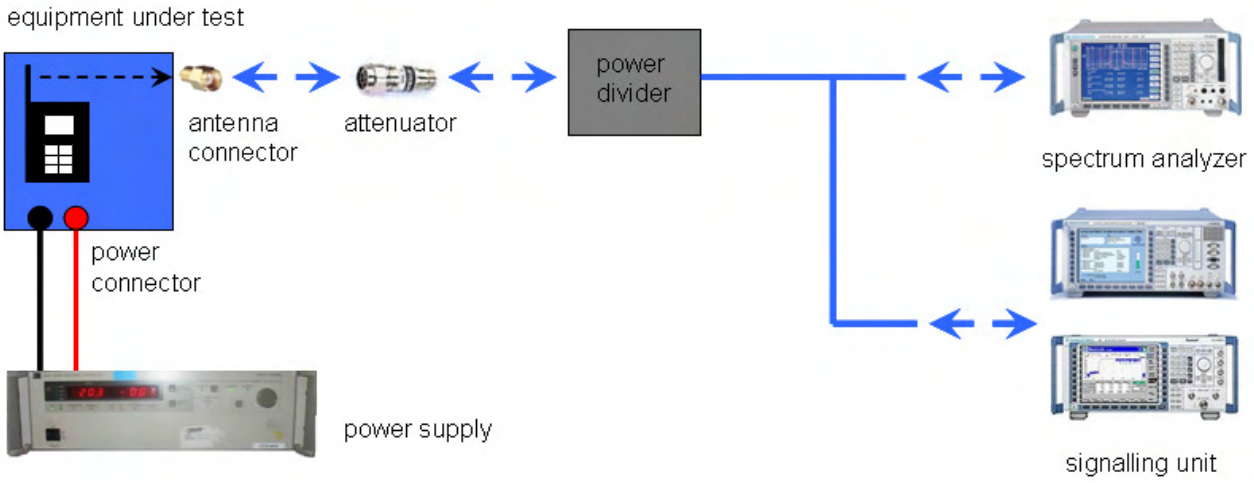
Picture 1: Diagram radiated measurements

9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

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.

8.1.2 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.



Picture 2: Diagram conducted measurements

8.2 Additional comments

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

Reference documents: None

Special test descriptions: None

Configuration descriptions: None

Test mode:

☒ Bluetooth Test mode loop back enabled
(EUT is controlled over CBT/CMU)

☐ Special software is used.
EUT is transmitting pseudo random data by itself

8.3 RSP100 test report cover sheet / performance test data

Test report number	:	**1-1954-45-02/10-B**
Equipment model number	:	**DGA-0004001**
Certification number	:	**4170B-DGA4001**
Manufacturer (complete address)	:	**Sony Ericsson Mobile Communications AB Nya Vattentornet 22188 Lund / Sweden**
Tested to radio standards specification no.	:	**RSS 210, Issue 7, Annex 8**
Open area test site IC No.	:	**IC 3462C-1**
Frequency range	:	**2400 – 2483.5 MHz band (2402 – 2480 MHz)**
RF-power [W] (max.)	:	**Cond.: 1.60 mW (GFSK) EIRP: 0.94 mW (GFSK) Cond.: 1.74 mW (Pi/4-DQPSK) EIRP: 0.86 mW (Pi/4-DQPSK) Cond.: 1.91 mW (8DPSK) EIRP: 0.94 mW (8DPSK)**
Occupied bandwidth (99%-BW) [kHz]	:	**932 (GFSK) 1317 (Pi/4-DQPSK) 1269 (8DPSK)**
Type of modulation	:	**GFSK; Pi/4-DQPSK; 8DPSK**
Emission designator (TRC-43)	:	**932KFXD (GFSK) 1M32GXD (Pi/4-DQPSK) 1M27GXD (8DPSK)**
Antenna information	:	**Integrated antenna**
Transmitter spurious (worst case) [µV/m @ 3m]	:	**347 µV/m @ 11.99 GHz**
Receiver spurious (worst case) [µV/m @ 3m]	:	**316 µV/m (noise floor)**

ATTESTATION:
DECLARATION OF COMPLIANCE:

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

Laboratory manager:

2010-09-30	Marco Bertolino	M. Bertolino
Date	Name	Signature

9 Measurement results

9.1 Antenna gain

Measurement:

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For normal Bluetooth® devices, the GFSK modulation is used.

Measurement parameters:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	3 MHz
Resolution bandwidth:	3 MHz
Span:	5 MHz
Trace-Mode:	Max hold

Limits:

FCC	IC
CFR Part 15.247 (b)(4)	RSS 210, Issue 7, A 8.4(2)
Antenna Gain	
6 dBi	

Results:

T_{nom}	V_{nom}	lowest channel 2402 MHz	middle channel 2441 MHz	highest channel 2480 MHz
Conducted power [dBm] Measured with GFSK modulation		2.10	2.26	2.04
Radiated power [dBm] Measured with GFSK modulation		-2.70	-0.82	-1.29
Gain [dBi] Calculated		-4.80	-3.08	-3.33

Result: **The result of the measurement is passed.**

9.2 Power spectral density

Description:

Measurement of the power spectral density of a digital modulated system. This requirement is only valid for digitally modulated systems without hopping functionality.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	500 s
Video bandwidth:	3 kHz
Resolution bandwidth:	3 kHz
Span:	150 kHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 15.247 (e)	RSS 210, Issue 7, A 8.2(b)
Power Spectral Density	
For digitally modulated systems the transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0-second duration.	

Result:

Modulation	Power spectral density [dBm/3kHz]		
Frequency	2412 MHz	2437 MHz	2462 MHz
GFSK	Not required for hopping systems!		
Pi/4 DQPSK			
8DPSK			
Measurement uncertainty	± 0.5 dB		

9.3 Carrier frequency separation

Description:

Measurement of the carrier frequency separation of a hopping system. The carrier frequency separation is constant for all modulation-modes. We use GFSK-modulation to show compliance. EUT in hopping mode.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	100 kHz
Resolution bandwidth:	100 kHz
Span:	4 MHz
Trace-Mode:	Max Hold

Limits:

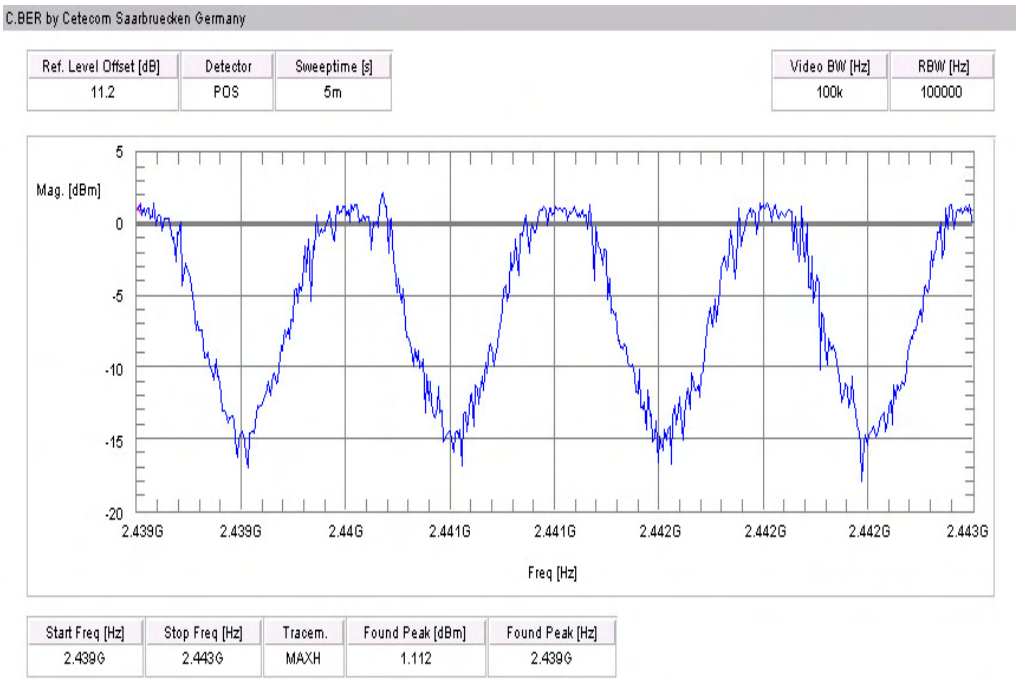
FCC	IC
CFR Part 15.247 (a)(1)	RSS 210, Issue 7, A 8.1(b)
Carrier Frequency Separation	
Minimum 25 kHz or two-thirds of the 20 dB bandwidth of the hopping system whichever is greater.	

Result:

Carrier frequency separation	~ 1 MHz

Result: **The result of the measurement is passed.**

Plot 1: Carrier Frequency Separation (GFSK)



9.4 Number of hopping channels

Description:

Measurement of the total number of used hopping channels. The number of hopping channels is constant for all modulation-modes. We use GFSK-modulation to show compliance. EUT in hopping mode.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	500 kHz
Resolution bandwidth:	500 kHz
Span:	Plot 1: 2400 – 2445 MHz Plot 2: 2445 – 2485 MHz
Trace-Mode:	Max Hold

Limits:

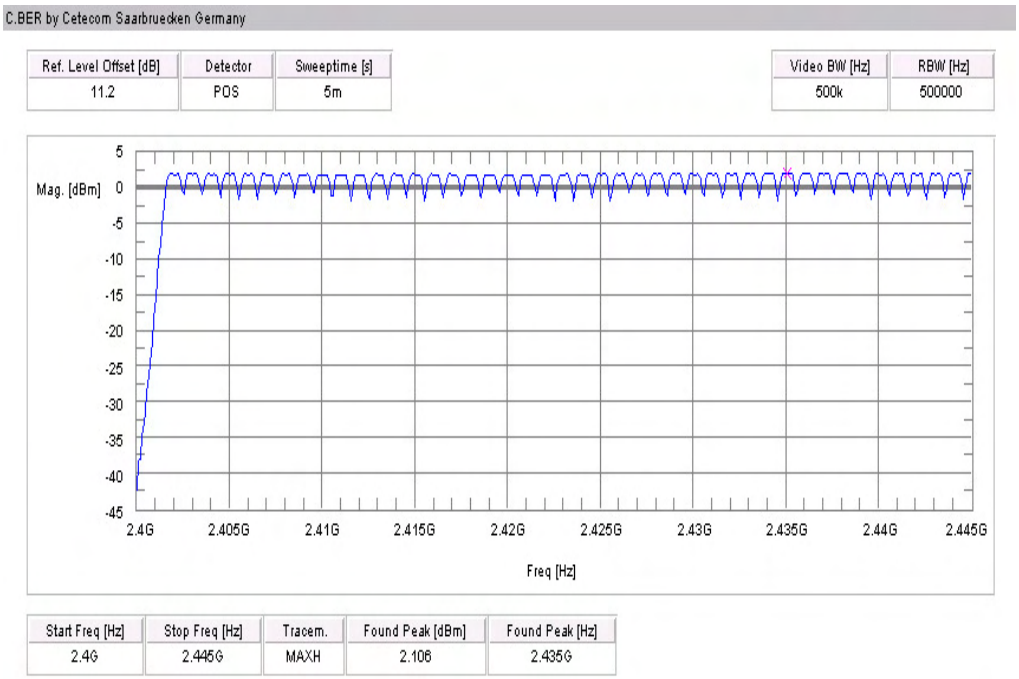
FCC	IC
CFR Part 15.247 (a)(1)	RSS 210, Issue 7, A 8.1(d)
Number of hopping channels	
At least 15 non overlapping hopping channels	

Result:

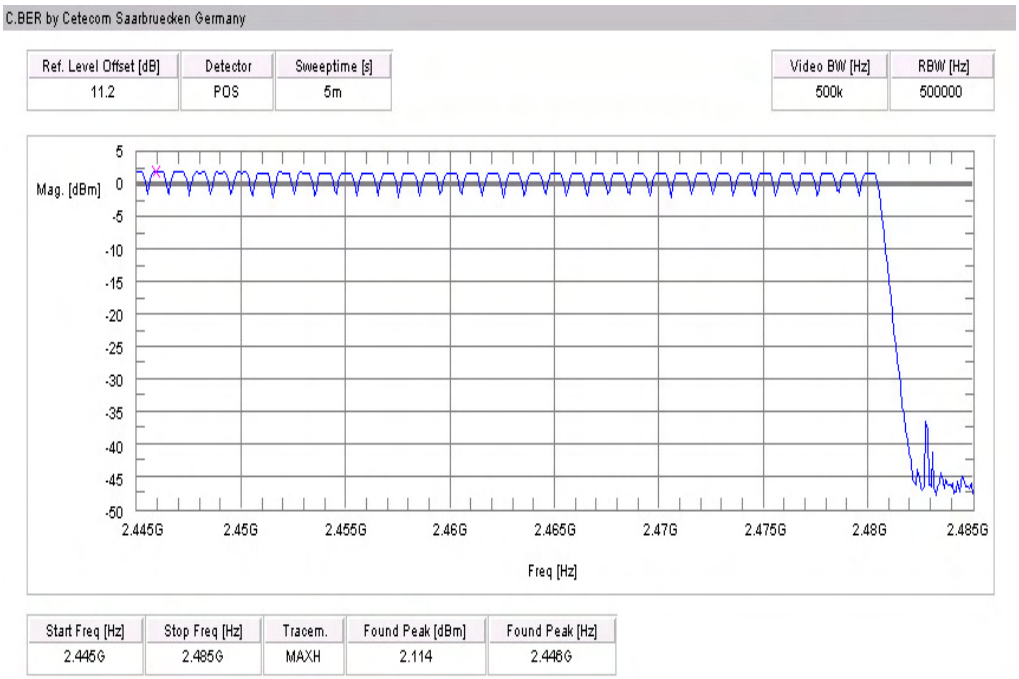
Number of hopping channels	79

Result: **The result of the measurement is passed.**

Plot 1: Number of hopping channels (GFSK)



Plot 2: Number of hopping channels (GFSK)



9.5 Time of occupancy (dwell time)

For Bluetooth® devices:

The channel staying time of 0.4 s within a 31.6 second period in data mode is constant for Bluetooth® devices and independent from the packet type (packet length). The calculation for a 31.6 second period is a follows:

Channel staying 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)
Channel staying time = 625 µs * 1600*1/s / 79 * 31.6 s = 0.4 s (in a 31.6 s period)

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

Example for a DH3 packet (with a maximum length of three time slots)
Channel staying time = 3 * 625 µs * 1600/3 *1/s / 79 * 31.6 s = 0.4 s (in a 31.6 s period)

Example for a DH5 packet (with a maximum length of five time slots)
Channel staying time = 5 * 625 µs * 1600/5 *1/s / 79 * 31.6 s = 0.4 s (in a 31.6 s period)

This is according the Bluetooth® Core Specification V2.0 & V2.1 & V3.0 & V4.0 (+ critical errata) for all Bluetooth® devices.

The following table shows the relations:

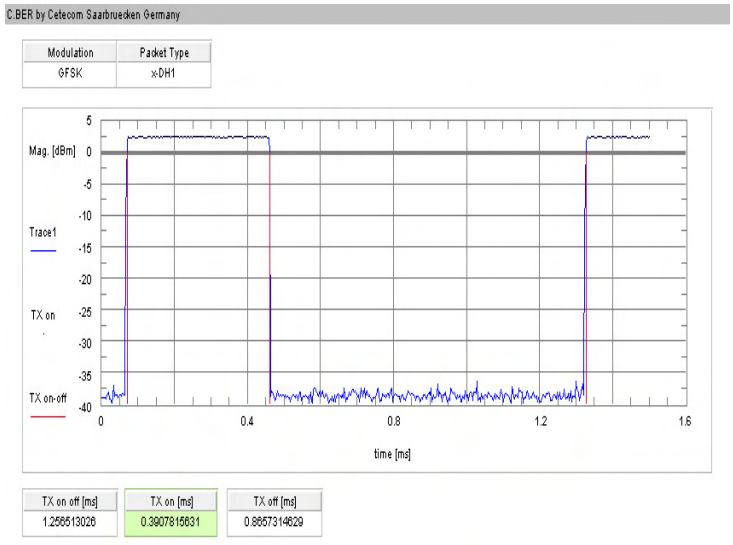
Packet Size	Pulse Width [ms] *	Max. number of transmissions per channel in 31.6 sec
DH1	0.366	640
DH3	1.622	214
DH5	2.870	128

* according Bluetooth® specification

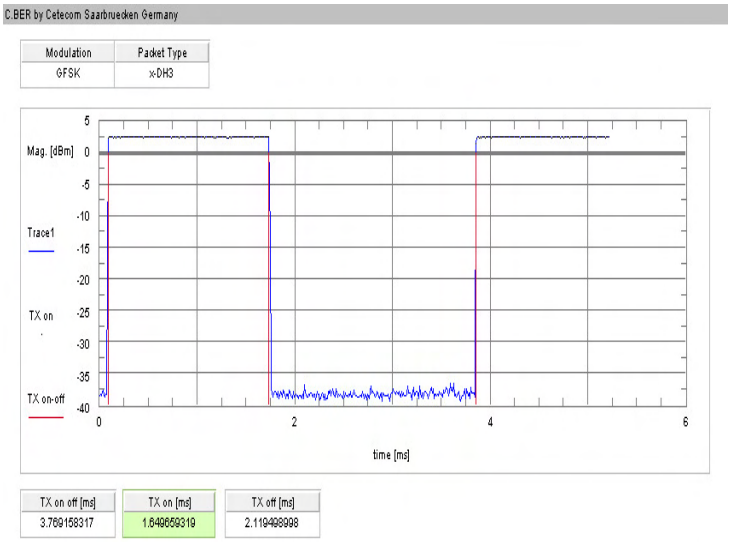
Measurement results:

Packet Size	Measured Pulse Width [ms]	Max. number of transmissions in 31.6 sec	Dwell time [Pulse width * Number of transmissions]
DH1	0.391	640	250.2 ms
DH3	1.650	214	353.1 ms
DH5	2.897	128	370.8 ms

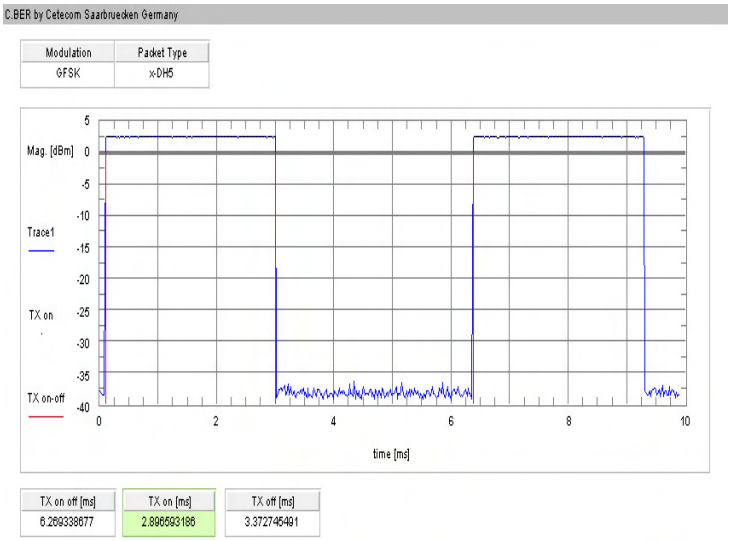
Plot 1: DH1



Plot 2 DH3



Plot 3 DH5



Limits:

FCC	IC
CFR Part 15.247 (a)(1)(iii)	RSS 210, Issue 7, A 8.3(1)
Time of occupancy (dwell time)	
The frequency hopping operation shall have an average time of occupancy on any frequency not exceeding 0.4 seconds within a duration in seconds equal to the number of hopping frequencies multiplied by 0.4.	

Result: **The result of the measurement is passed.**

9.6 Spectrum bandwidth of a FHSS system – 20 dB bandwidth

Description:

Measurement of the 20dB bandwidth of the modulated signal. The measurement is performed according to the "Measurement Guidelines" (DA 00-705, March 30, 2000). EUT in single channel mode.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	2 s
Video bandwidth:	30 kHz
Resolution bandwidth:	10 kHz
Span:	3 MHz
Trace-Mode:	Max Hold

Limits:

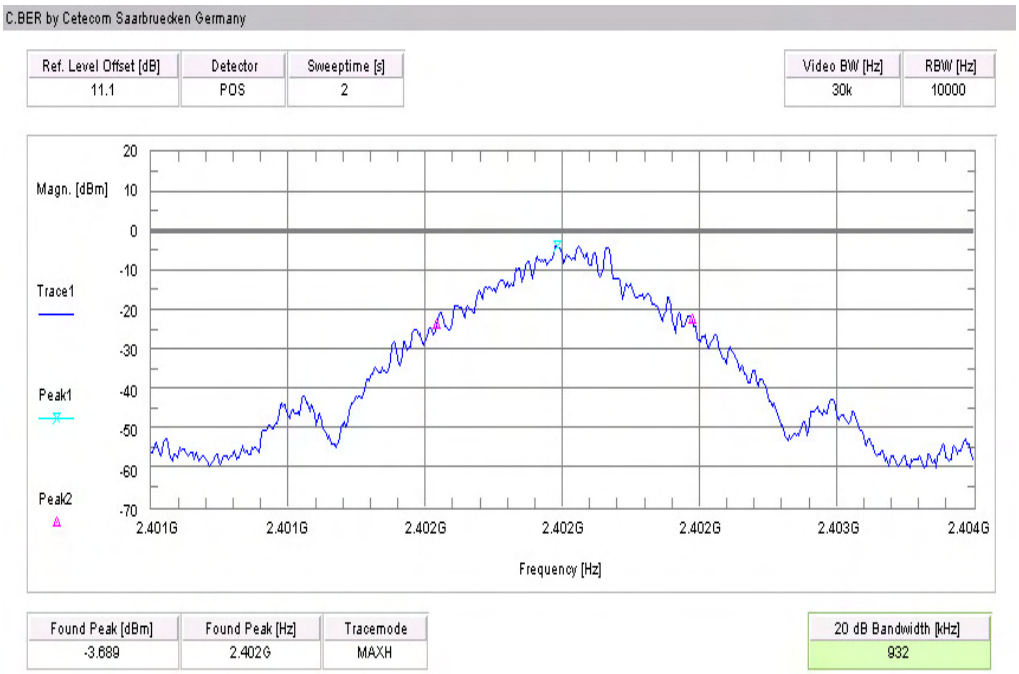
FCC	IC
CFR Part 15.247 (a)(1)	RSS 210, Issue 7, A 8.2(a)
Spectrum bandwidth of a FHSS system – 20 dB bandwidth	
GFSK < 1000 kHz Pi/4 DQPSK < 1500 kHz 8DPSK < 1500 kHz	

Results:

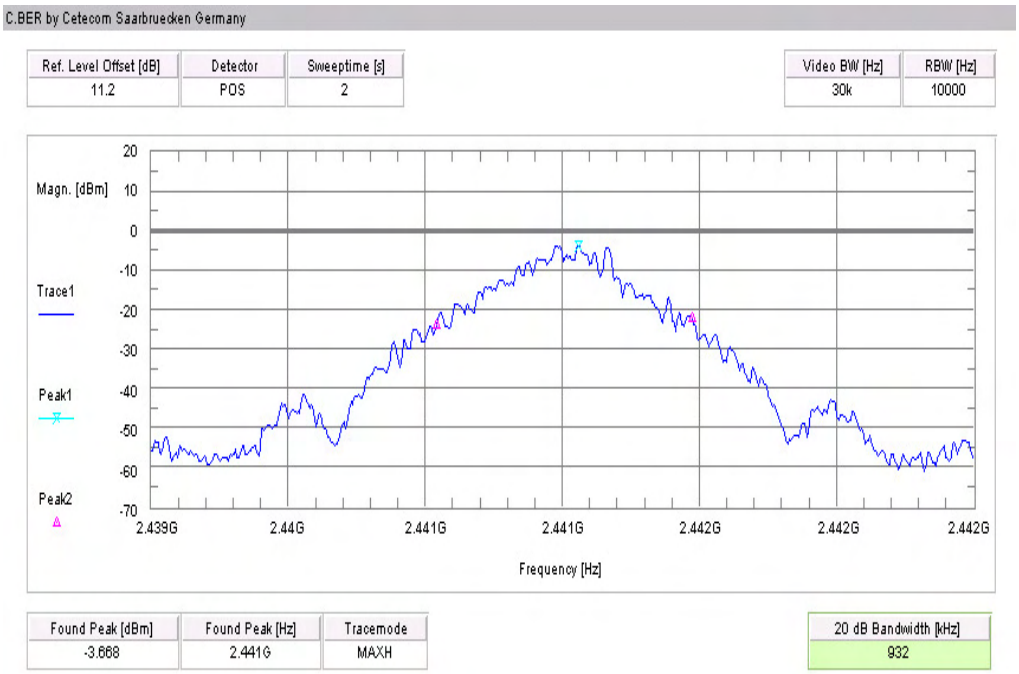
Modulation	20 dB BANDWIDTH [kHz]		
Frequency	2402 MHz	2441 MHz	2480 MHz
GFSK	932	932	926
Pi/4 DQPSK	1317	1317	1317
8DPSK	1269	1269	1263
Measurement uncertainty	± 10 kHz		

Result: The result of the measurement is passed.

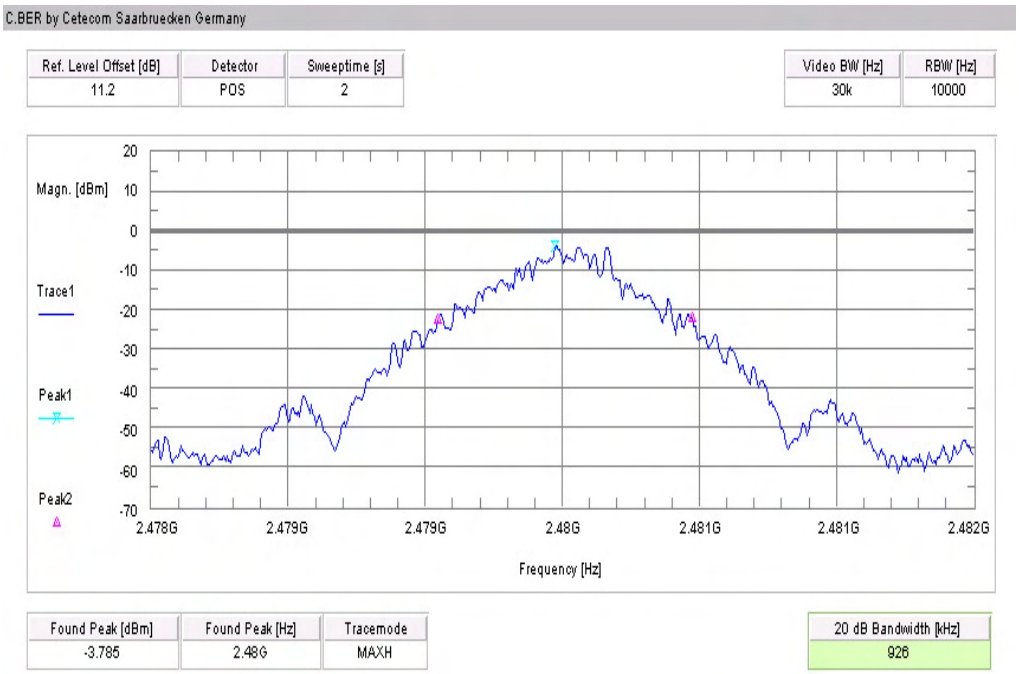
Plot 1: Channel 00 / GFSK



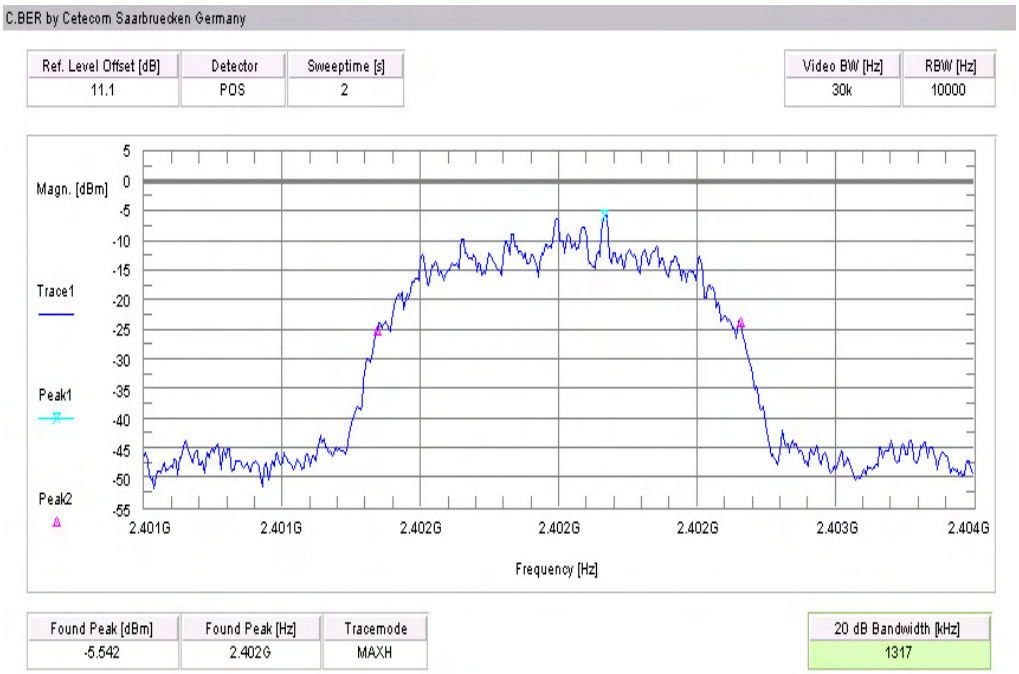
Plot 2: Channel 39 / GFSK



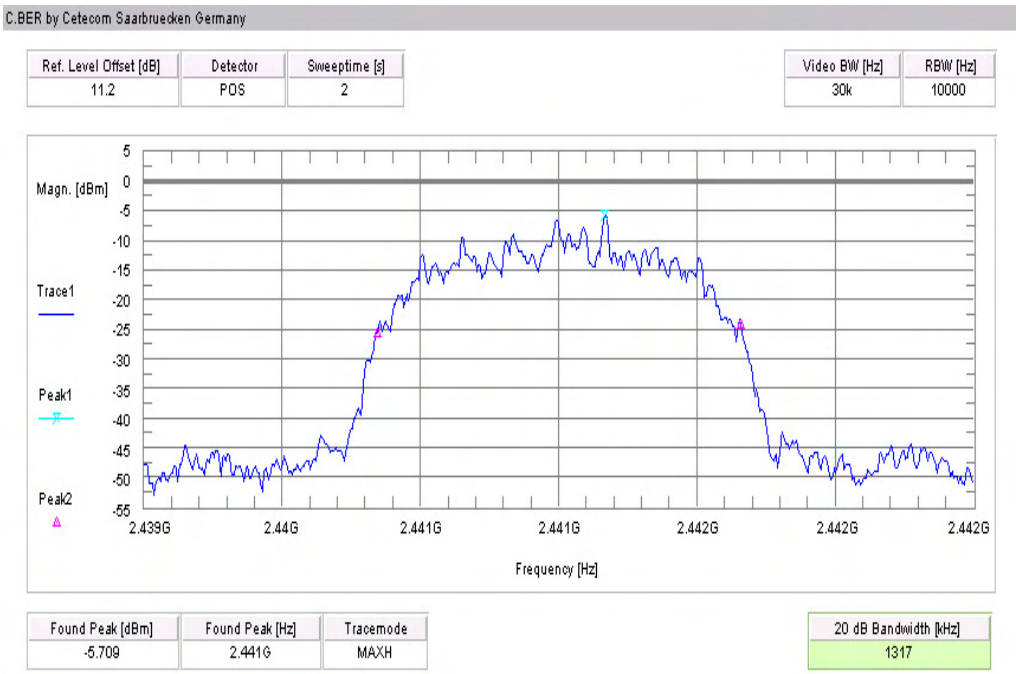
Plot 3: Channel 78 / GFSK



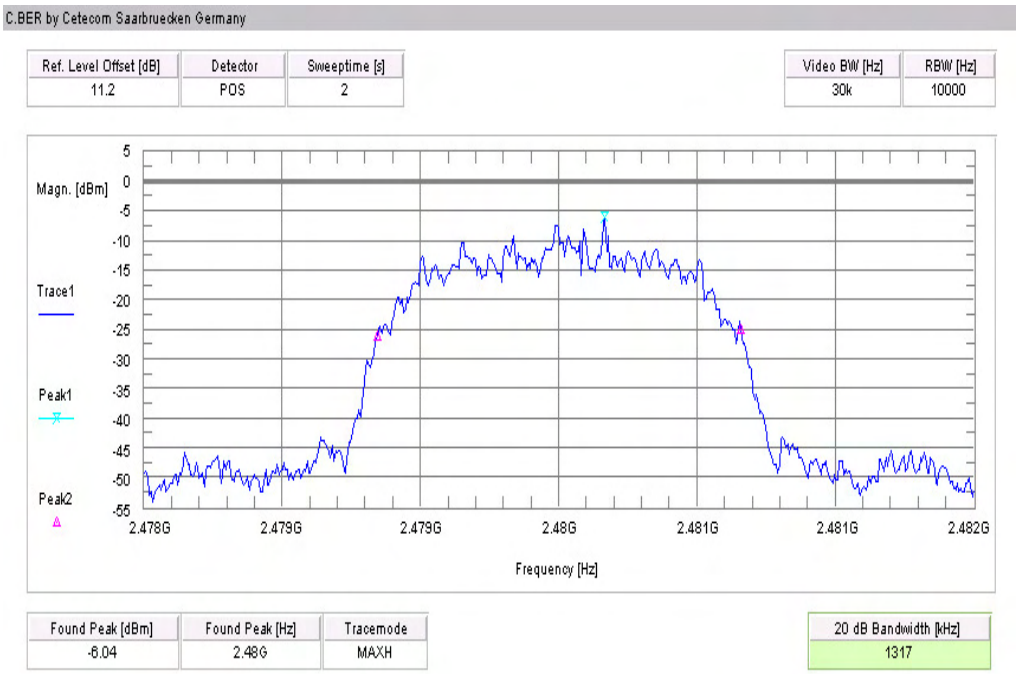
Plot 4: Channel 00 / Pi/4 DQPSK



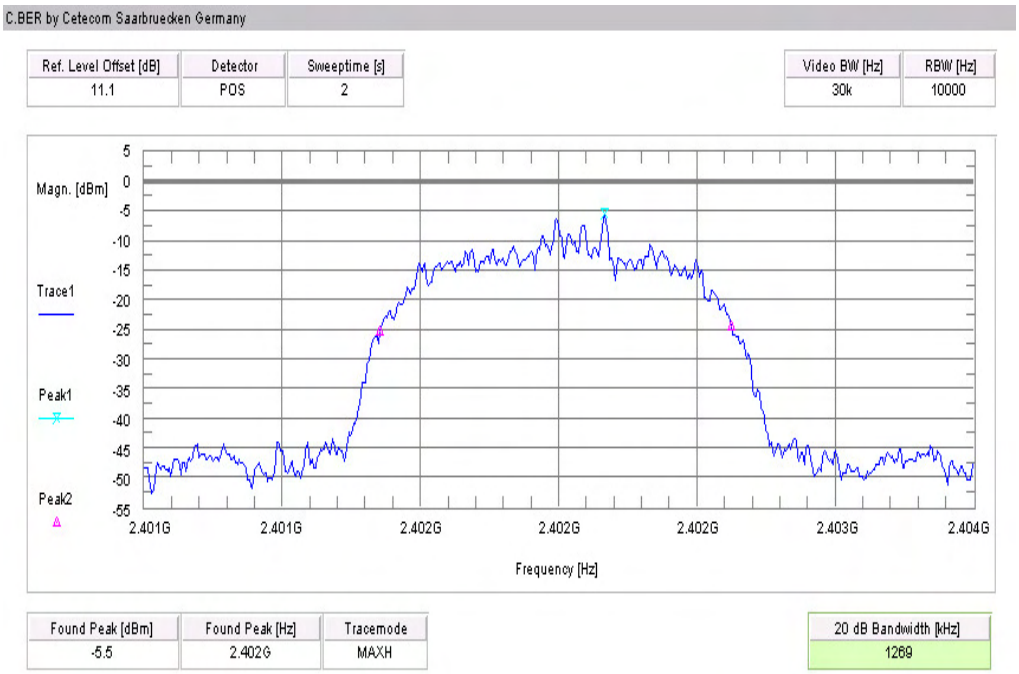
Plot 5: Channel 39 / Pi/4 DQPSK



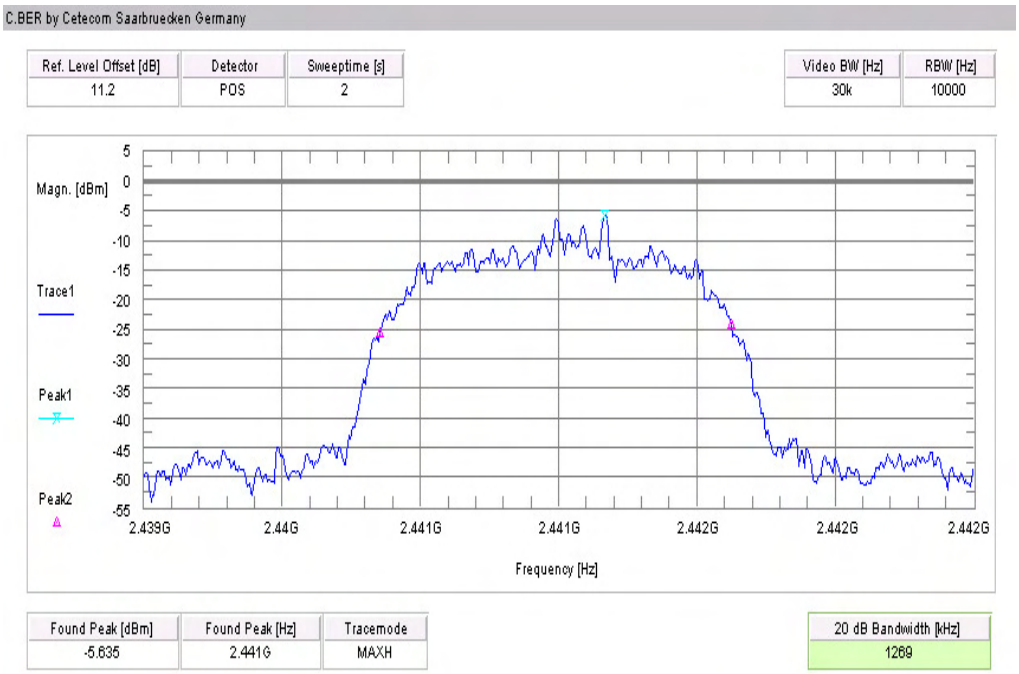
Plot 6: Channel 78 / Pi/4 DQPSK



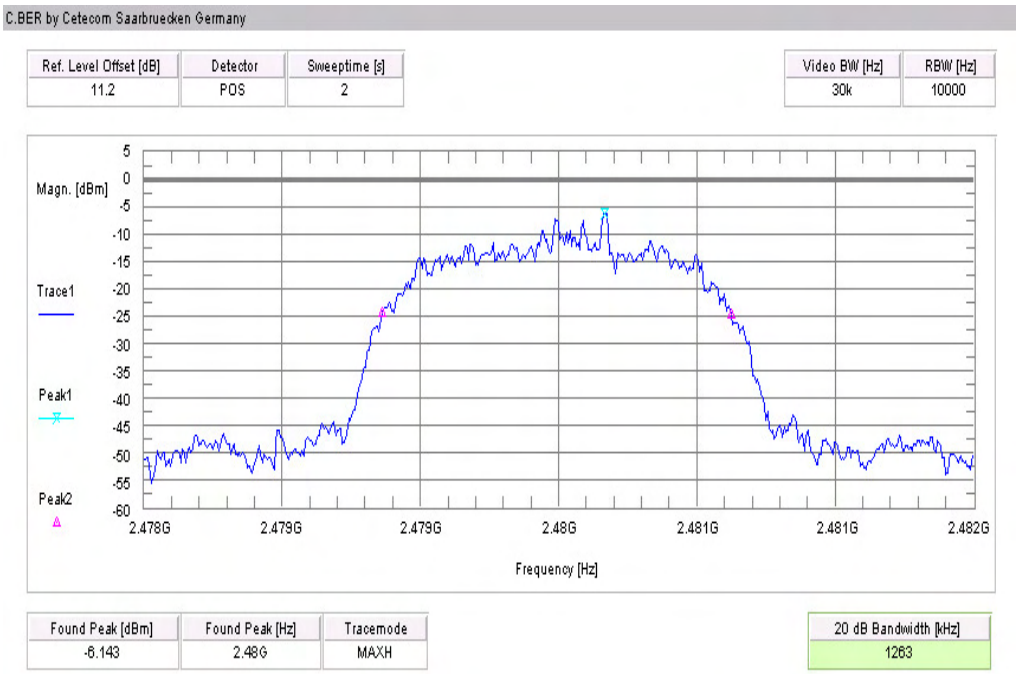
Plot 7: Channel 00 / 8DPSK



Plot 8: Channel 39 / 8DPSK



Plot 9: Channel 78 / 8DPSK



9.7 Maximum output power

Description:

Measurement of the maximum output power conducted and radiated. EUT in single channel mode.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	3 MHz
Resolution bandwidth:	3 MHz
Span:	3 MHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 15.247 (b)(1)	RSS 210, Issue 7, A 8.4(2)
Maximum output power	
[Conducted: 0.125 W – antenna gain max. 6 dBi] Systems using more than 75 hopping channels: Conducted: 1.0 W – antenna gain max. 6 dBi	

Result:

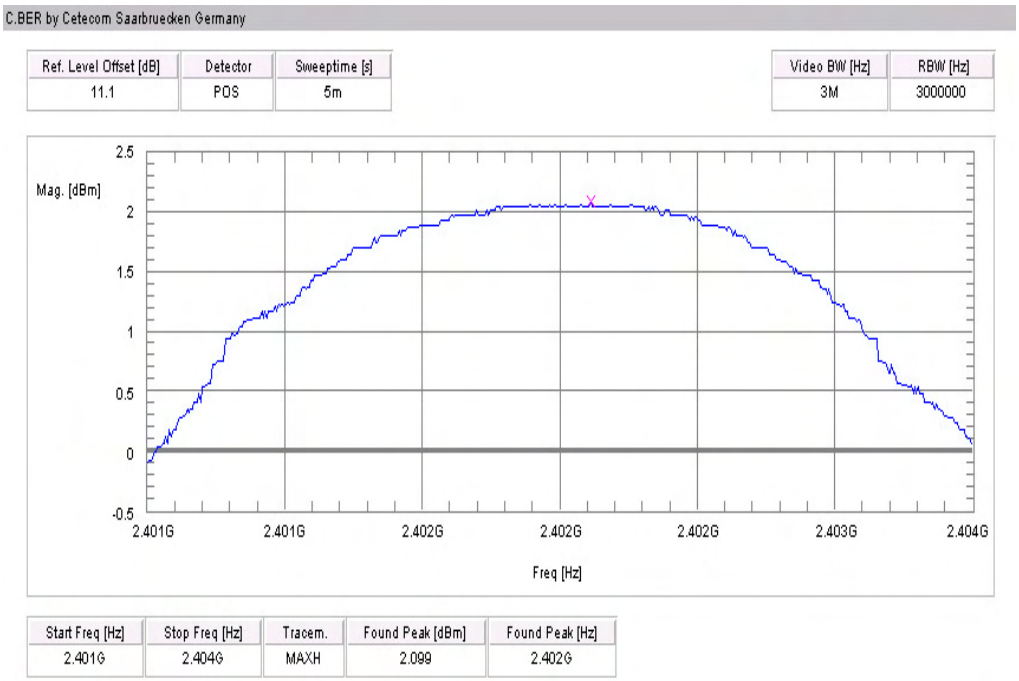
Modulation / Frequency	Maximum output power conducted [dBm]		
	2402 MHz	2441 MHz	2480 MHz
GFSK	2.10	2.26	2.04
Pi/4 DQPSK	2.37	2.40	2.07
8DPSK	2.82	2.82	2.55
Measurement uncertainty	± 0.5 dB		

Modulation / Frequency	Maximum output power radiated - EIRP [dBm]		
	2402 MHz	2441 MHz	2480 MHz
GFSK	-2.70	-0.82	-0.29
Pi/4 DQPSK *)	-2.43	-0.68	-1.26
8DPSK *)	-1.98	-0.26	-0.78
Measurement uncertainty	± 2.0 dB		

*) - Values calculated with antenna gain

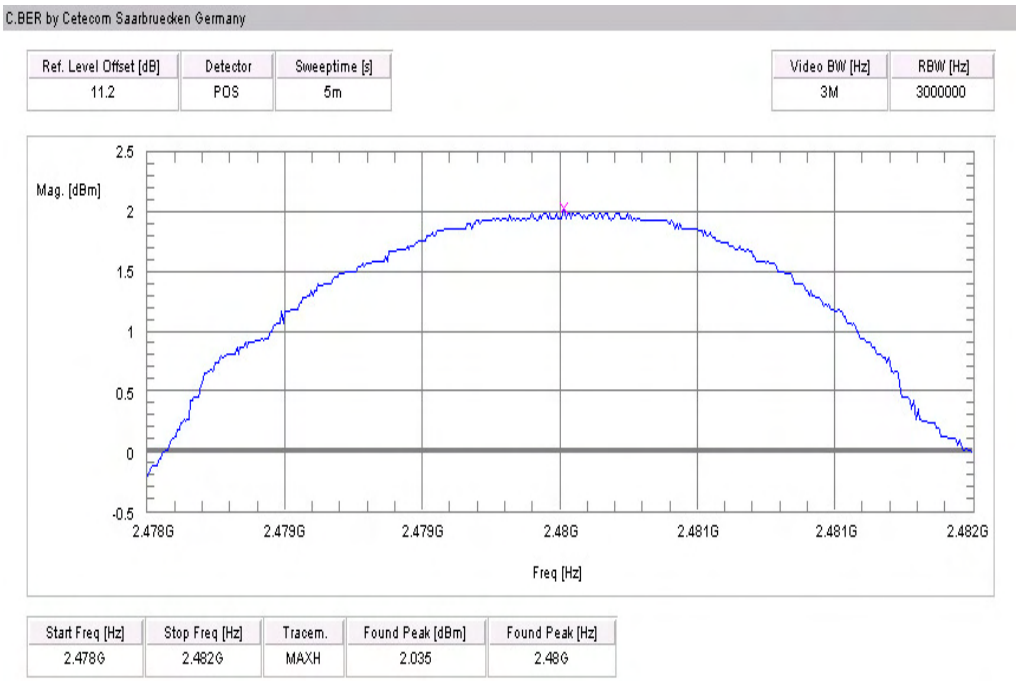
Result: **The result of the measurement is passed.**

Plot 1: Channel 00 / GFSK (conducted)

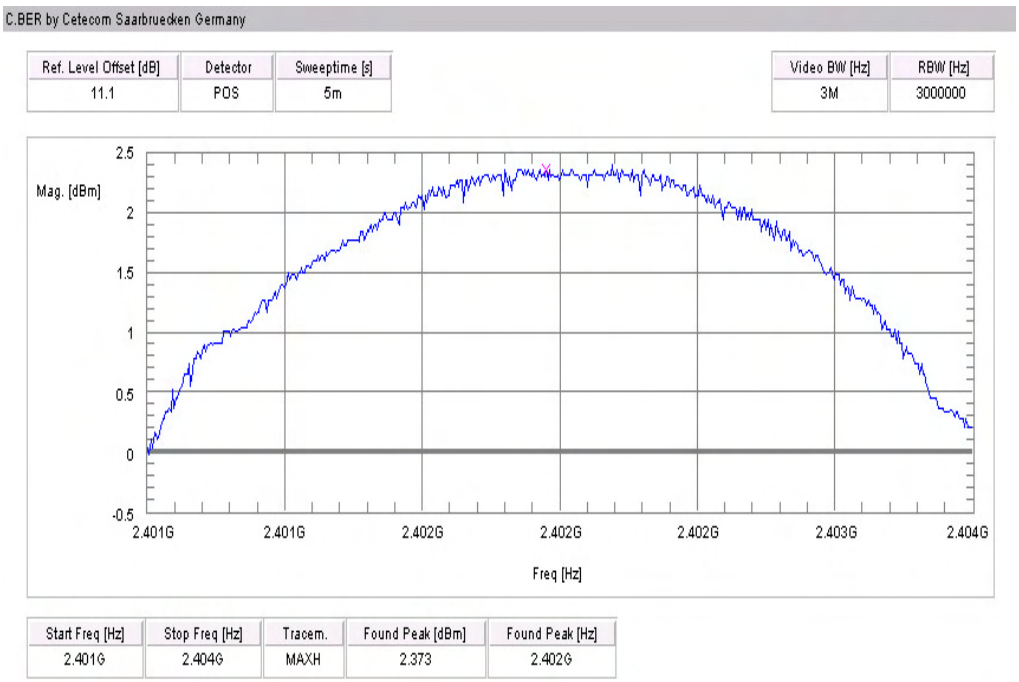


Plot 2: Channel 39 / GFSK (conducted)

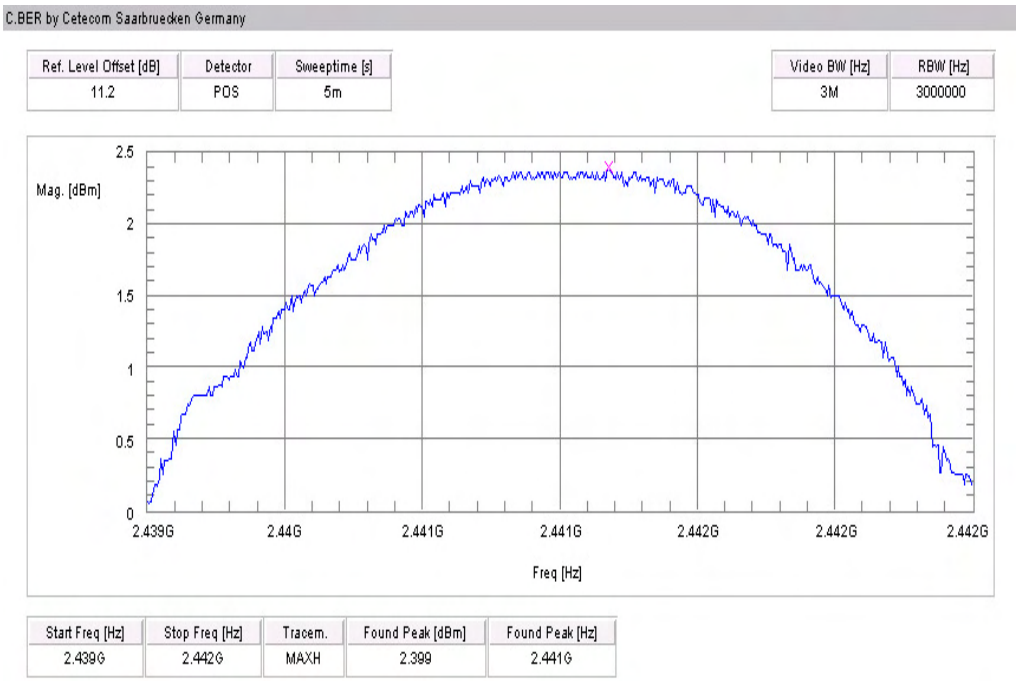
Plot 3: Channel 78 / GFSK (conducted)



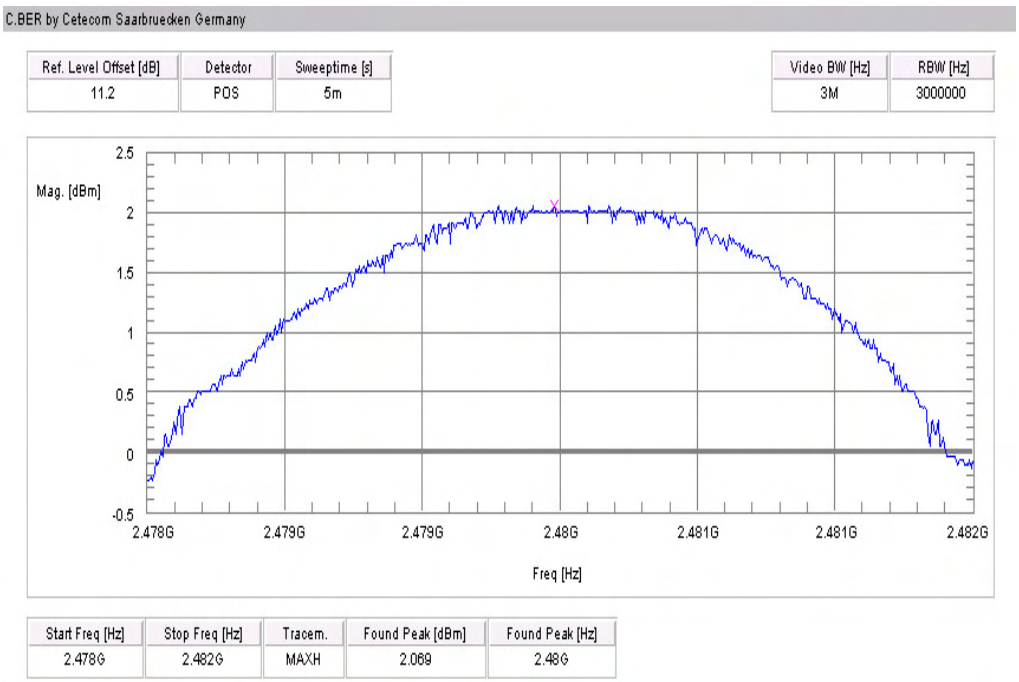
Plot 4: Channel 00 / Pi/4 DQPSK (conducted)



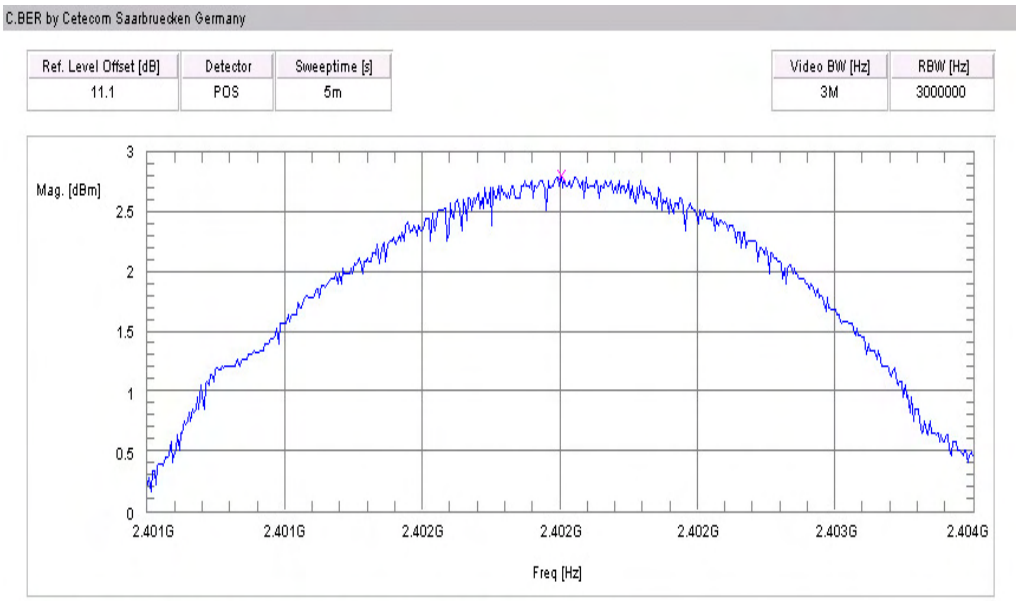
Plot 5: Channel 39 / Pi/4 DQPSK (conducted)



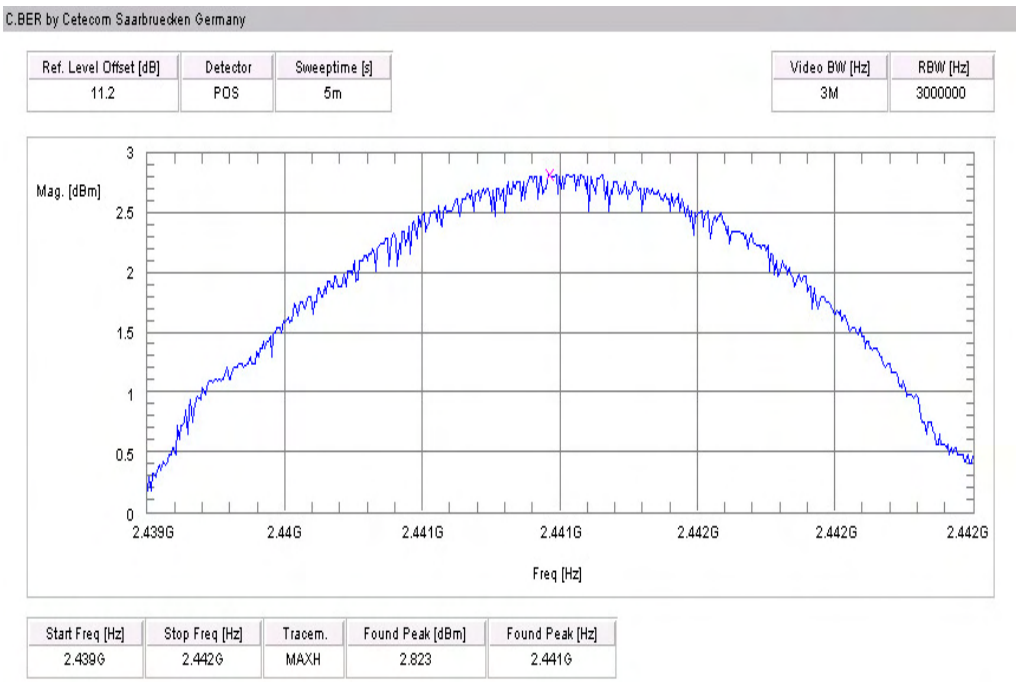
Plot 6: Channel 78 / Pi/4 DQPSK (conducted)



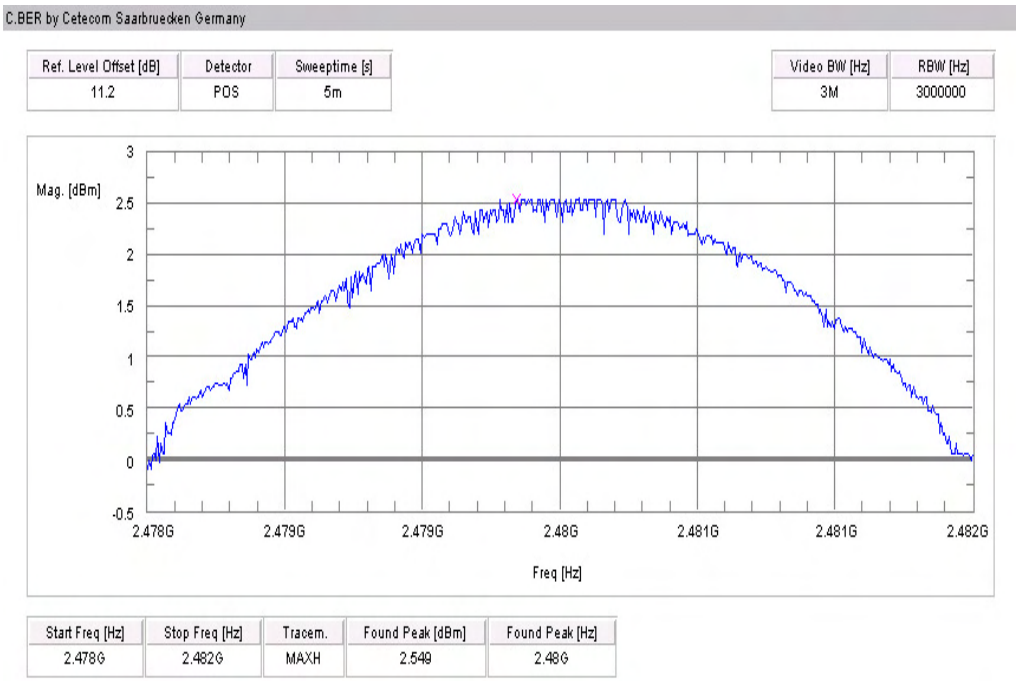
Plot 7: Channel 00 / 8DPSK (conducted)



Plot 8: Channel 39 / 8DPSK (conducted)



Plot 9: Channel 78 / 8DPSK (conducted)



9.8 Band edge compliance conducted

Description:

Measurement of the conducted band edge compliance. EUT is measured at the lower and upper band edge in single channel and hopping mode. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	100 kHz
Resolution bandwidth:	100 kHz
Span:	Lower Band Edge: 2395 – 2405 MHz Upper Band Edge: 2478 – 2489 MHz
Trace-Mode:	Max Hold

Limits:

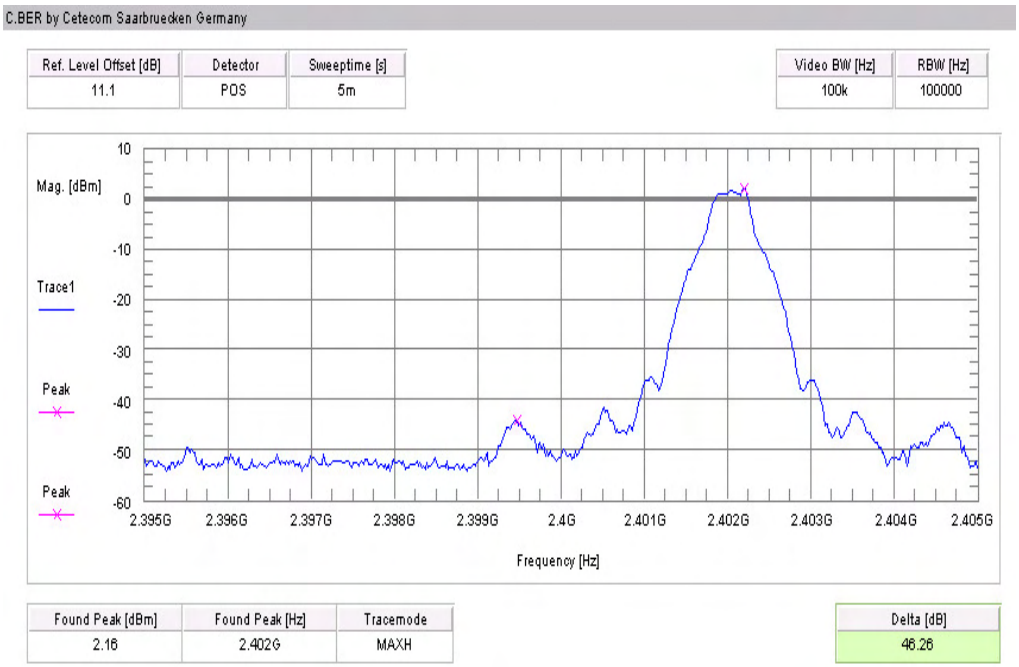
FCC	IC
CFR Part 15.247 (d)	RSS 210, Issue 7, A 8.5
Band edge compliance conducted	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be 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.	

Result: **Also see plots**

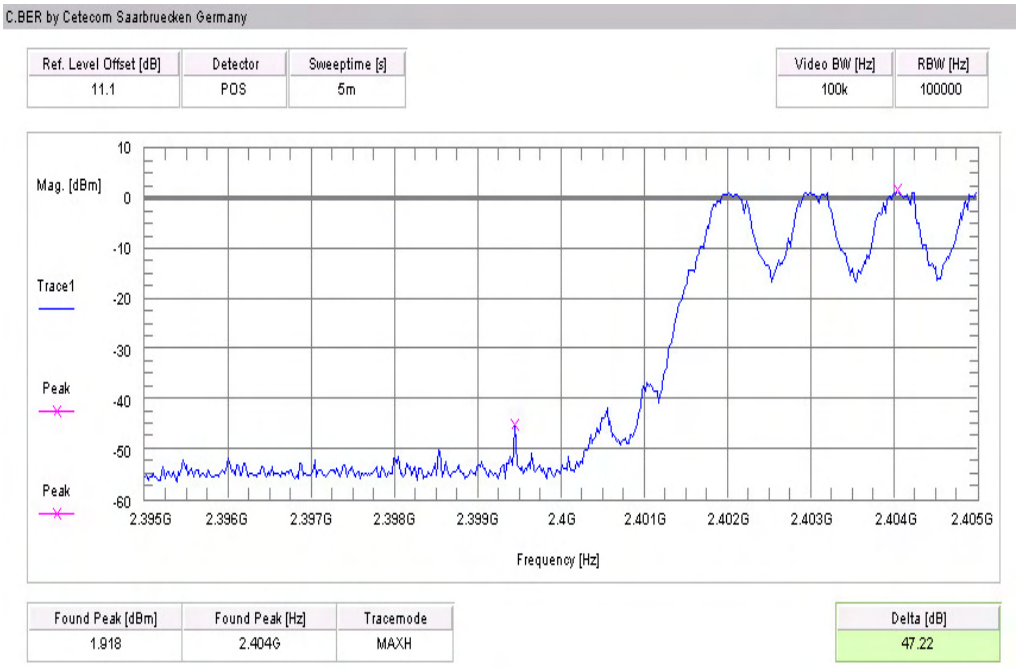
Szenario Modulation	Band edge compliance conducted [dB]		
	GFSK	Pi/4 DQPSK	8DPSK
Lower band edge – hopping off	> 20 dB	> 20 dB	> 20 dB
Lower band edge – hopping on	> 20 dB	> 20 dB	> 20 dB
Upper band edge – hopping off	> 20 dB	> 20 dB	> 20 dB
Upper band edge – hopping on	> 20 dB	> 20 dB	> 20 dB
Measurement uncertainty	± 1.5 dB		

Result: **The result of the measurement is passed.**

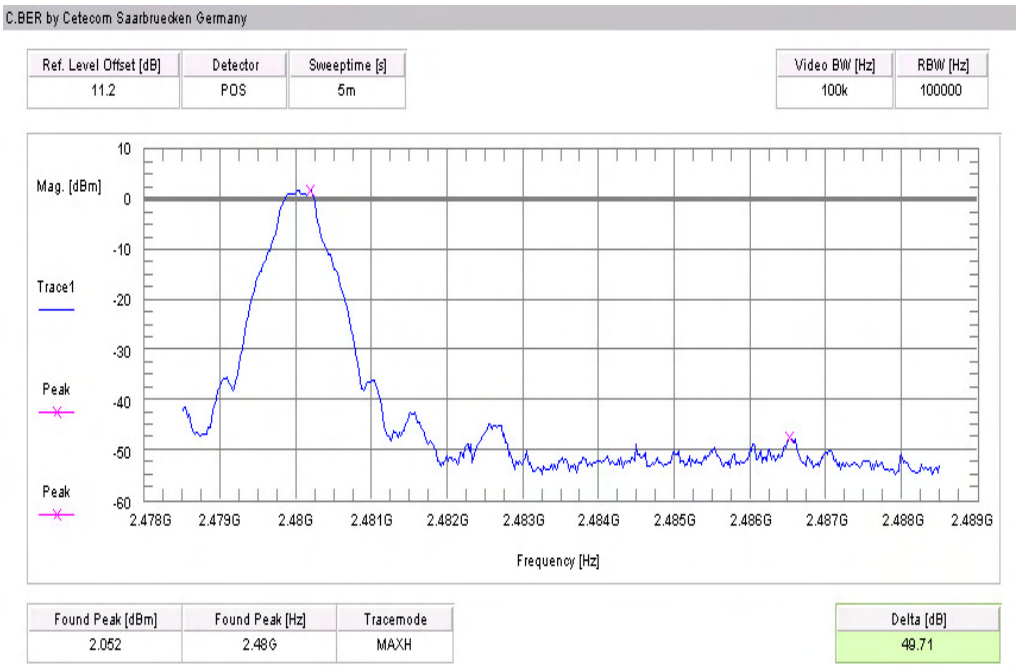
Plot 1: Lower band edge – hopping off / GFSK (conducted)



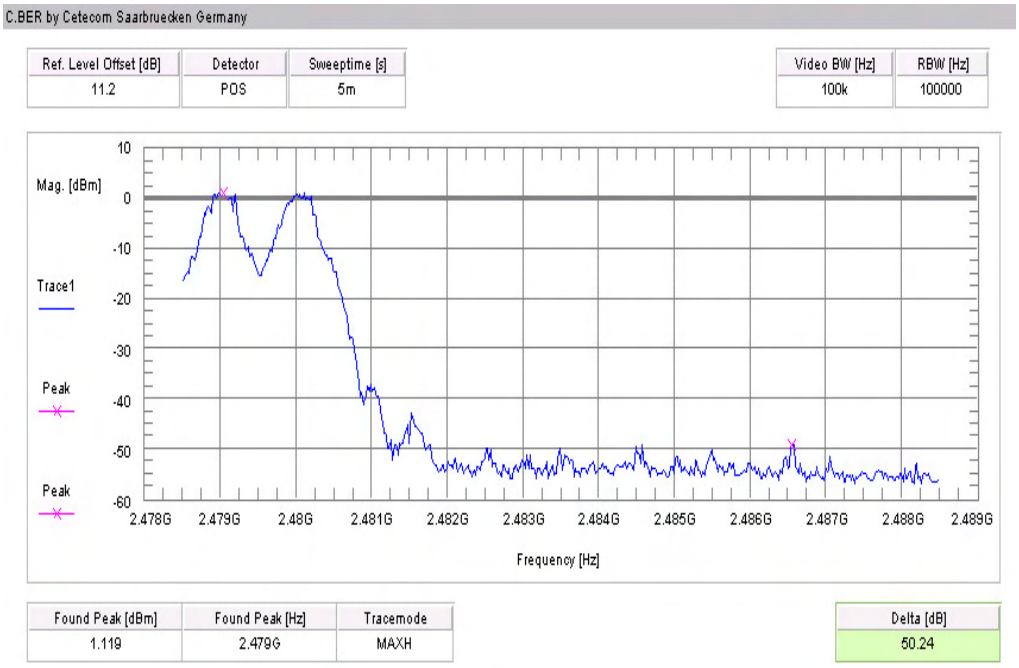
Plot 2: Lower band edge – hopping on / GFSK (conducted)



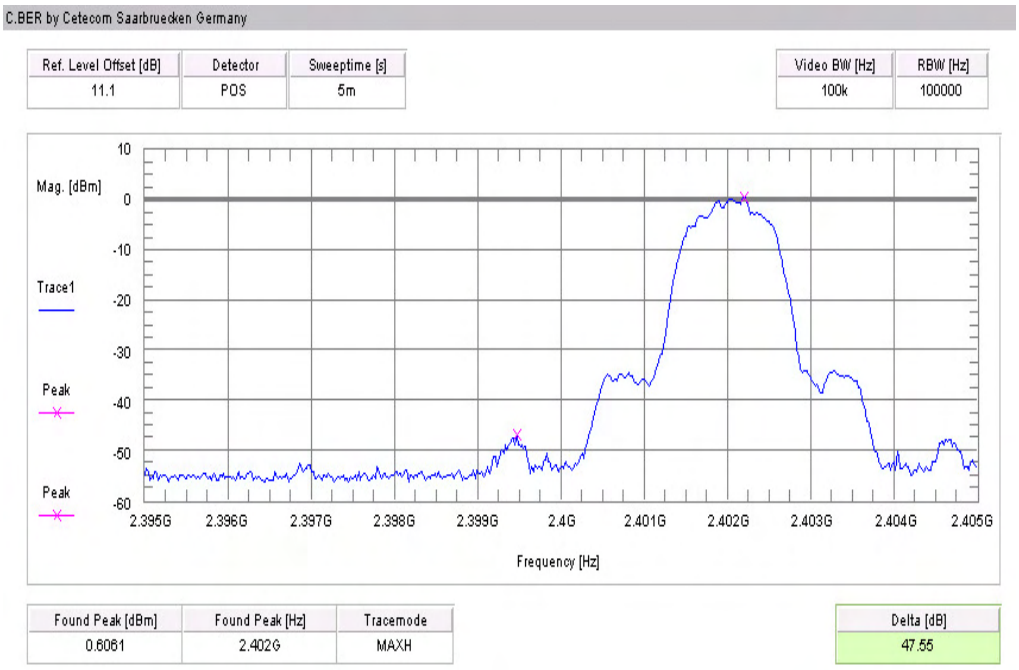
Plot 3: Upper band edge – hopping off / GFSK (conducted)



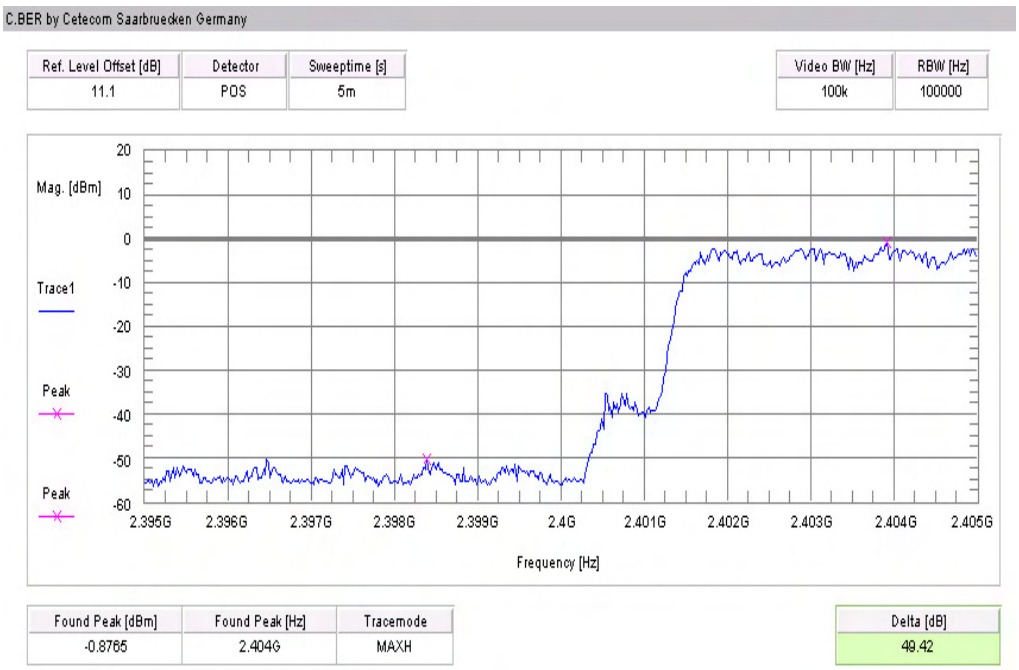
Plot 4: Upper band edge – hopping on / GFSK (conducted)



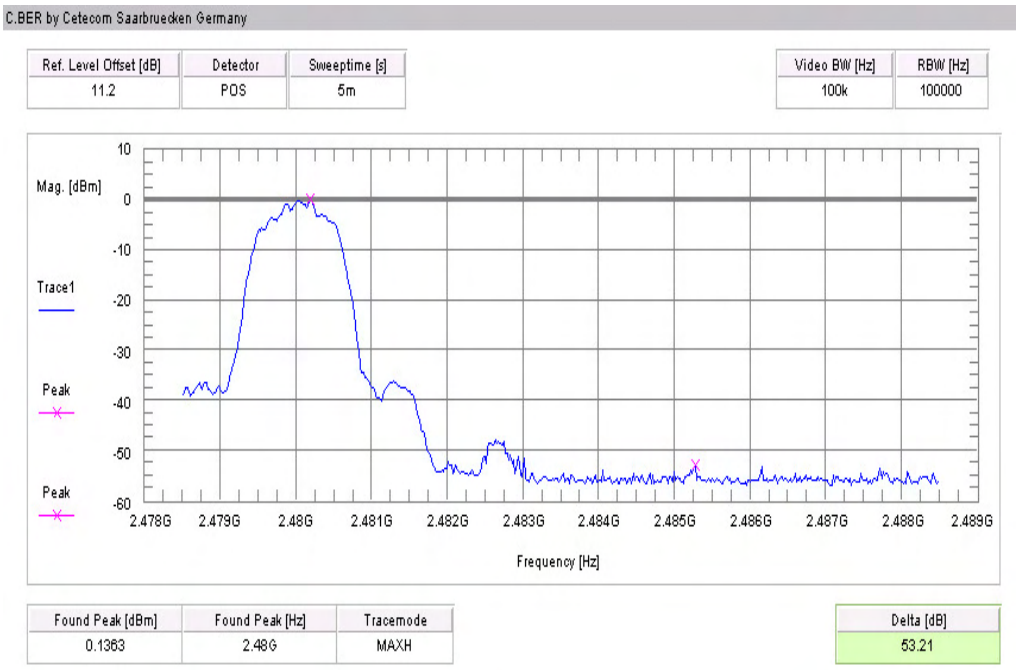
Plot 5: Lower band edge – hopping off / Pi/4 DQPSK (conducted)



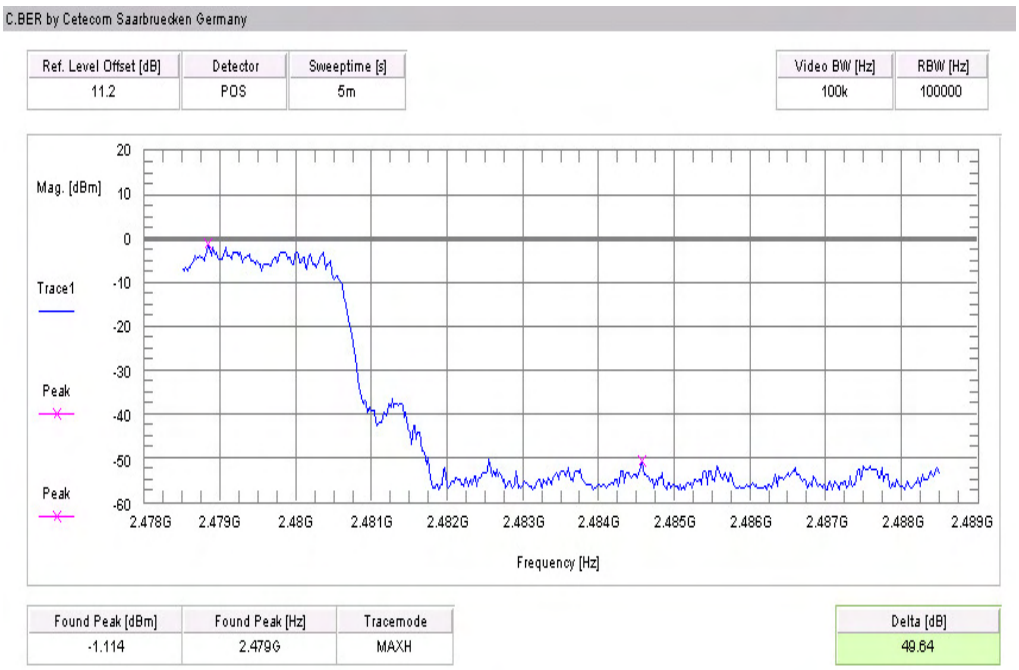
Plot 6: Lower band edge – hopping on / Pi/4 DQPSK (conducted)



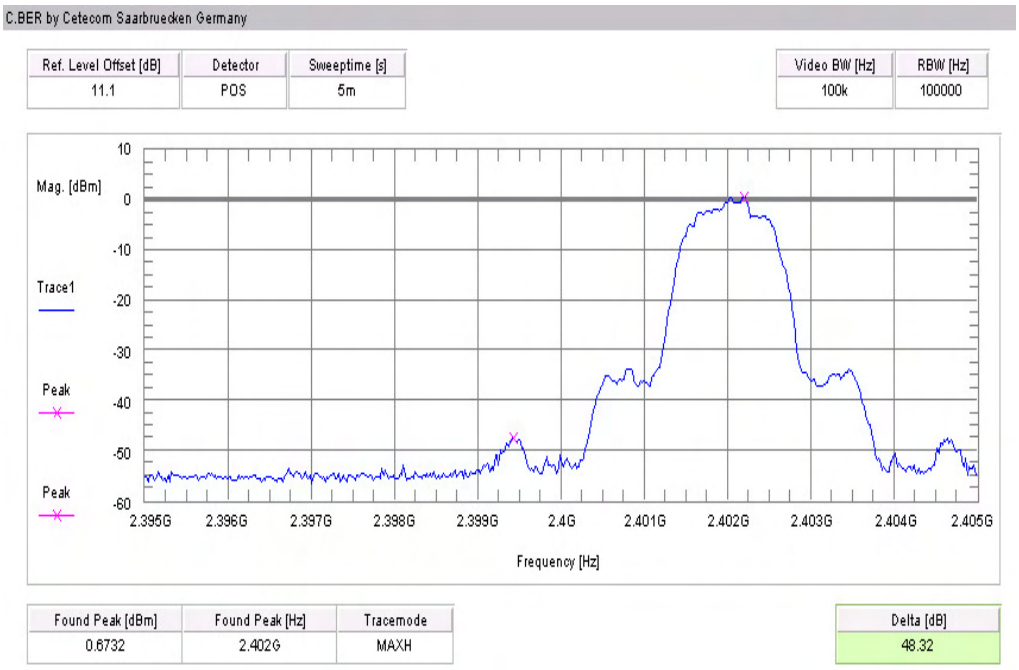
Plot 7: Upper band edge – hopping off / Pi/4 DQPSK (conducted)



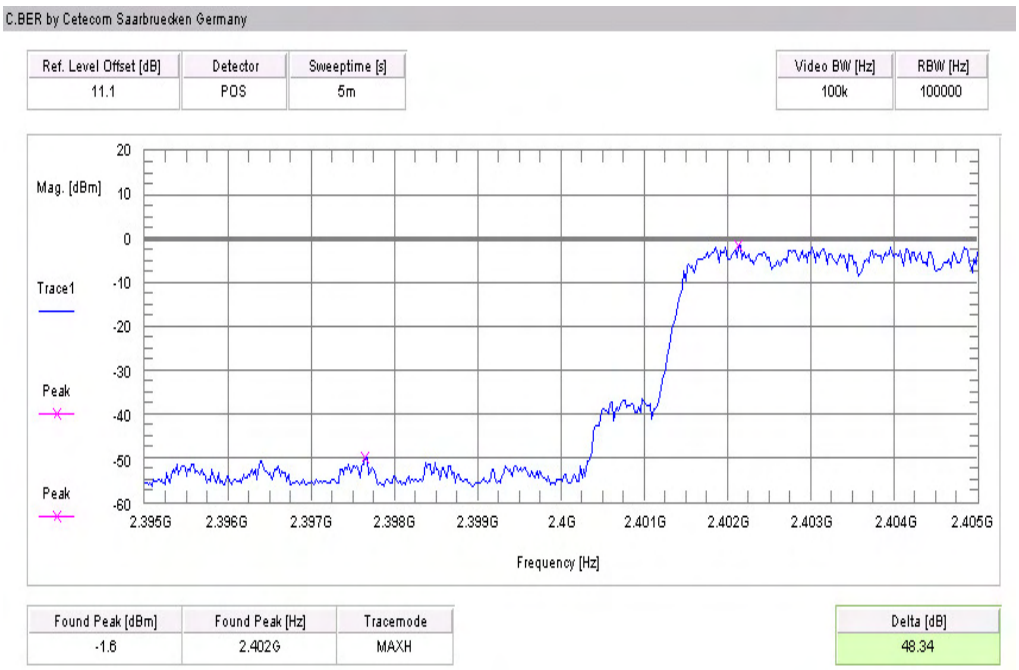
Plot 8: Upper band edge – hopping on / Pi/4 DQPSK (conducted)



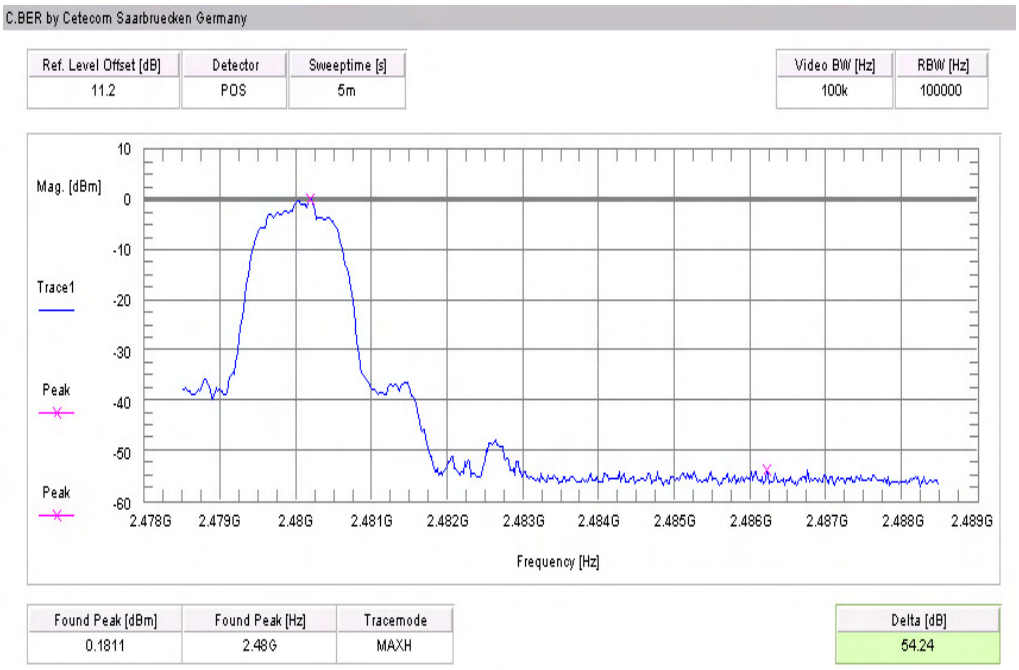
Plot 9: Lower band edge – hopping off / 8DPSK (conducted)



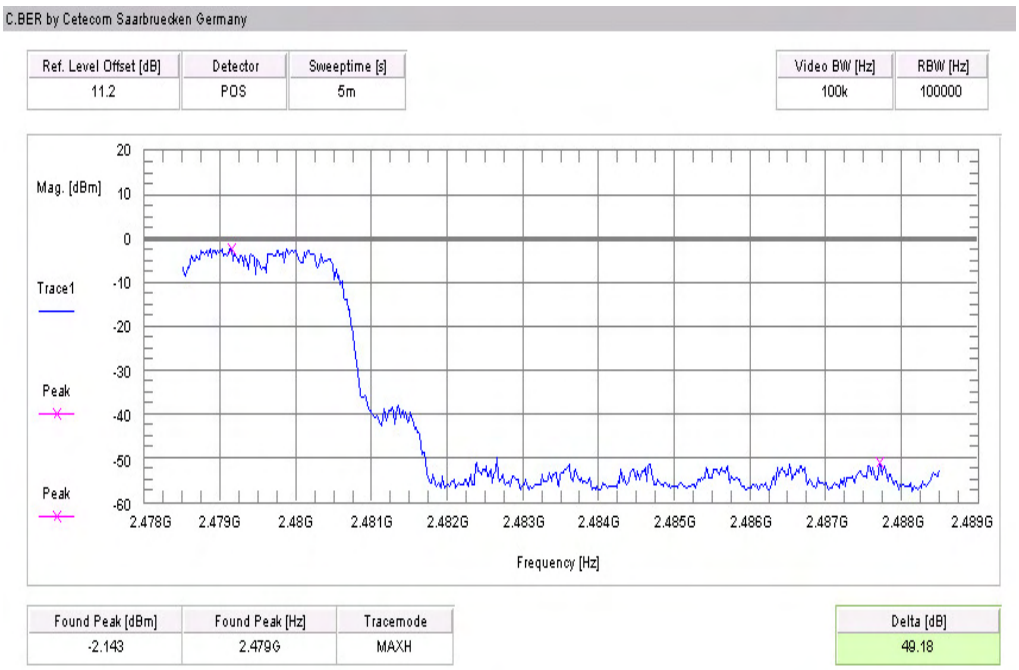
Plot 10: Lower band edge – hopping on / 8DPSK (conducted)



Plot 11: Upper band edge – hopping off / 8DPSK (conducted)



Plot 12: Upper band edge – hopping on / 8DPSK (conducted)



9.9 Band edge compliance radiated

Description:

Measurement of the radiated band edge compliance. The EUT is turned in the position that results in the maximum level at the band edge. Then a sweep over the corresponding restricted band is performed. The EUT is set to single channel mode and the transmit channel is channel 00 for the lower restricted band and channel 78 for the upper restricted band. The measurement is repeated for all modulations. Measurement distance is 3m.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	10 Hz
Resolution bandwidth:	1 MHz
Span:	Lower Band: 2300 – 2400 MHz Higher Band: 2480 – 2500 MHz
Trace-Mode:	Max Hold

Limits:

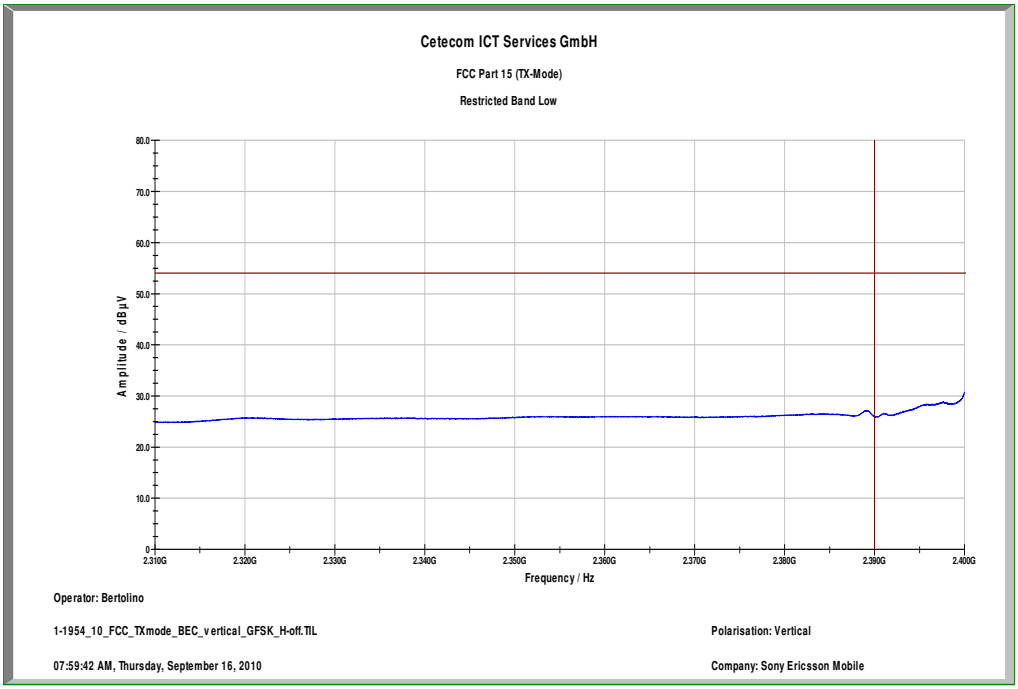
FCC	IC
CFR Part 15.205	RSS 210, Issue 7, A 8.5
Band edge compliance radiated	
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 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)).	
54 dBµV/m AVG	

Result: **Also see plots**

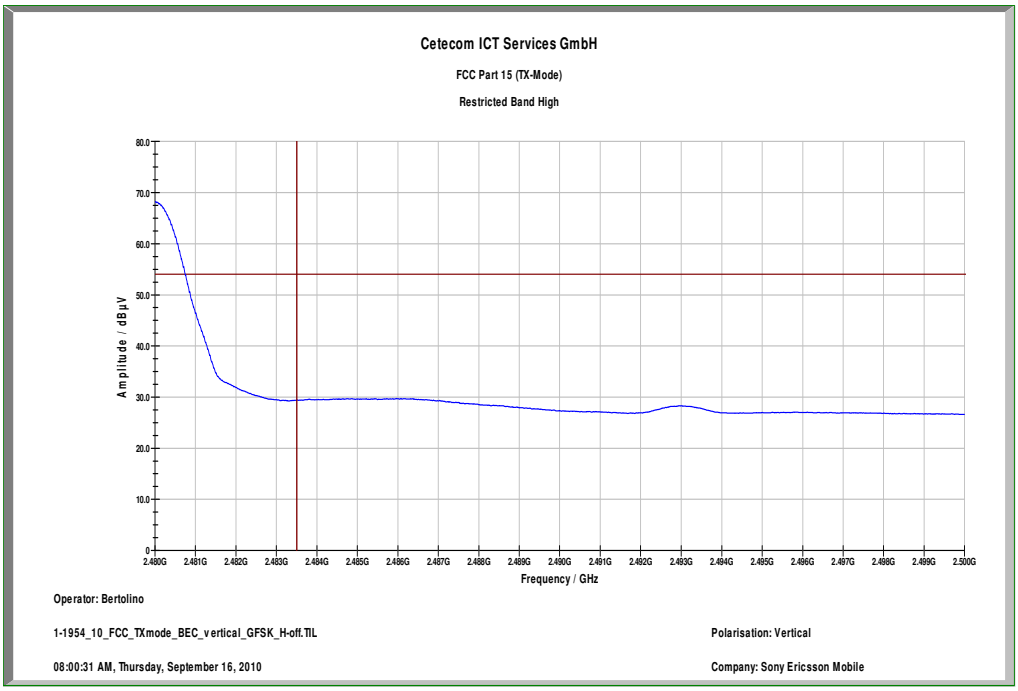
Szenario	Band edge compliance radiated [dBµV/m]		
Modulation	GFSK	Pi/4 DQPSK	8DPSK
Lower restricted band	< 54 (see plot 1)	< 54 (see plot 3)	< 54 (see plot 5)
Upper restricted band	< 54 (see plot 2)	< 54 (see plot 4)	< 54 (see plot 6)
Measurement uncertainty	± 2 dB		

Result: **The result of the measurement is passed.**

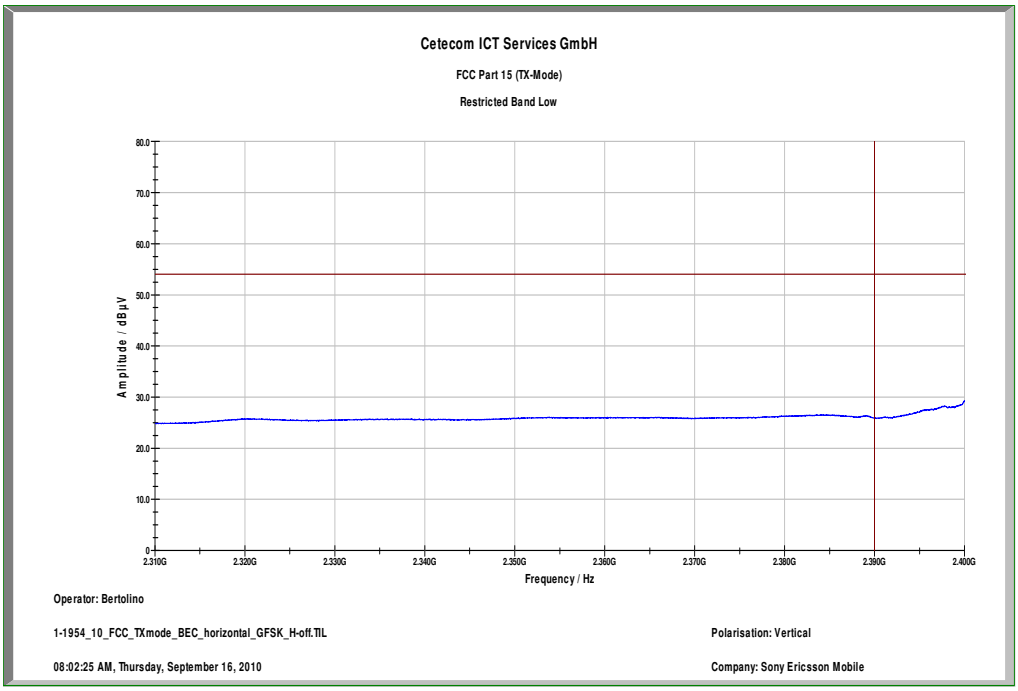
Plot 1: Lower Restricted Band / GFSK (radiated), vertical polarization



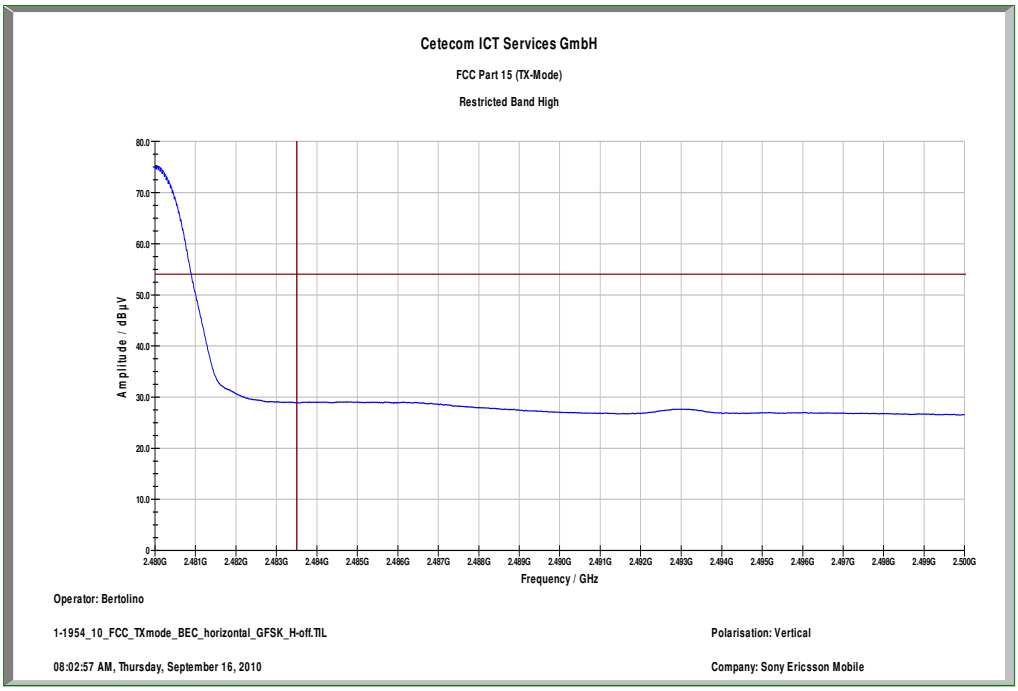
Plot 2: Upper Restricted Band / GFSK (radiated), vertical polarization



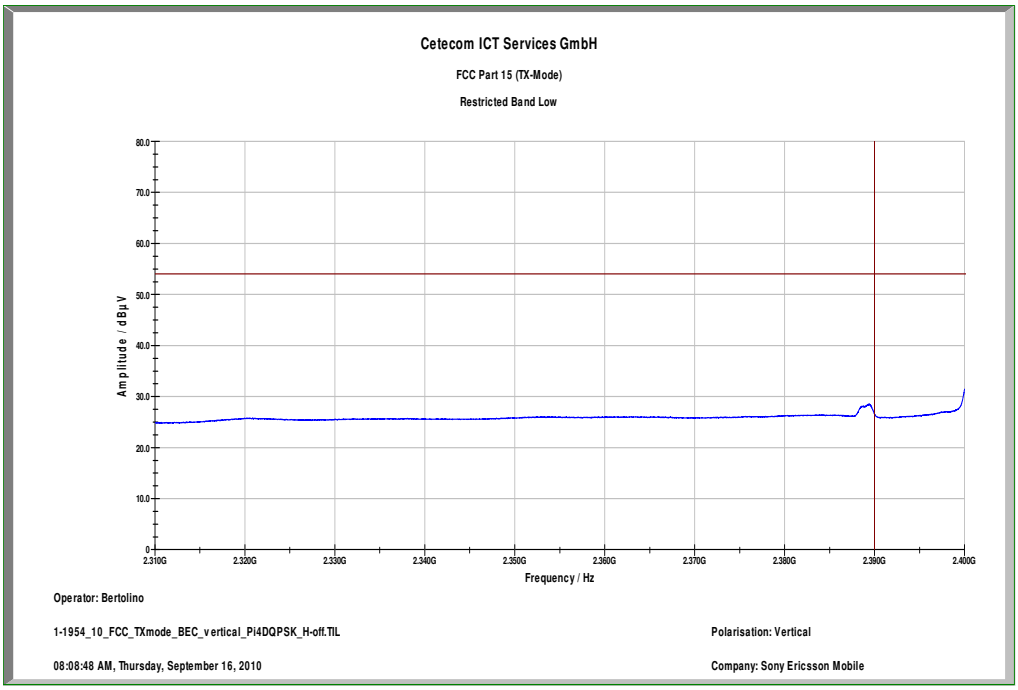
Plot 3: Lower Restricted Band / GFSK (radiated), horizontal polarization



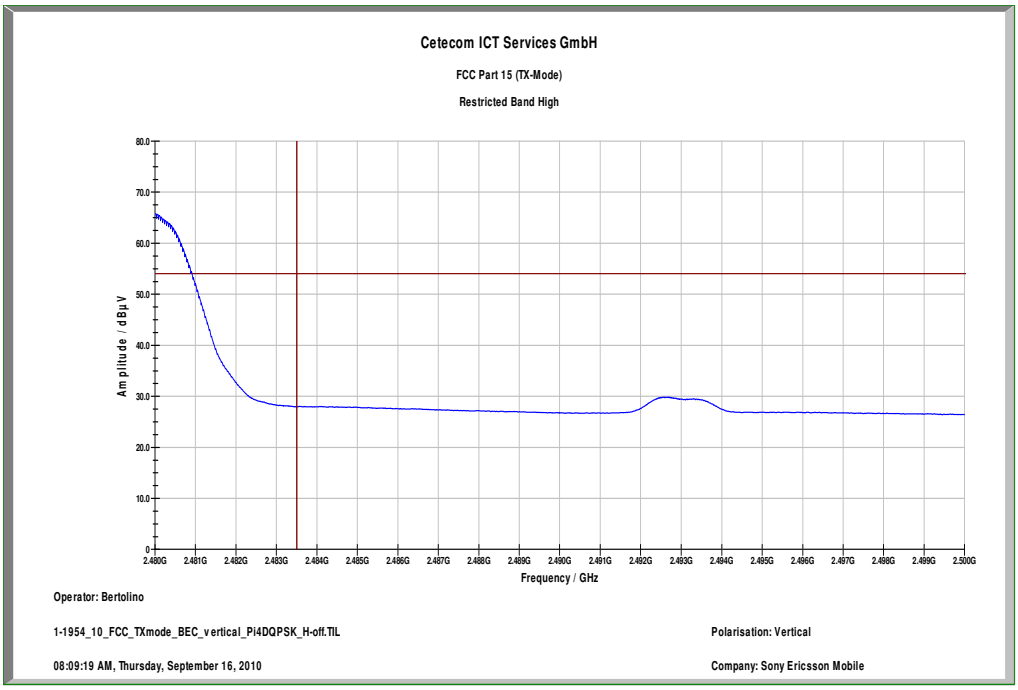
Plot 4: Upper Restricted Band / GFSK (radiated), horizontal polarization



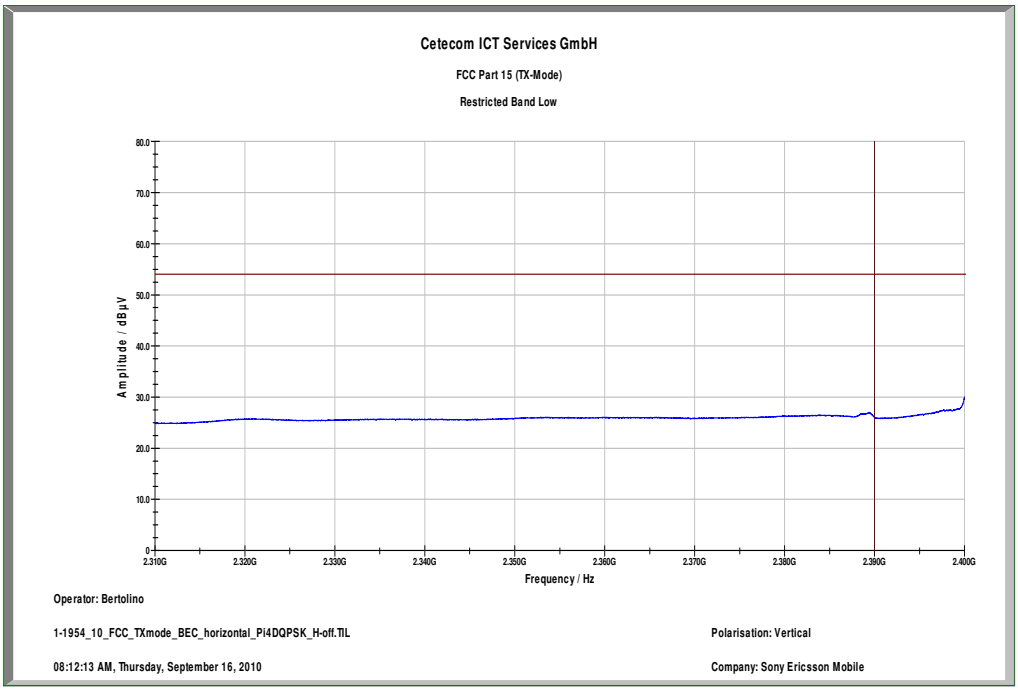
Plot 5: Lower Restricted Band / Pi/4 DQPSK (radiated), vertical polarization



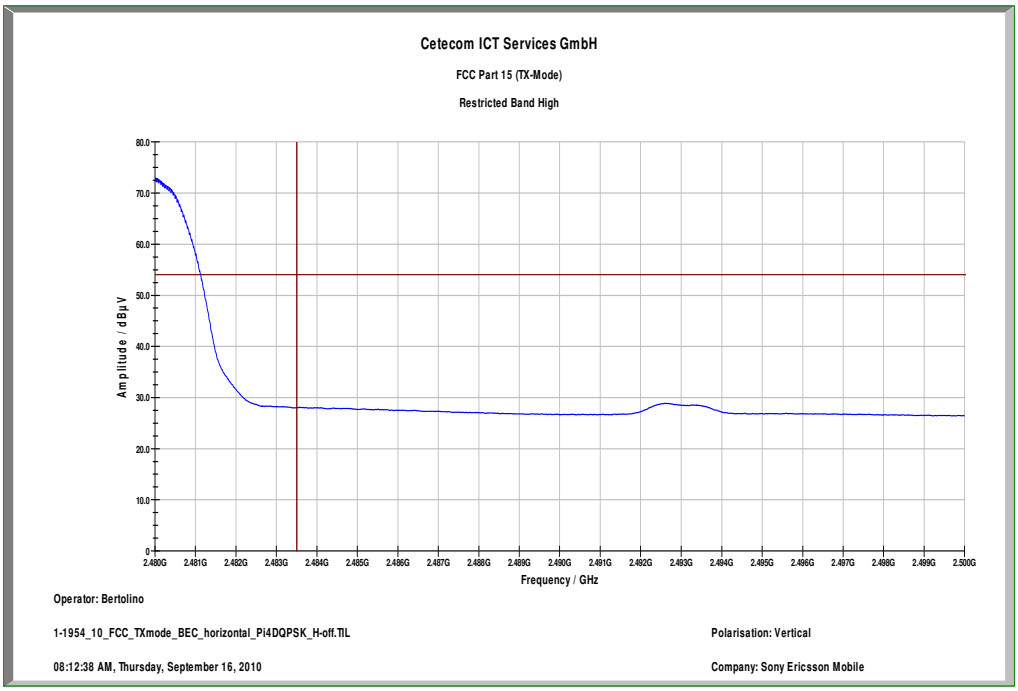
Plot 6: Upper Restricted Band / Pi/4 DQPSK (radiated), vertical polarization



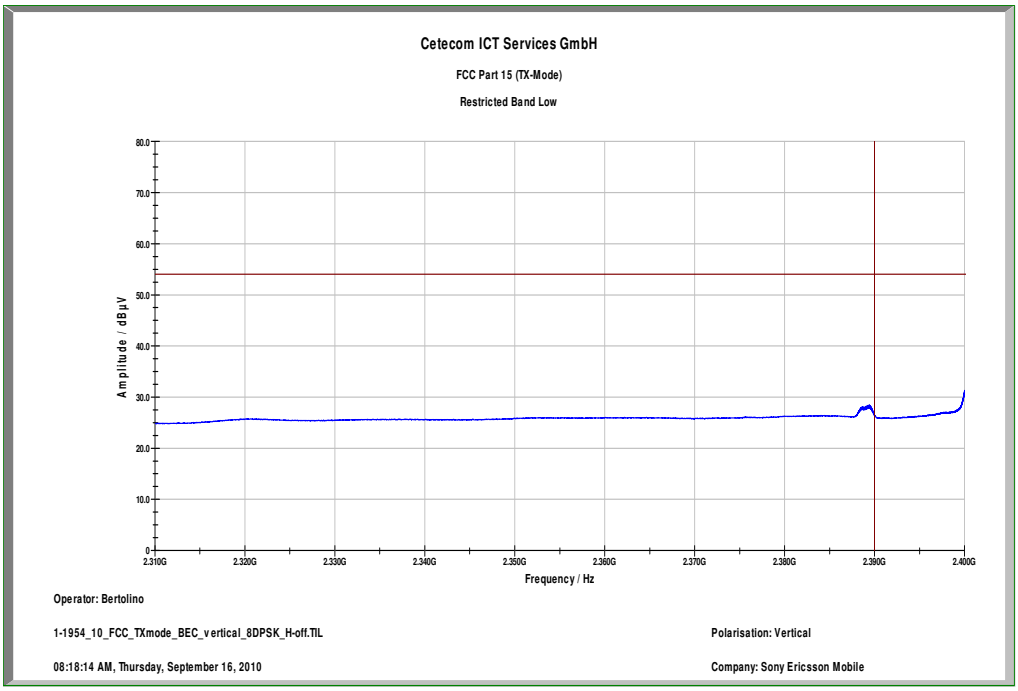
Plot 7: Lower Restricted Band / Pi/4 DQPSK (radiated), horizontal polarization



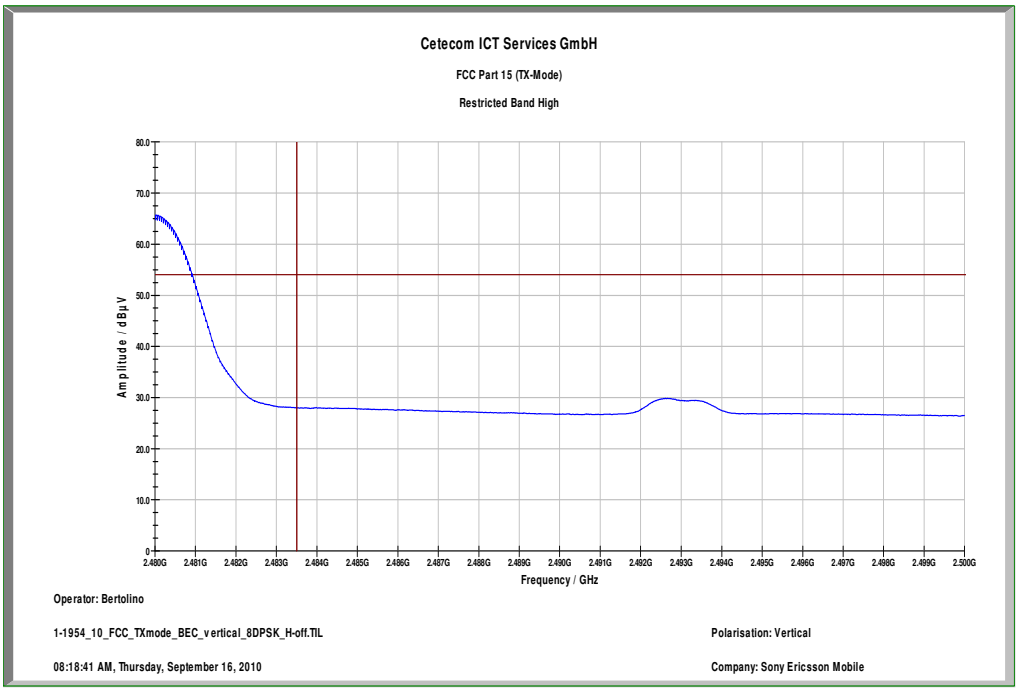
Plot 8: Upper Restricted Band / Pi/4 DQPSK (radiated), horizontal polarization



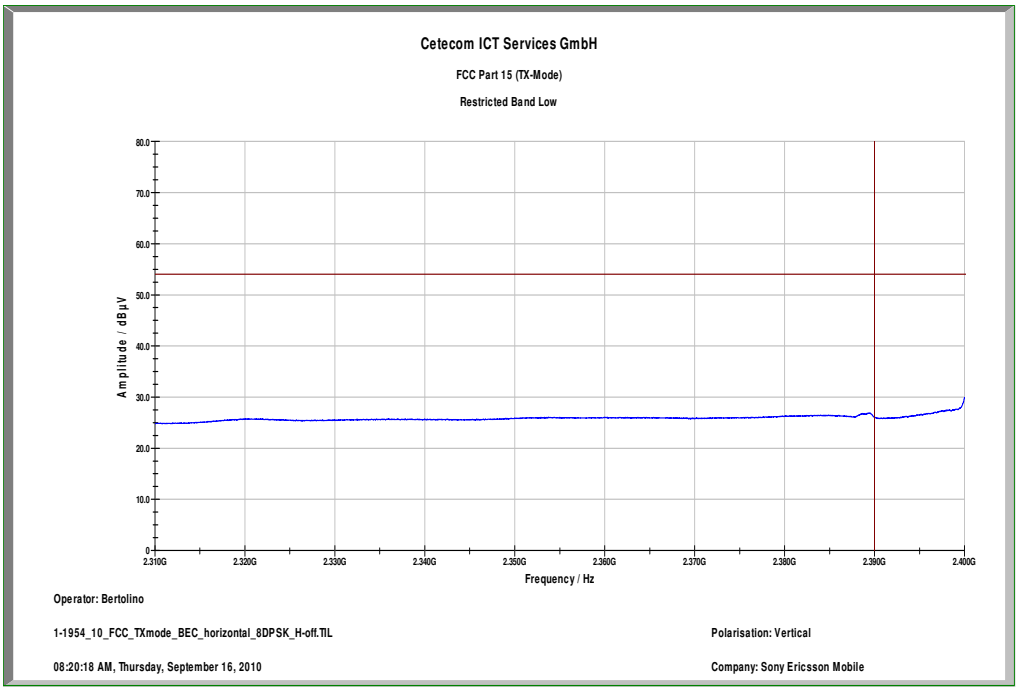
Plot 9: Lower Restricted Band / 8DPSK (radiated), vertical polarization



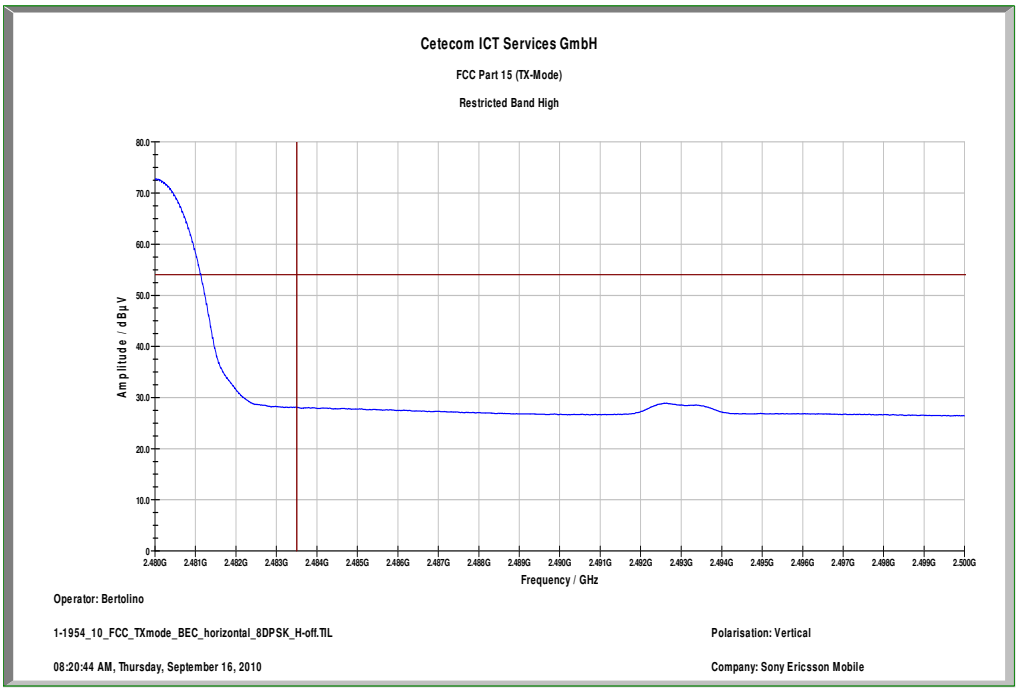
Plot 10: Upper Restricted Band / 8DPSK (radiated), vertical polarization



Plot 11: Lower Restricted Band / 8DPSK (radiated), horizontal polarization



Plot 12: Upper Restricted Band / 8DPSK (radiated), horizontal polarization



9.10 TX spurious emissions conducted

Description:

Measurement of the conducted spurious emissions in transmit mode. The EUT is set to single channel mode and the transmit channel is channel 00, channel 39 and channel 78. The measurement is repeated for all modulations.

Measurement:

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Span:	9 kHz to 25 GHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 15.247(d)	RSS 210, Issue 7, A 8.5
TX spurious emissions conducted	
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	

Result: **Also see plots**

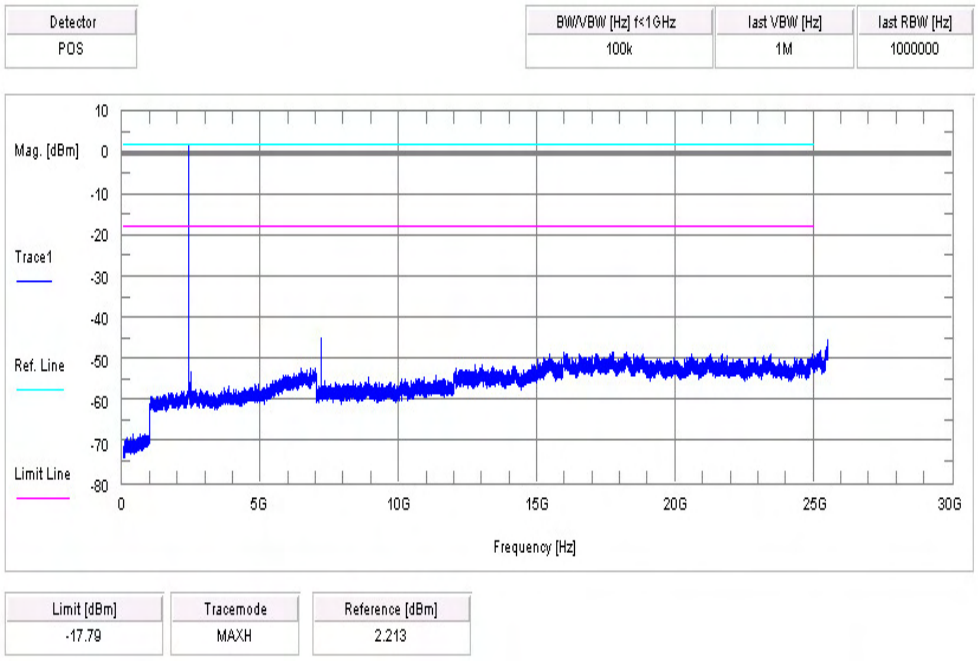
TX spurious emissions conducted					
GFSK - mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		2.2	30 dBm		Operating frequency
No critical peaks found			-20 dBc		complies
2441		2.3	30 dBm		Operating frequency
No critical peaks found			-20 dBc		complies
2480		2.1	30 dBm		Operating frequency
No critical peaks found			-20 dBc		complies
Measurement uncertainty		± 3 dB			

TX spurious emissions conducted					
Pi/4-DQPSK - mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		2.2	30 dBm		Operating frequency
No critical peaks found			-20 dBc		complies
2441		2.1	30 dBm		Operating frequency
No critical peaks found			-20 dBc		complies
2480		1.8	30 dBm		Operating frequency
No critical peaks found			-20 dBc		complies
Measurement uncertainty		± 3dB			

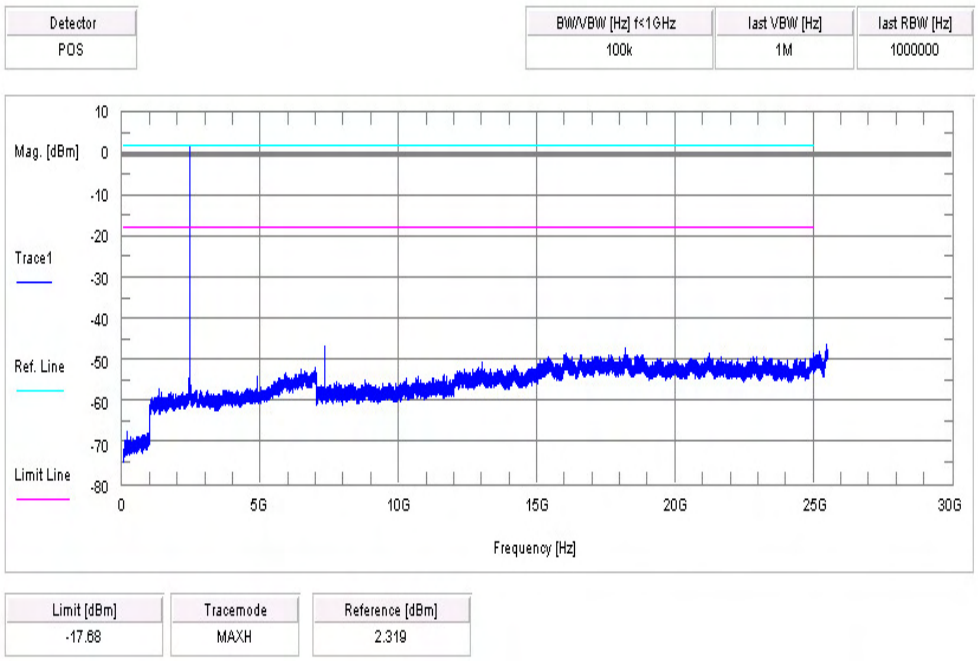
TX spurious emissions conducted					
8DPSK - mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		2.4	30 dBm		Operating frequency
No critical peaks found			-20 dBc		complies
2441		2.4	30 dBm		Operating frequency
No critical peaks found			-20 dBc		complies
2480		2.1	30 dBm		Operating frequency
No critical peaks found			-20 dBc		complies
Measurement uncertainty		± 3dB			

Result: **The result of the measurement is passed.**

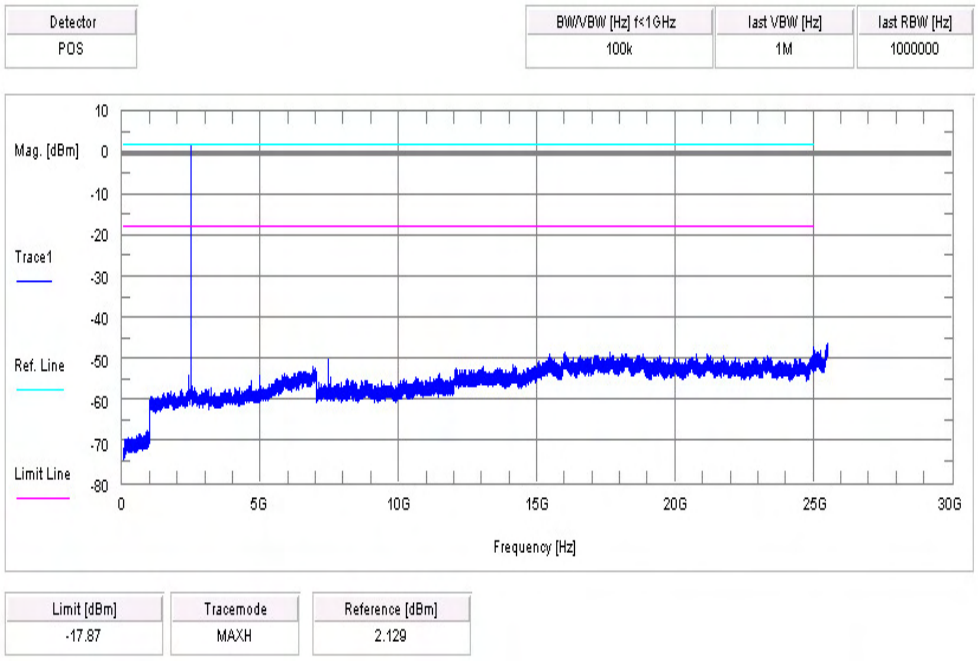
Plot 1: Channel 00 / GFSK



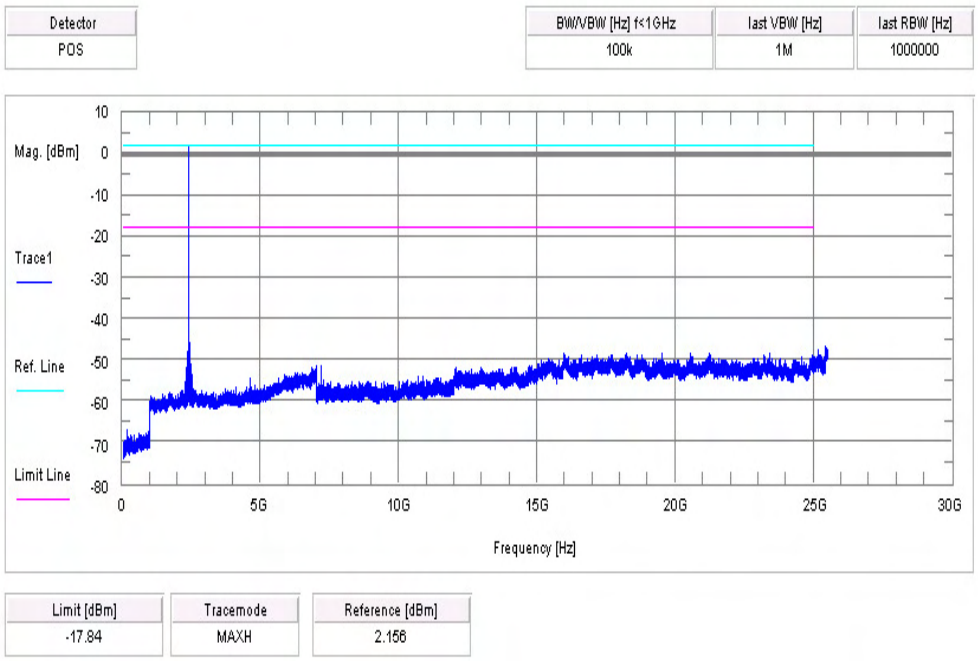
Plot 2: Channel 39 / GFSK



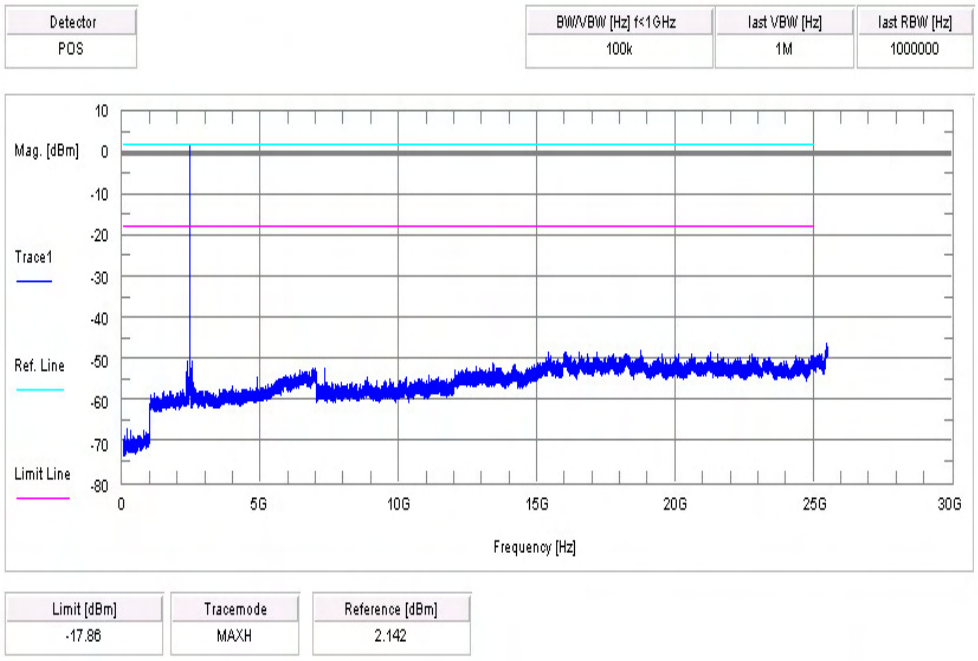
Plot 3: Channel 78 / GFSK



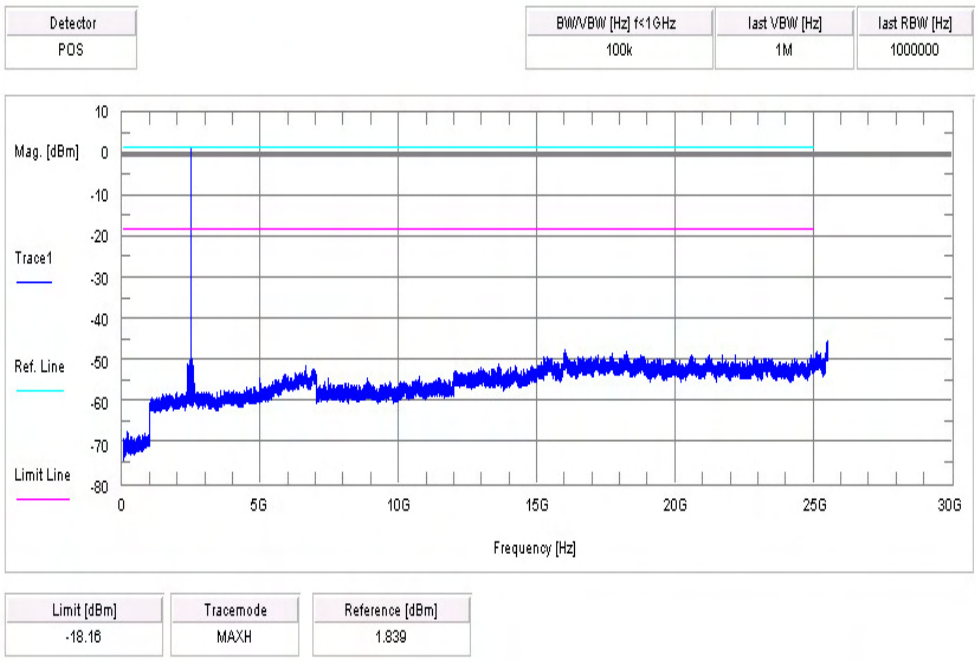
Plot 4: Channel 00 / Pi/4 DQPSK



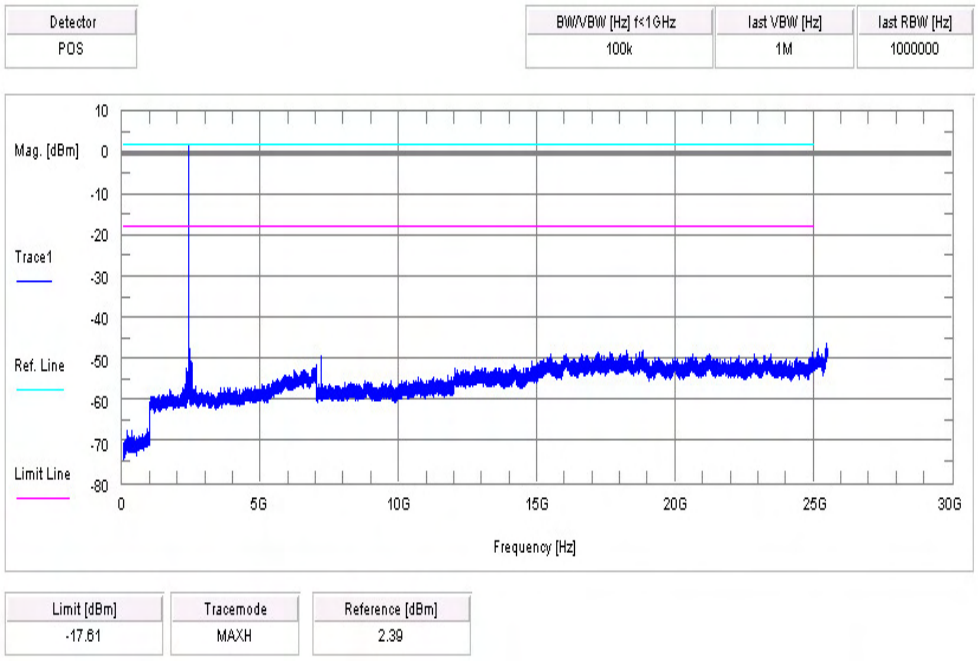
Plot 5: Channel 39 / Pi/4 DQPSK



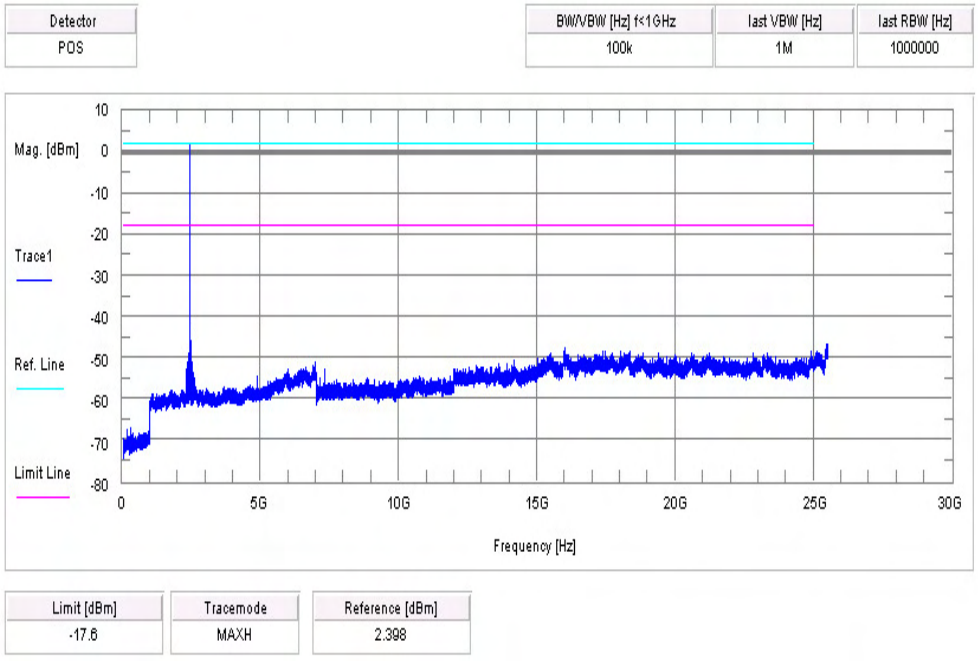
Plot 6: Channel 78 / Pi/4 DQPSK



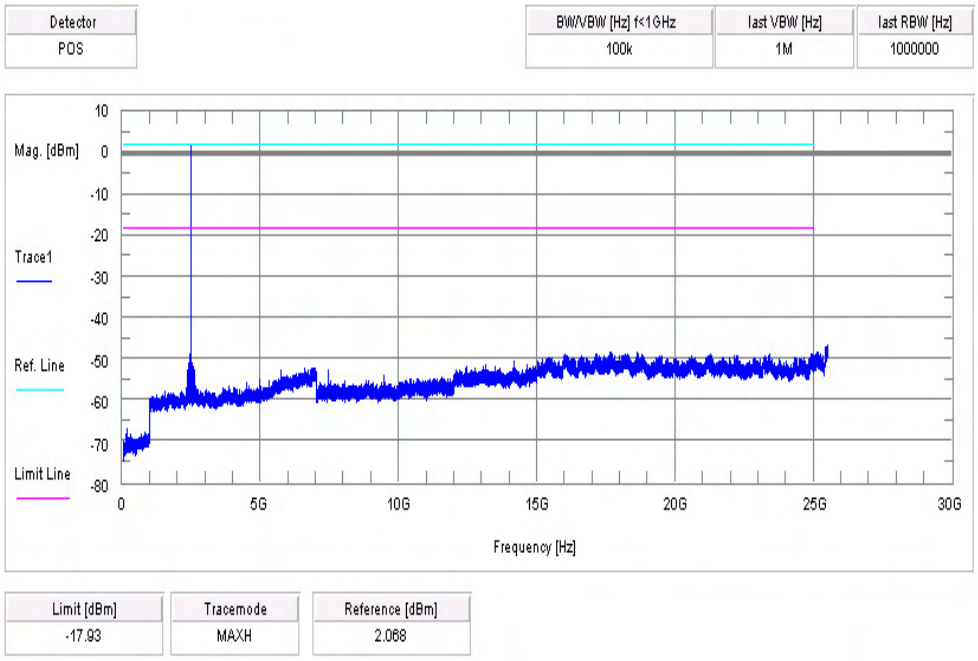
Plot 7: Channel 00 / 8DPSK



Plot 8: Channel 00 / 8DPSK



Plot 9: Channel 00 / 8DPSK



9.11 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode. The EUT is set to single channel mode and the transmit channel is channel 00, channel 39 and channel 78. The measurement is performed in the mode with the highest output power.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi Peak
Sweep time:	Auto
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold
Measured Modulation:	☐ GFSK ☐ Pi/4 DQPSK ☒ 8DPSK

The modulation with the highest output power was used to perform the transmitter spurious emissions. If spurious were detected a re-measurement was performed on the detected frequency with each modulation to determine the worst case result.

Limits:

FCC	IC	
CFR Part 15.247(d)	RSS 210, Issue 7, A 8.5	
TX spurious emissions radiated		
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 §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).		
§15.209		
Frequency (MHz)	Field strength (dBµV/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Result: **Also see plots**

TX spurious emissions radiated [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]
7206	Pk	44.0 (V)	7322	Pk	43.5 (H)	7440	Pk	43.3 (H)
Measurement uncertainty			± 3 dB					

H = horizontal polarisation V = vertical polarisation

Result: **The result of the measurement is passed.**

Plot 1: 30 MHz to 1 GHz / channel 00 (horizontal/vertical)

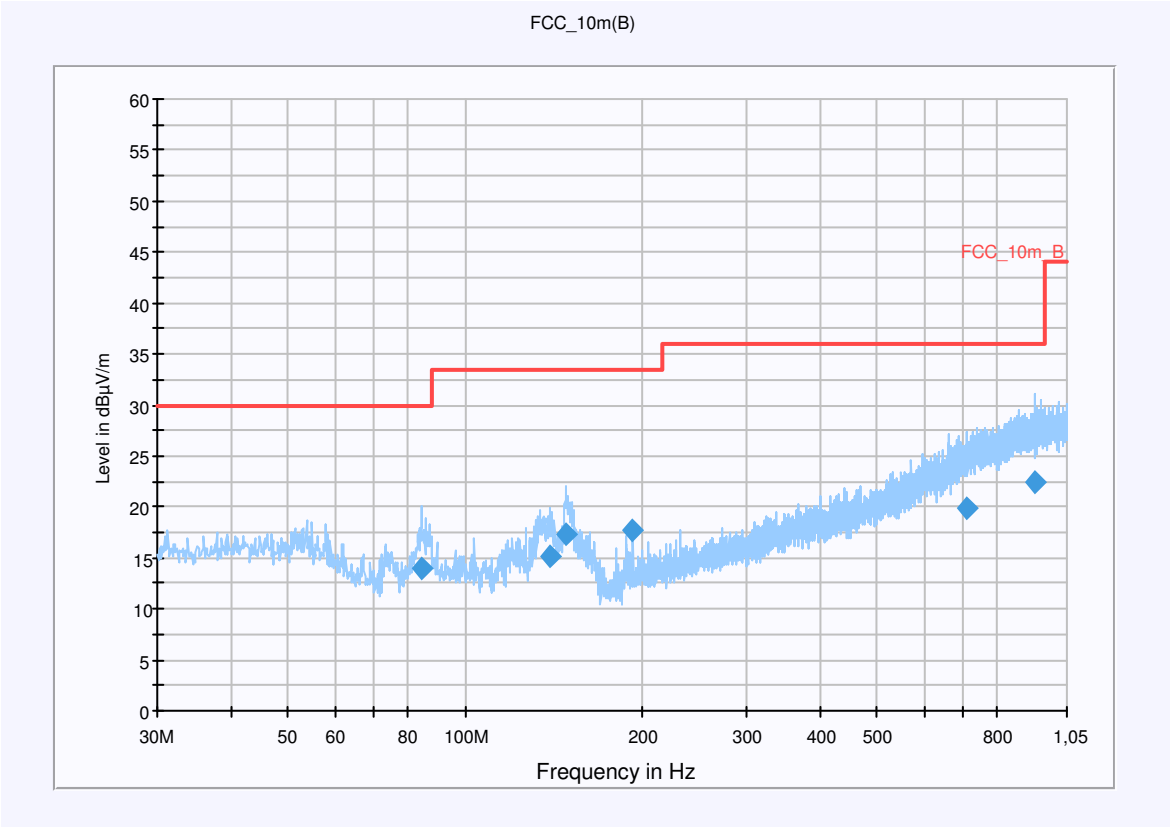
Common Information

EUT:	DGA-0004001 + CCA-0004001-BV
Serial Number:	#18964
Test Description:	FCC part 15 C Class B @ 10 m
Operating Conditions:	BT testmode; CH: 0
Operator Name:	LNG
Comment:	Power: 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
84.301650	13.9	15000.000	120.000	400.0	V	282.0	9.7	16.1	30.0	
138.693300	15.2	15000.000	120.000	98.0	V	82.0	8.7	18.3	33.5	
148.594800	17.3	15000.000	120.000	105.0	V	220.0	8.9	16.2	33.5	
192.675750	17.8	15000.000	120.000	98.0	V	56.0	11.2	15.7	33.5	
711.968550	19.8	15000.000	120.000	98.0	H	69.0	22.8	16.2	36.0	
923.046900	22.3	15000.000	120.000	329.0	H	122.0	25.3	13.7	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 (1005)
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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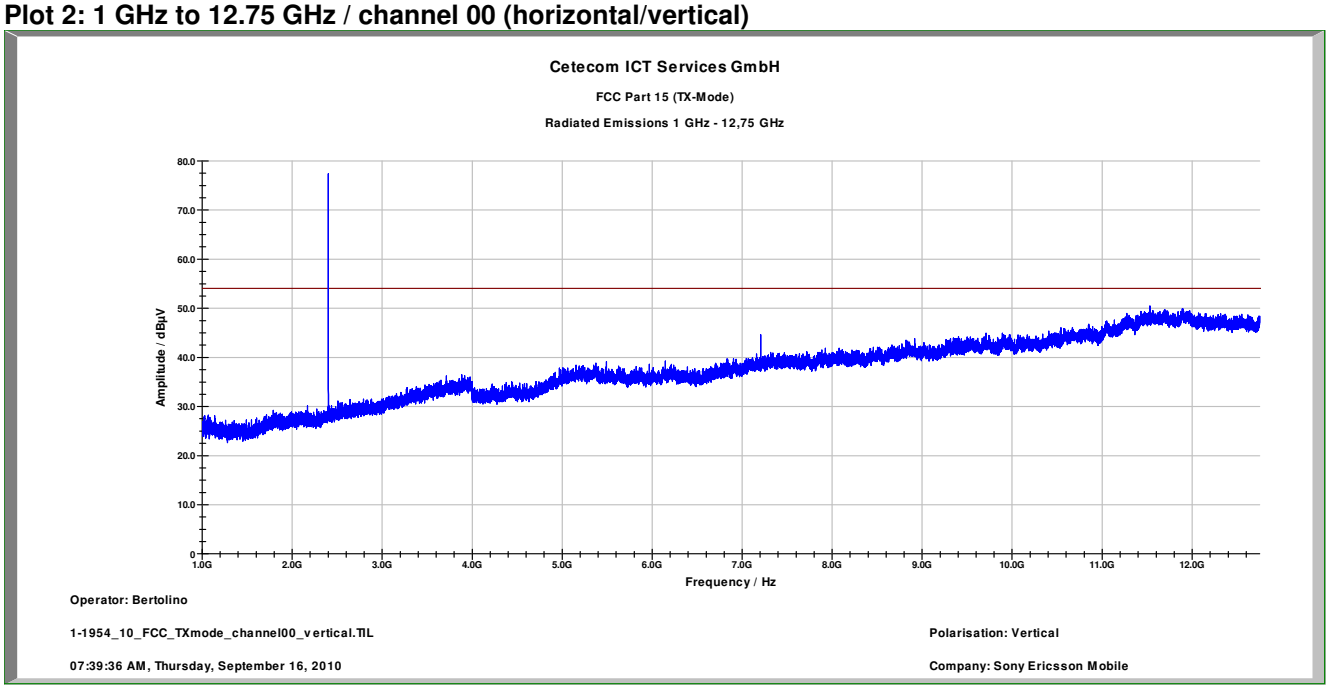
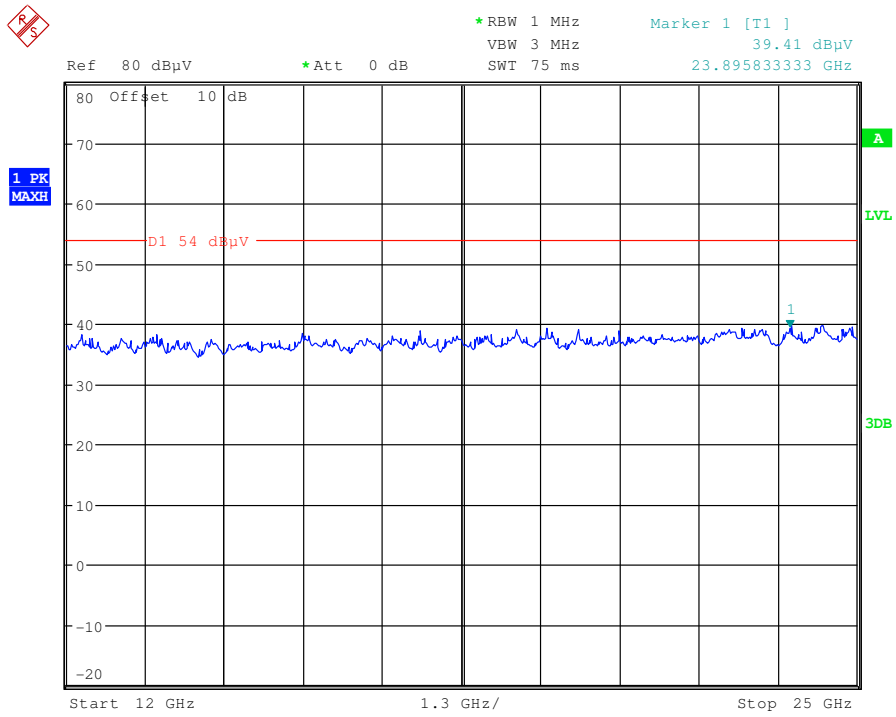
Plot 2: 1 GHz to 12.75 GHz / channel 00 (horizontal/vertical)



Carrier suppressed with a 2.4 GHz-band rejection filter.

Plot 3: 12 GHz to 25 GHz / channel 00 (horizontal/vertical) – valid for all channels



Plot 4: 30 MHz to 1 GHz / channel 39 (horizontal/vertical)

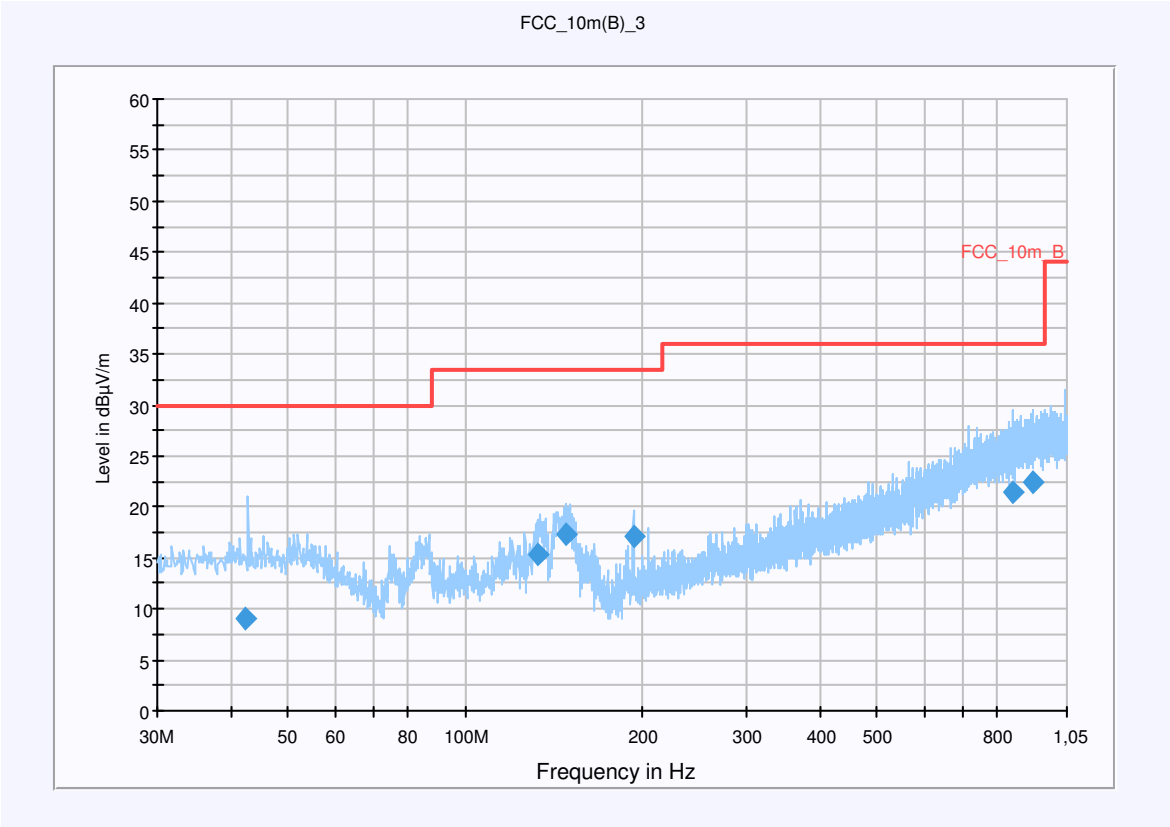
Common Information

EUT:	DGA-0004001 + CCA-0004001-BV
Serial Number:	#18964
Test Description:	FCC part 15 C Class B @ 10 m
Operating Conditions:	BT testmode; CH: 39
Operator Name:	LNG
Comment:	Power: 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
42.504450	9.1	15000.000	120.000	220.0	H	13.0	13.3	20.9	30.0	
133.105800	15.3	15000.000	120.000	112.0	V	91.0	9.2	18.2	33.5	
148.148100	17.2	15000.000	120.000	105.0	V	-6.0	8.9	16.3	33.5	
192.800100	17.1	15000.000	120.000	98.0	V	13.0	11.3	16.4	33.5	
846.771450	21.5	15000.000	120.000	154.0	H	110.0	24.5	14.5	36.0	
916.463550	22.4	15000.000	120.000	178.0	V	266.0	25.3	13.6	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 (1005)
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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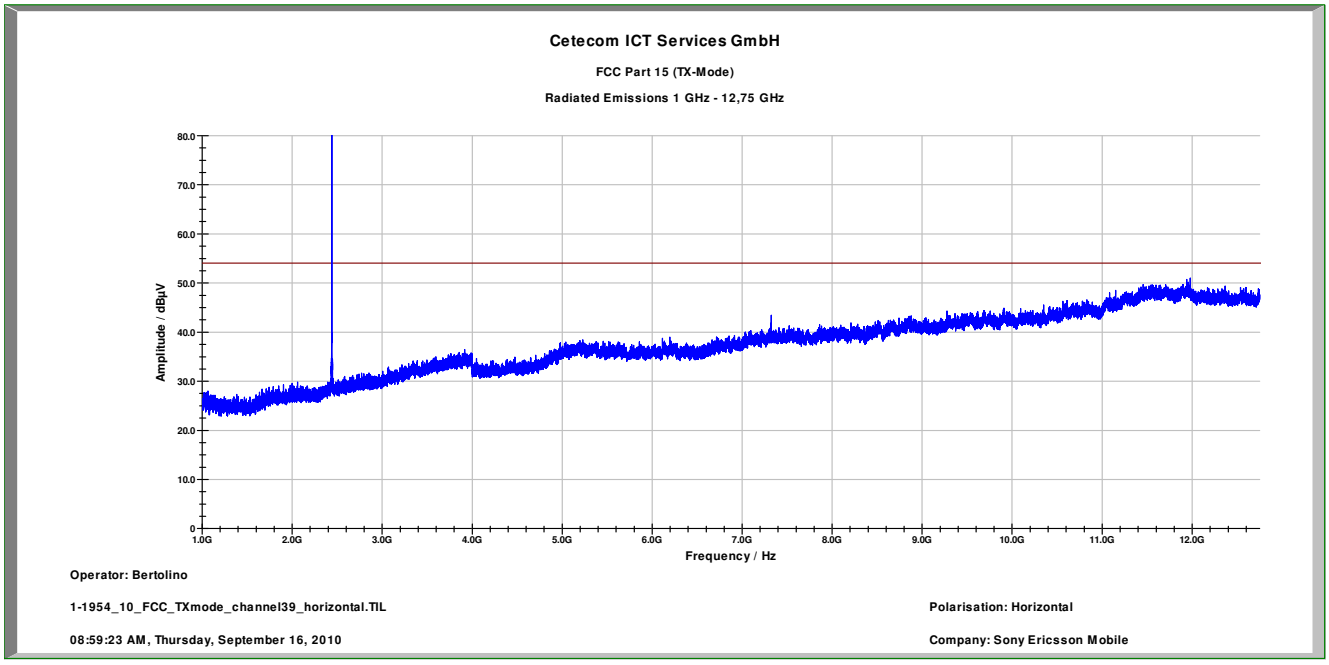
Plot 5: 1 GHz to 12.75 GHz / channel 39 (horizontal/vertical)



Carrier suppressed with a 2.4 GHz-band rejection filter.

Plot 6: 30 MHz to 1 GHz / channel 78 (horizontal/vertical)

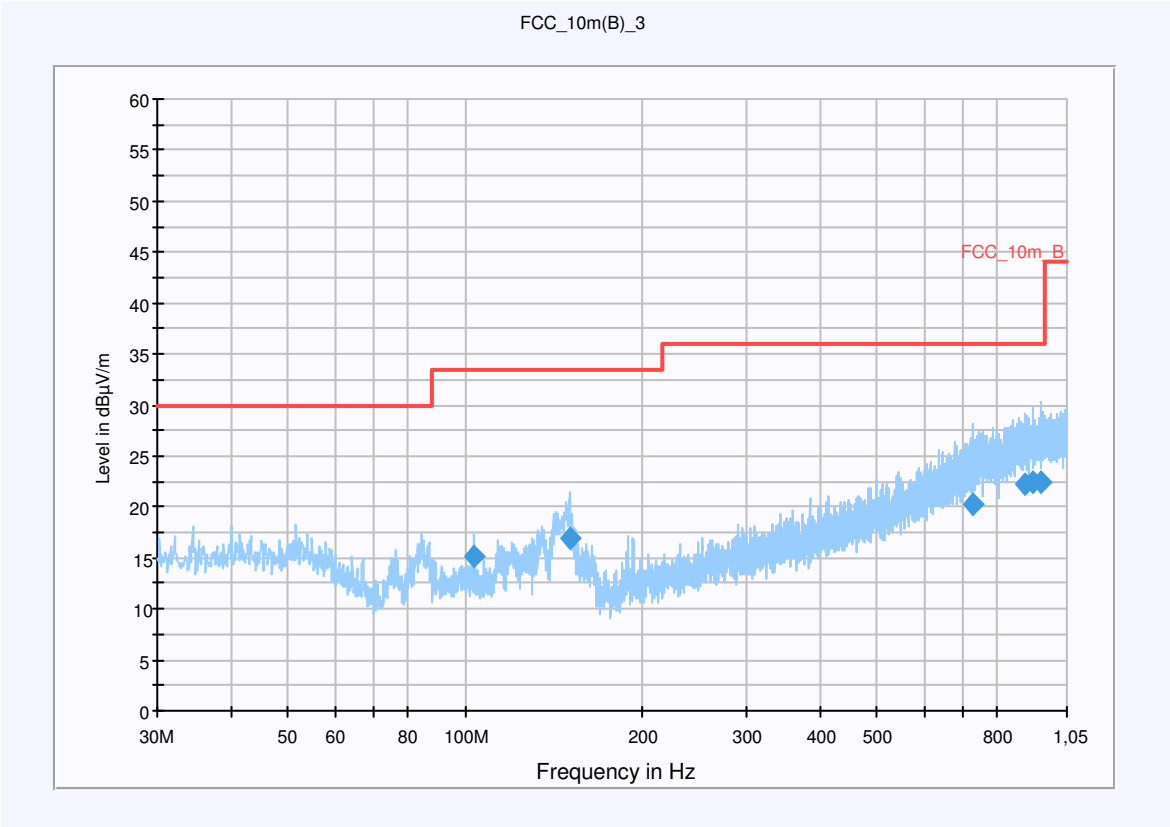
Common Information

EUT:	DGA-0004001 + CCA-0004001-BV
Serial Number:	#18964
Test Description:	FCC part 15 C Class B @ 10 m
Operating Conditions:	BT testmode; CH: 78
Operator Name:	LNG
Comment:	Power: 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
103.714200	15.1	15000.000	120.000	212.0	V	76.0	11.6	18.4	33.5	
150.004650	16.8	15000.000	120.000	98.0	V	0.0	8.9	16.7	33.5	
729.048600	20.2	15000.000	120.000	178.0	H	168.0	23.2	15.8	36.0	
893.769450	22.2	15000.000	120.000	220.0	V	201.0	25.1	13.8	36.0	
916.445850	22.4	15000.000	120.000	147.0	H	-1.0	25.3	13.6	36.0	
950.756250	22.5	15000.000	120.000	220.0	V	110.0	25.4	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 (1005)
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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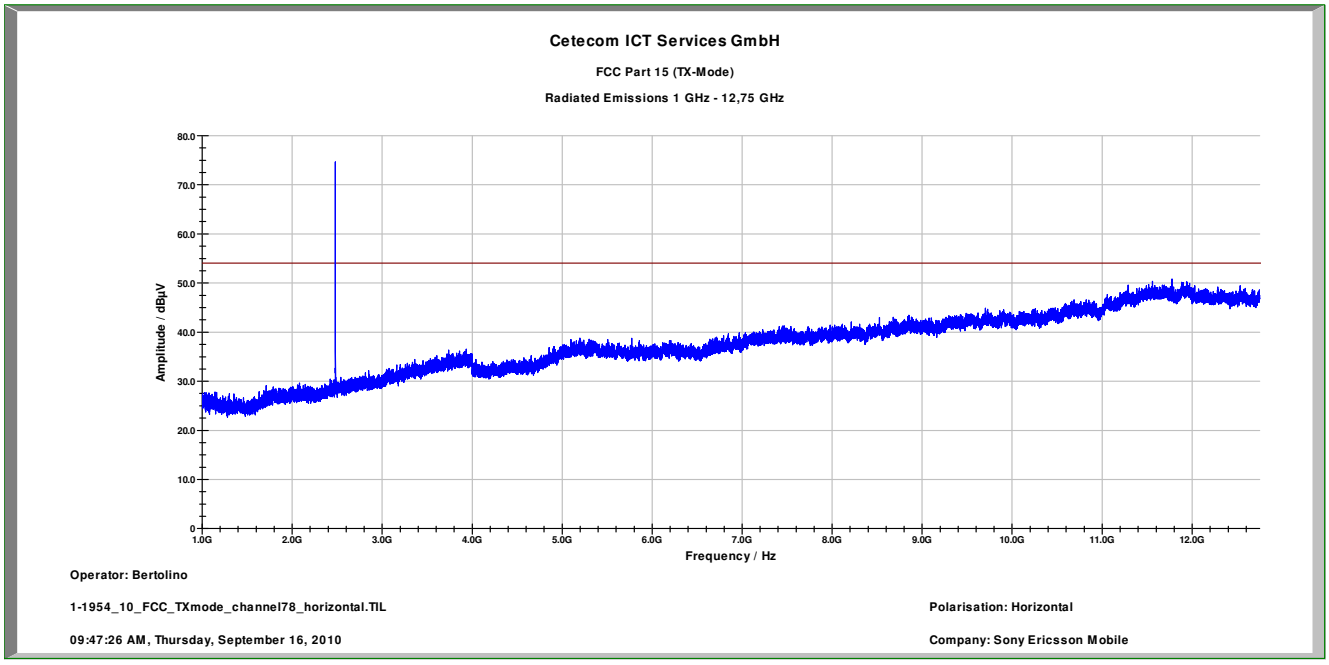
Plot 7: 1 GHz to 12.75 GHz / channel 78 (horizontal/vertical)



Carrier suppressed with a 2.4 GHz-band rejection filter.

9.12 RX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in idle/receive mode. The EUT is detached so all oszillators are active.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi peak
Sweep time:	Auto
Video bandwidth:	Sweep: 100 kHz Remeasurement: 10 Hz
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Span:	30 MHz to 25 GHz
Trace-Mode:	Max Hold

Limits:

FCC		IC
CFR Part 15.109		RSS Gen, Issue 2, 4.10
RX Spurious Emissions Radiated		
Frequency (MHz)	Field strength (dBµV/m)	Measurement distance
30 - 88	30.0	10
88 – 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Result: **Also see plots**

RX spurious emissions radiated [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
No critical peaks found		
Measurement uncertainty	±3 dB	

Result: **The result of the measurement is passed.**

Plot 1: 30 MHz to 1 GHz / idle-mode (horizontal/vertical)

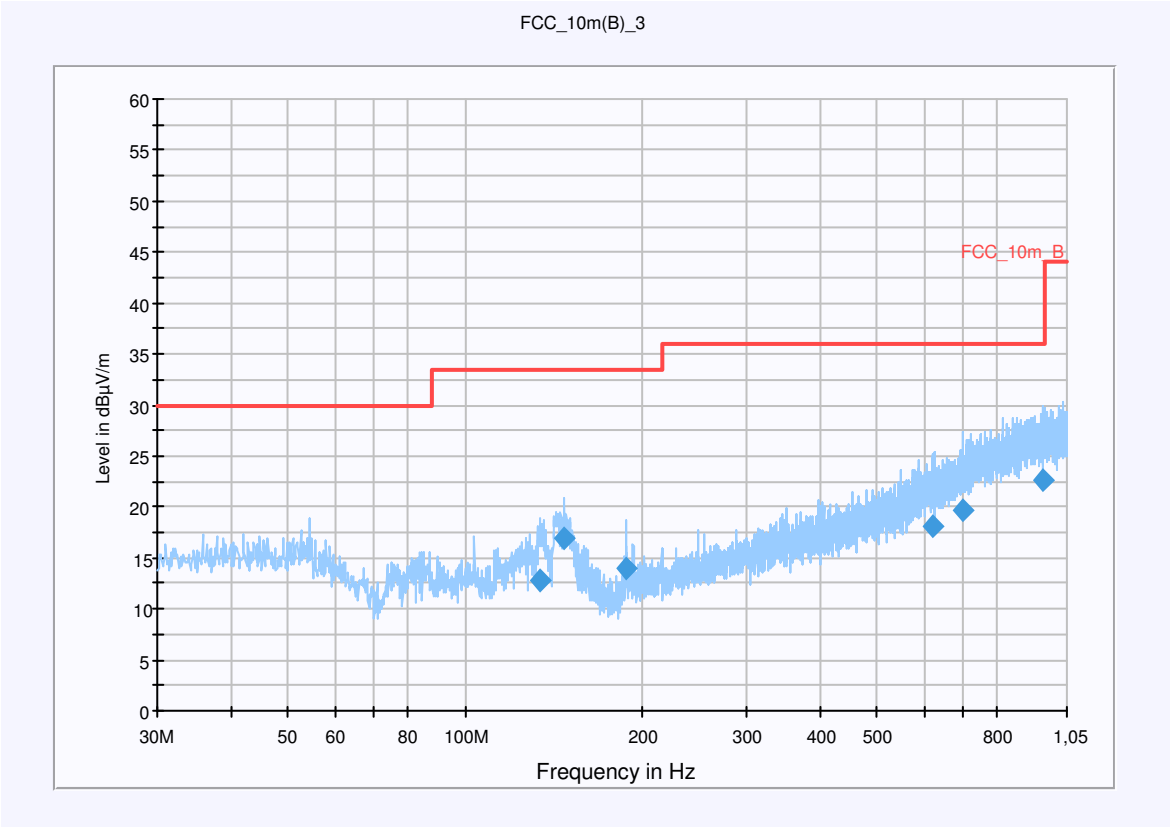
Common Information

EUT:	DGA-0004001 + CCA-0004001-BV
Serial Number:	#18964
Test Description:	FCC part 15 C Class B @ 10 m
Operating Conditions:	RX Mode; idle
Operator Name:	LNG
Comment:	Power: 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
134.128800	12.9	15000.000	120.000	98.0	V	86.0	9.1	20.6	33.5	
147.494700	16.9	15000.000	120.000	98.0	V	258.0	8.9	16.6	33.5	
187.390350	14.0	15000.000	120.000	112.0	V	110.0	10.9	19.5	33.5	
620.904300	18.0	15000.000	120.000	177.0	V	110.0	20.9	18.0	36.0	
701.229000	19.6	15000.000	120.000	201.0	H	-2.0	22.5	16.4	36.0	
953.170650	22.6	15000.000	120.000	220.0	H	184.0	25.4	13.4	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 (1005)
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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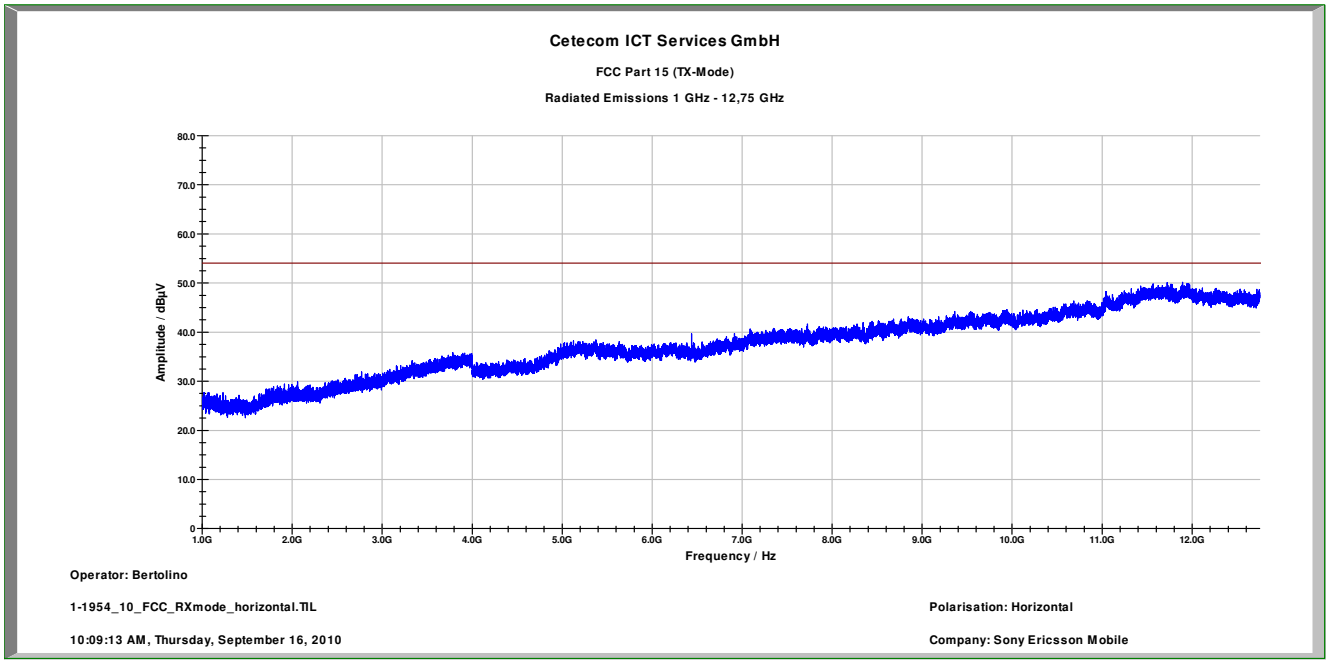
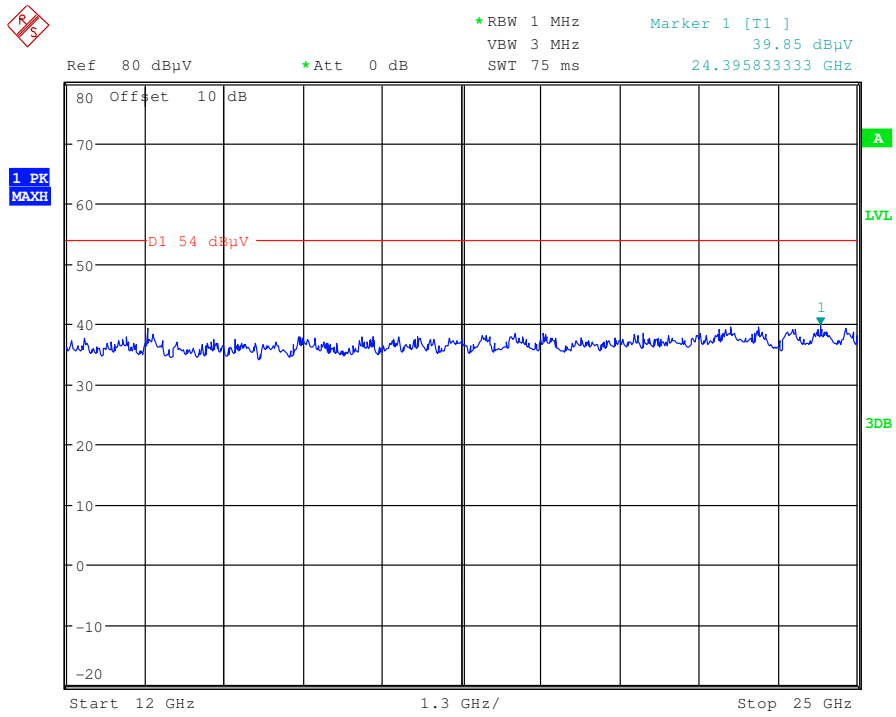
Plot 2: 1 GHz to 12.75 GHz / idle-mode (horizontal/vertical)



Plot 3: 12 GHz to 25 GHz / idle-mode (horizontal/vertical)



9.13 TX spurious emissions radiated < 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to single channel mode and the transmit channel is channel 39. This measurement is representative for all channels and modes. If critical peaks are found channel 00 and channel 78 will be measured too. The measurement is performed in the mode with the highest output power. The limits are recalculated to a measurement distance of 3 m with 40 dB/decade according CFR Part 2.

Measurement:

Measurement parameter	
Detector:	Peak / Quasi peak
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold

Limits:

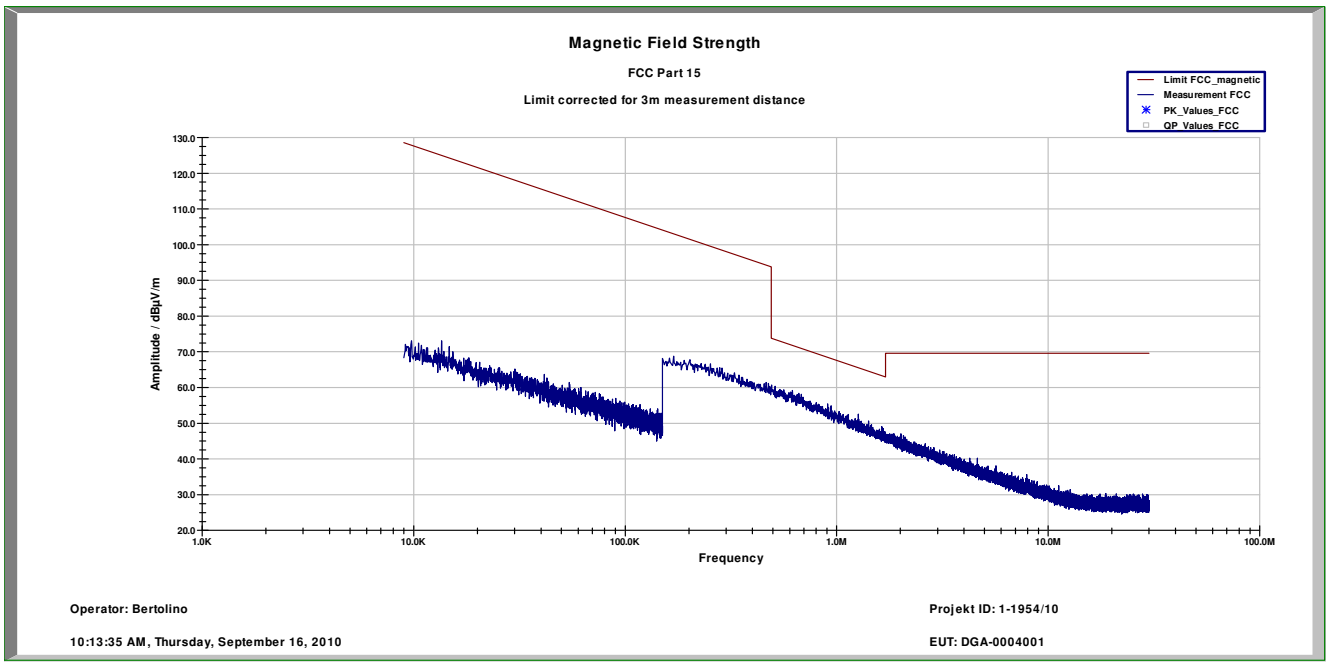
FCC		IC
CFR Part 15.209(a)		RSS 210, Issue 7, 2.2
TX spurious emissions radiated < 30 MHz		
Frequency (MHz)	Field strength (dBµV/m)	Measurement distance
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

Result: **Also see plot**

TX spurious emissions radiated < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
No critical peaks found		
Measurement uncertainty	± 3 dB	

Result: **The result of the measurement is passed.**

Plot 1: 9 kHz to 30 MHz / channel 39 (valid for all channels and modes)



9.14 TX spurious emissions conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to single channel mode and the transmit channel is channel 39. This measurement is representative for all channels and modes. If critical peaks are found channel 00 and channel 78 will be measured too. The measurement is performed in the mode with the highest output power. Both power lines, phase and neutral line, are measured. Found peaks are remeasured with average and quasi peak detection to show compliance to the limits.

Measurement:

Measurement parameter	
Detector:	Peak - Quasi peak / average
Sweep time:	Auto
Video bandwidth:	F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz
Resolution bandwidth:	F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz
Span:	9 kHz to 30 MHz
Trace-Mode:	Max Hold
Charger:	EP800 CAA-0002016-BV + EC700 USB-cable

Limits:

FCC		IC
CFR Part 15.107(a)		ICES-003, Issue 4
TX spurious emissions conducted < 30 MHz		
Frequency (MHz)	Quasi-peak (dBµV/m)	Average (dBµV/m)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30.0	60	50

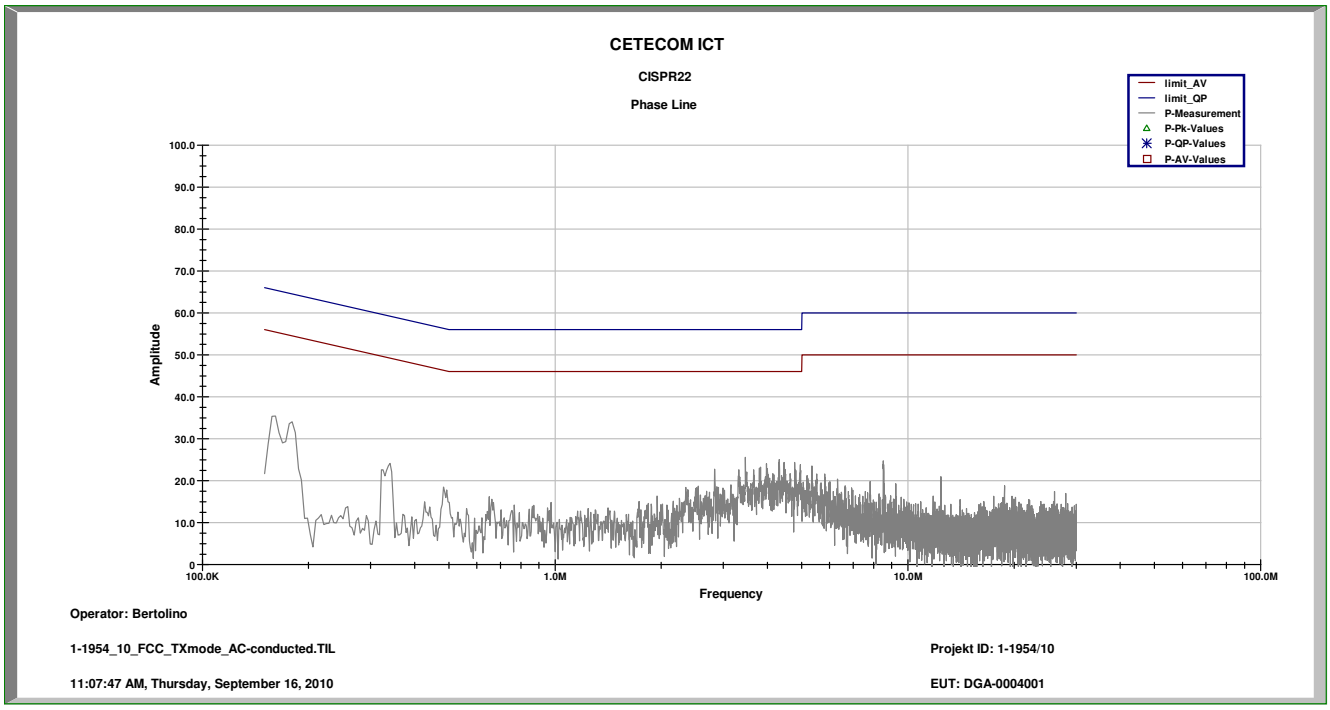
*Decreases with the logarithm of the frequency

Result: **Also see plots**

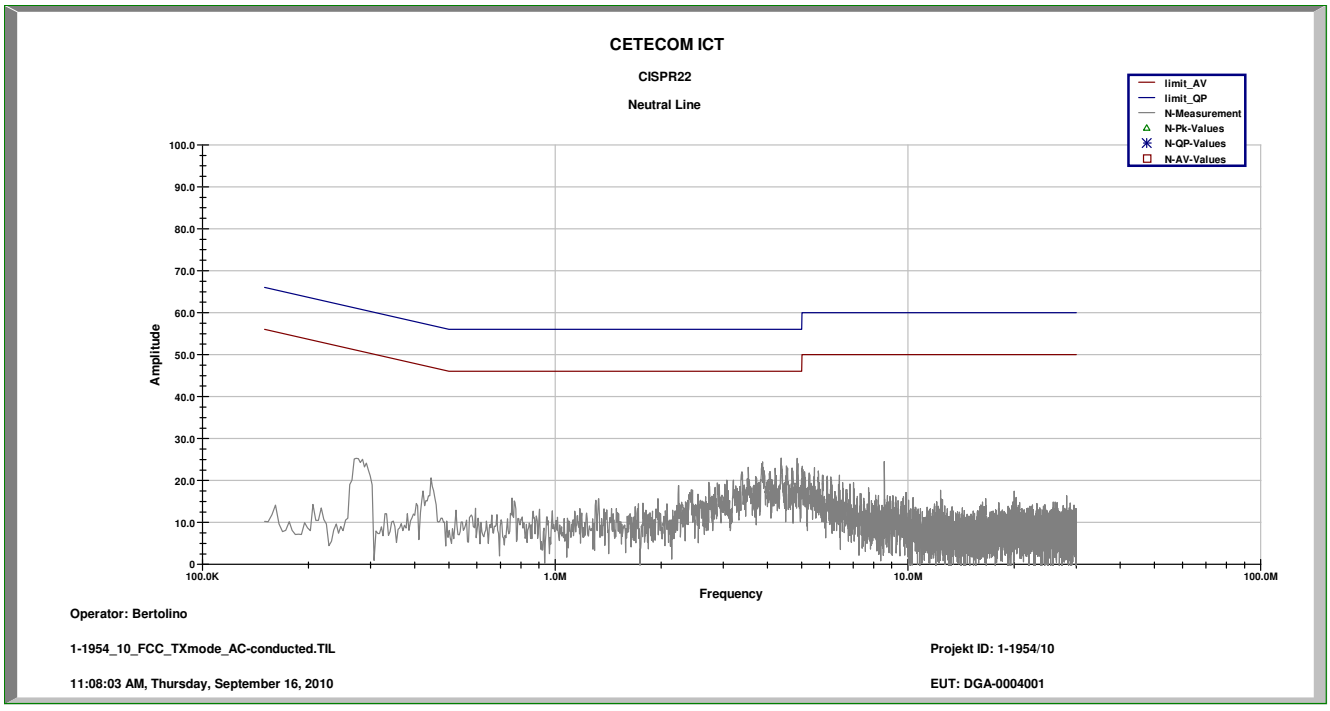
TX spurious emissions conducted < 30 MHz [dBµV/m]		
F [MHz]	Detector	Level [dBµV/m]
No critical peaks found		
Measurement uncertainty	± 3 dB	

Result: **The result of the measurement is passed.**

Plot 1: 9 kHz to 30 MHz / phase Line



Plot 2: 9 kHz to 30 MHz / neutral Line



10 Test equipment and ancillaries used for tests

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).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

No.	Labor / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	08.01.2009	08.01.2012
2	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vlKl!	05.03.2009	05.03.2011
3	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
4	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996		23.03.2009	
5	Spec.A. 2_2e	System rack for EMI measurement solution	85900	HP I.V.	*	300000222	ne		
6	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2010	06.01.2012
7	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
8	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
9	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
10	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
11	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
12	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
13	n. a.	Highpass Filter	WHKX2.9/18G-12SS	Wainwright	1	300003492	ev		
14	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
15	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Technologies	MY48250080	300003812	k	05.08.2008	
16	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Technologies	MY48260003	300003825	vlKl!	19.08.2008	
17	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vlKl!	17.12.2008	17.12.2010
18	CR 79	Std. Gain Horn Antenna 26.5-40.0 GHz	V637	Narda	7911	300001751	ne		
19	n. a.	Spectrum Analyzer 9kHz to 30GHz - 140..+30dBm	FSP30	R&S	100886	300003575	k	25.08.2008	
20	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/84193	300003889	vlKl!	28.05.2009	28.05.2011
21	n. a.	CBT (Bluetooth Tester + EDR Signalling)	CBT 1153.9000K35	R&S	100185	300003416	vlKl!	27.08.2008	27.08.2010

22	n. a.	Switch / Control Unit	3488A	HP Meßtechnik		300000929	ne		
23	n. a.	Signal Analyzer 20Hz-26,5GHz-150 to + 30 DBM	FSIQ26	R&S	835540/018	300002681-0005	k	07.01.2010	07.01.2012
24	n. a.	CBT (Bluetooth Tester + EDR Signalling)	CBT 1153.9000K35, CBT-B55, CBT-K55	R&S	100313	300003516	k	03.09.2008	03.09.2010

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress