

TEST REPORT

Test report no.: 1-2555-01-02/10-A



Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Straße 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: <http://www.cetecom.com>
e-mail: ict@cetecom.com

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

Oticon A/S
Kongebakken 9
2765 Smørum / Denmark
Phone: +45 39 17 71 00
Contact: Jørgen Peter Hanuscheck
e-mail: jnp@oticon.dk
Phone: +45 39 13 85 38

Manufacturer

Oticon A/S
Kongebakken 9
2765 Smørum / Denmark

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 8 Low-power Licence-exempt Radiocommunication Devices
(All Frequency Bands): Category I Equipment 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: Bluetooth Device

Model name: Streamer 1.4

FCC ID: U28STREAM02

IC: 1350B-STREAM02

Frequency [MHz]: 2402MHz – 2480MHz

Power supply: 3.7 V DC by Battery / switching power adapter

Temperature range: +10 °C to +45 °C

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

Test performed:

Andreas Keller

Test report authorised:

Stefan Bös

1 Table of contents	
1	Table of contents.....2
2	General information3
2.1	Notes.....3
2.2	Application details.....3
3	Test standard/s3
4	Test environment.....3
5	Test item4
6	Test laboratories sub-contracted4
7	Summary of measurement results5
8	RF measurement testing.....6
8.1	Description of test setup6
8.1.1	Radiated measurements.....6
8.1.2	Conducted measurements.....7
8.2	Additional comments7
8.3	RSP100 test report cover sheet / performance test data8
9	Measurement results.....9
9.1	Antenna gain9
9.2	Power spectral density10
9.3	Carrier frequency separation10
9.4	Number of hopping channels.....12
9.5	Time of occupancy (dwell time)14
9.6	Spectrum bandwidth of a FHSS system – 20 dB bandwidth15
9.7	Maximum output power18
9.8	Band edge compliance conducted22
9.9	Band edge compliance radiated26
9.10	TX spurious emissions conducted29
9.11	TX spurious emissions radiated.....33
9.12	RX spurious emissions radiated44
9.13	TX spurious emissions radiated < 30 MHz.....49
9.14	TX spurious emissions conducted < 30 MHz.....52
10	Test equipment and ancillaries used for tests56
Annex A	Document history59
Annex B	Further information.....59

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.

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

2.2 Application details

Date of receipt of order:	2010-09-21
Date of receipt of test item:	2010-09-21
Start of test:	2010-09-21
End of test:	2010-09-22
Person(s) present during the test:	Mr. Hanuscheck, Mr Giedenbacher

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 8	2010-12	Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment

4 Test environment

Temperature:	T_{nom}	+24 °C during room temperature tests
	T_{max}	+45 °C during high temperature test
	T_{min}	+10 °C during low temperature test
Relative humidity content:		55 %
Air pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	3.7 V DC by Battery / switching power adapter
	V_{max}	4.0 V
	V_{min}	3.2 V

5 Test item

Kind of test item	:	Bluetooth Device
Type identification	:	Streamer 1.4
S/N serial number	:	Rad.: 0334391, 0346649, 0329048, 0329415, 0334383, 0334384, 0347077, 0346649 Cond.: Sample #2/BT address: 00198E12341D
HW hardware status	:	Rev. 7
SW software status	:	FW version 4.3.0
Frequency band [MHz]	:	2402MHz – 2480MHz
Type of modulation	:	GFSK
Number of channels	:	79
Antenna	:	Integrated PCB antenna
Power supply	:	3.7V DC by Battery / switching power adapter
Temperature range	:	+10 °C to +45 °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 8, Annex 8	Passed	2011-01-27	-/-

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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(e) RSS 210 / A8.2(b)	Power spectral density	Nominal	Nominal	GFSK	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
§15.247(a)(1) RSS 210 / A8.1(b)	Carrier frequency separation	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(1) RSS 210 / A8.1(d)	Number of hopping channels	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(1)(iii) RSS 210 / A8.3(1)	Time of occupancy (dwell time)	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.247(a)(1) RSS 210 / A8.2(a)	Spectrum bandwidth of a FHSS system 20dB bandwidth	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(b)(1) RSS-210 / A8.4(2)	Maximum output power	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	Band edge compliance conducted	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	complies
§15.205 RSS-210 / A8.5	Band edge compliance radiated	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions conducted	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	complies
§15.247(d) RSS-210 / A8.5	TX spurious emissions radiated	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.109 RSS-Gen.	RX spurious emissions radiated	Nominal	Nominal	-/-	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.209(a) RSS-Gen	TX spurious emissions radiated < 30 MHz	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies
§15.107(a)	Conducted emissions < 30 MHz	Nominal	Nominal	GFSK	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	complies

Note: NA = Not Applicable; NP = Not Performed

8 RF measurement testing

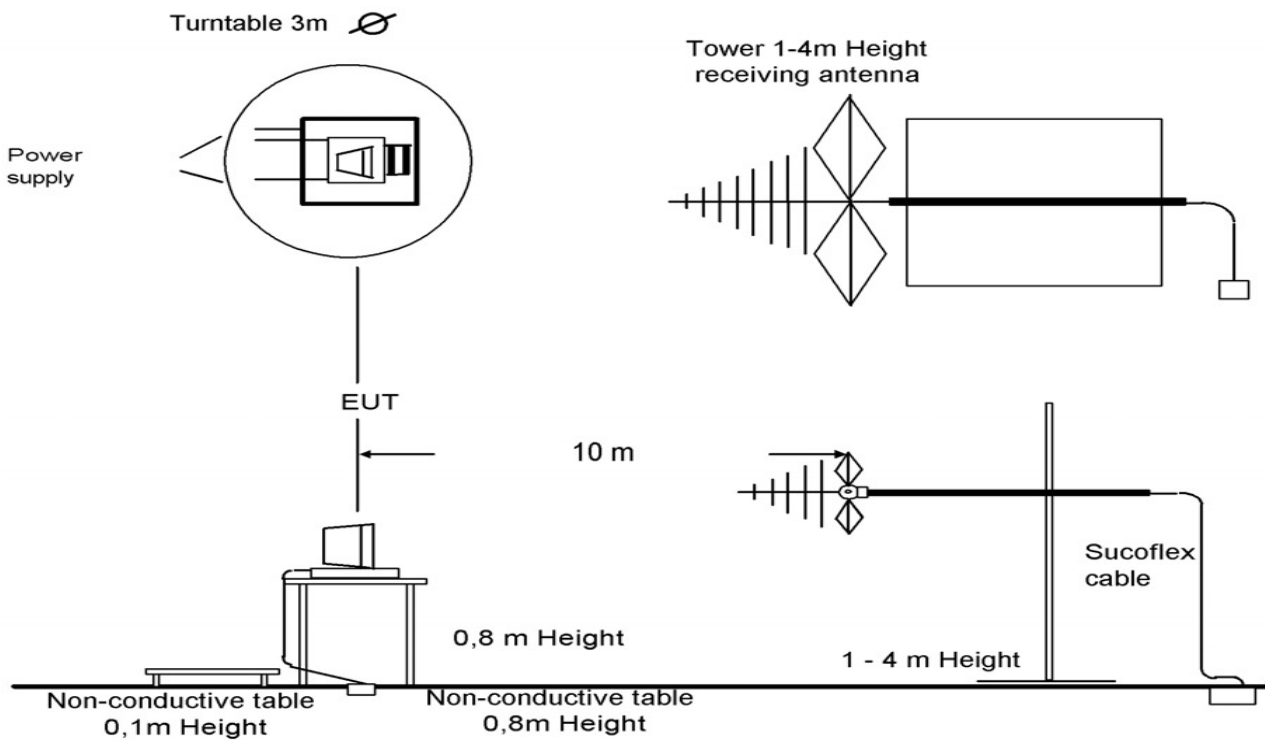
8.1 Description of test setup

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

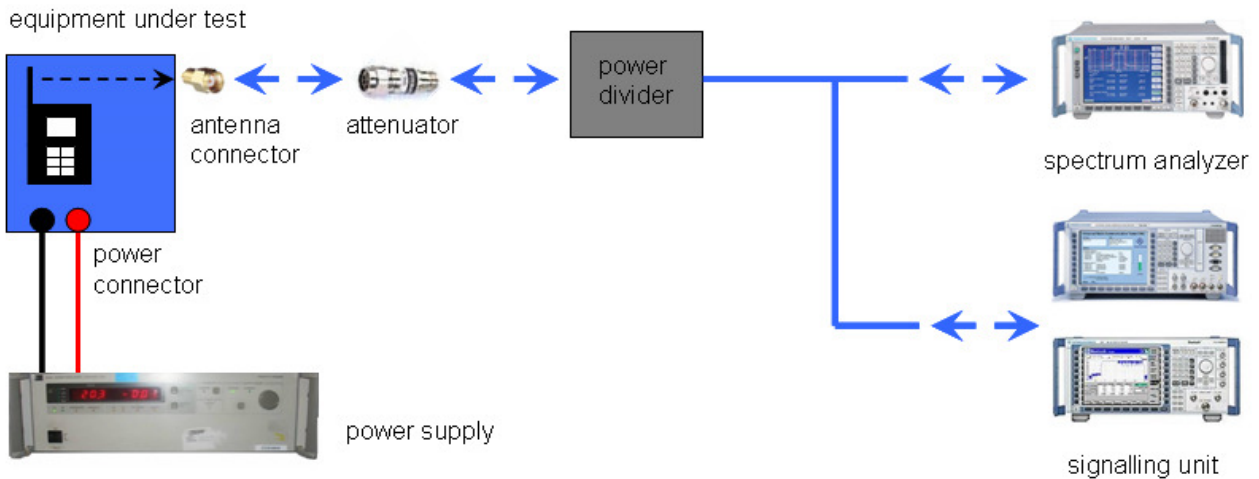
9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

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	:	1-2555-01-02/10
Equipment model number	:	Streamer 1.4
Certification number	:	1350B-STREAM02
Manufacturer (complete address)	:	Oticon A/S Kongebakken 9 2765 Smørum / Denmark
Tested to radio standards specification no.	:	RSS 210, Issue 8, 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.: 1.6mW (GFSK) EIRP: 3.1mW (GFSK)
Occupied bandwidth (99%-BW) [kHz]	:	836 (GFSK)
Type of modulation	:	GFSK
Emission designator (TRC-43)	:	836KFXD (GFSK)
Antenna information	:	Integrated PCB antenna
Transmitter spurious (worst case) [dB μ V/m @ 3m]:		50dB μ V/m (noise floor)
Receiver spurious (worst case) [dB μ V/m @ 3m]:		50 dB μ V/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:

2011-01-27

Andreas Keller

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:	3 MHz
Trace-Mode:	Max hold

Limits:

FCC	IC
CFR Part 15.247 (b)(4)	RSS 210, Issue 8, 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		1.9	1.5	0.9
Radiated power [dBm] Measured with GFSK modulation		4.9	4.7	4.4
Gain [dBi] Calculated		3.0	3.2	3.5

Result: The result of the measurement is passed.

9.2 Power spectral density

Not applicable

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 8, 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
------------------------------	---------

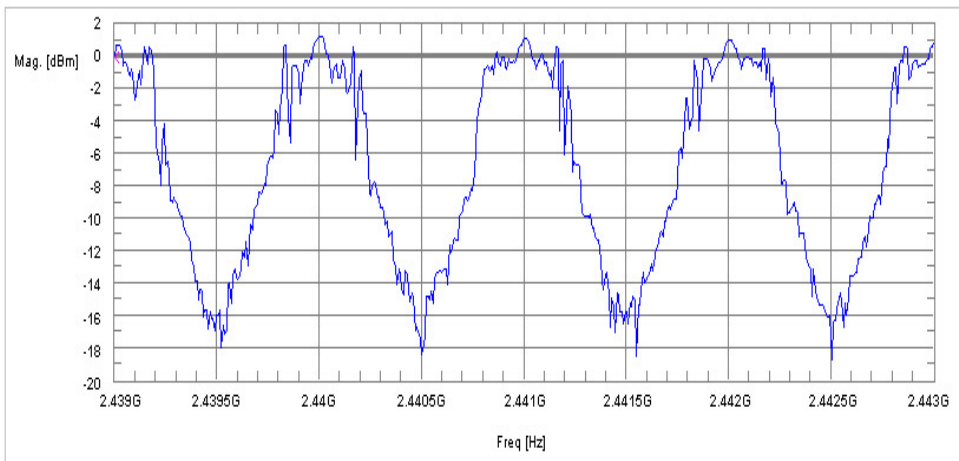
Result: The result of the measurement is passed.

Plot 1: Carrier Frequency Separation (GFSK)

C.BER by Cetecom Saarbruecken Germany

Ref. Level Offset [dB]	Detector	SweepTime [s]
12.5	POS	2.5m

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



Start Freq [Hz]	Stop Freq [Hz]	TraceM.	Found Peak [dBm]	Found Peak [Hz]
2.439G	2.443G	MAXH	11.48030428m	2.439G

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:

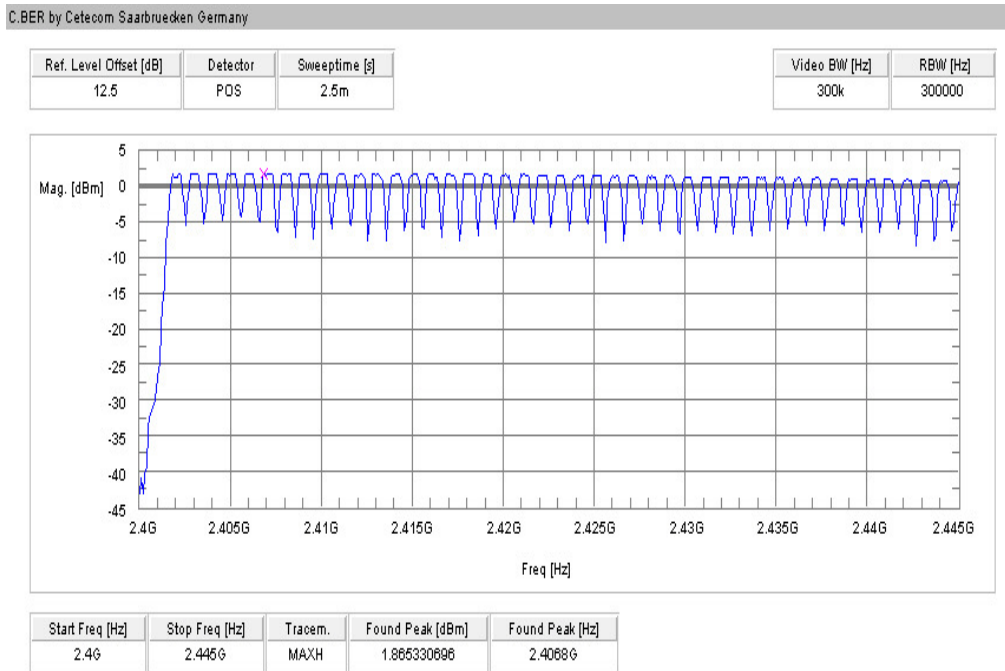
FCC	IC
CFR Part 15.247 (a)(1)	RSS 210, Issue 8, A 8.1(d)
Number of hopping channels	
At least 15 non overlapping hopping channels	

Result:

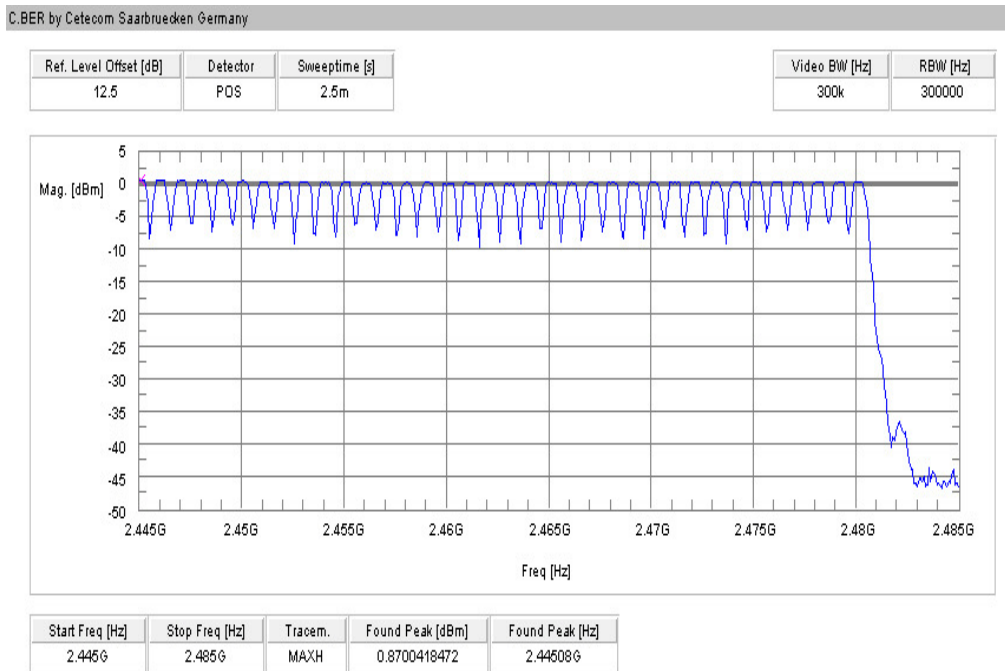
Number of hopping channels	79
----------------------------	----

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)

Measurement:

For Bluetooth® devices no measurements mandatory depending on the fixed requirements according to the Bluetooth® Core Specifications!

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 2.0 & V 2.1 & V 3.0 & V4.0 (+ critical errata) for all Bluetooth® devices.

Therefore, all Bluetooth® devices comply with the FCC dwell time requirements 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)

Limits:

FCC	IC
CFR Part 15.247 (a)(1)(iii)	RSS 210, Issue 8, 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:	30 kHz
Span:	3 MHz
Trace-Mode:	Max Hold

Limits:

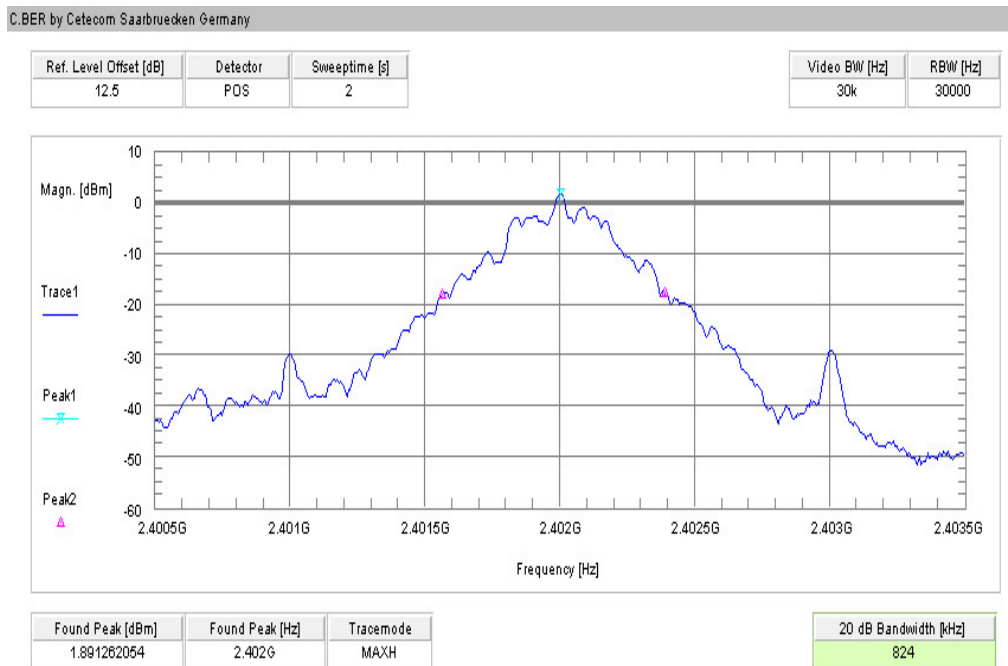
FCC	IC
CFR Part 15.247 (a)(1)	RSS 210, Issue 8, A 8.2(a)
Spectrum bandwidth of a FHSS system – 20 dB bandwidth	
GFSK < 1000 kHz Pi/4 DQPSK < 1500 kHz 8DPSK < 1500 kHz	

Result:

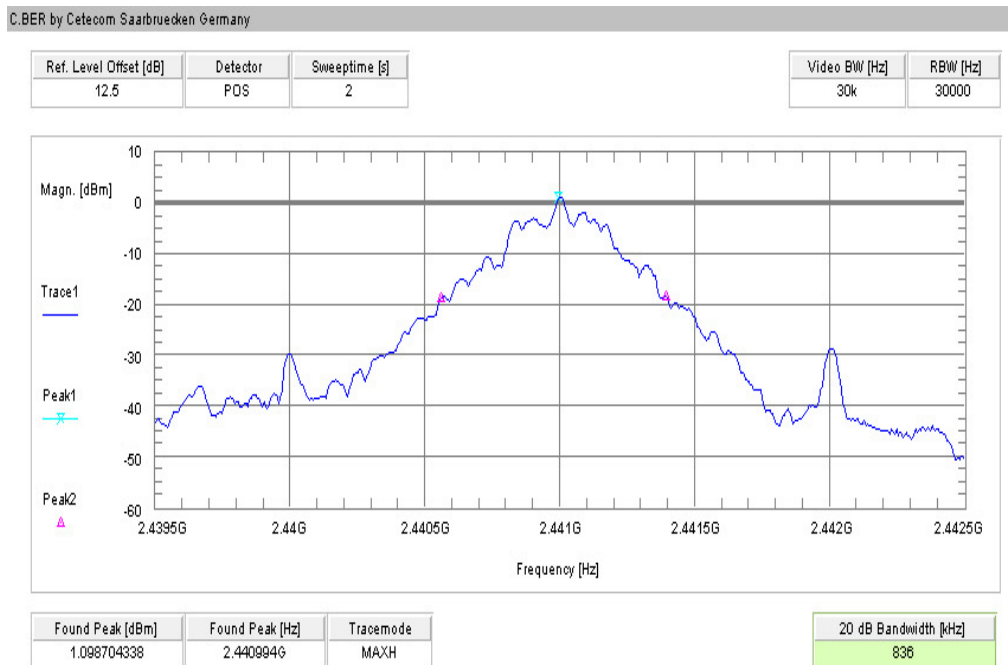
Modulation	20 dB BANDWIDTH [kHz]		
	2402 MHz	2441 MHz	2480 MHz
Frequency			
GFSK	824	836	836
Measurement uncertainty	± 30 kHz		

Result: The result of the measurement is passed.

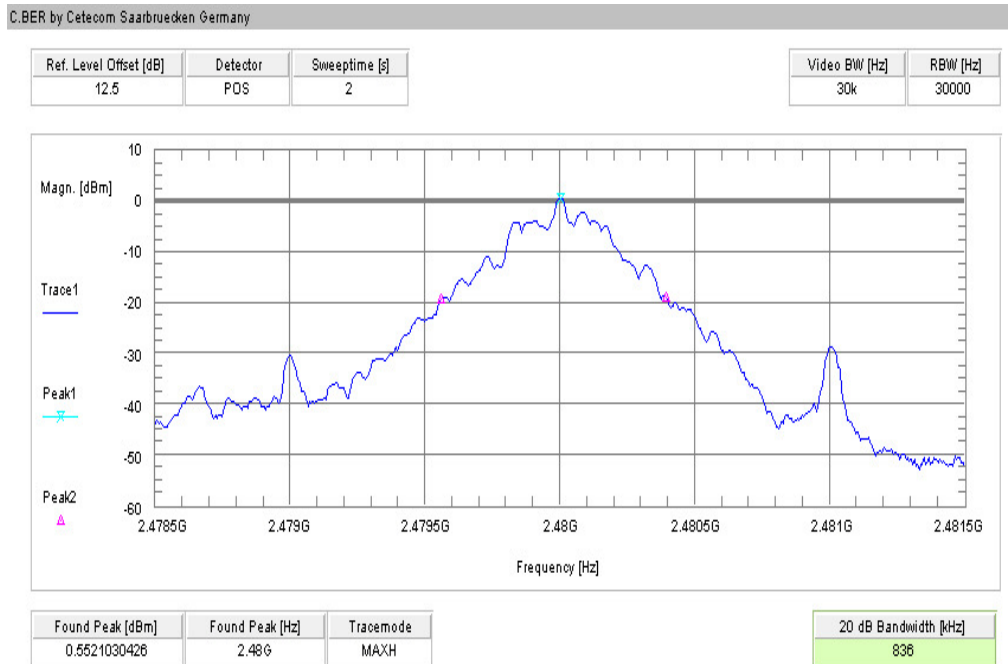
Plot 1: Channel 00 / GFSK



Plot 2: Channel 39 / GFSK



Plot 3: Channel 78 / GFSK



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 8, 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	

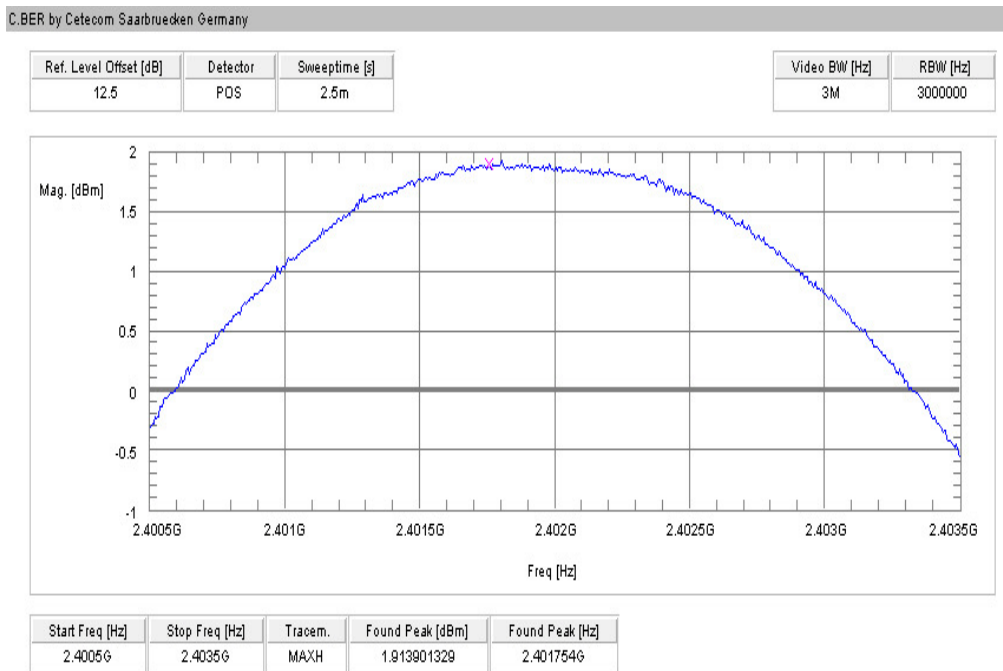
Result:

Modulation Frequency	Maximum output power conducted [dBm]		
	2402 MHz	2441 MHz	2480 MHz
GFSK	1.91	1.46	0.93
Measurement uncertainty	± 0.5 dB		

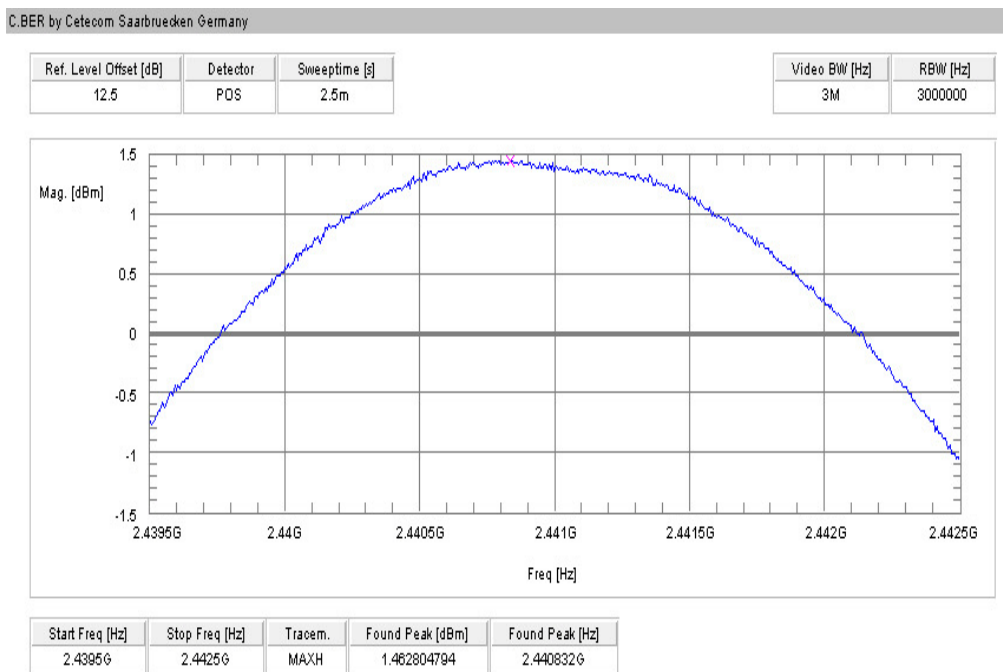
Modulation Frequency	Maximum output power radiated - EIRP [dBm]		
	2402 MHz	2441 MHz	2480 MHz
GFSK	4.9	4.7	4.4
Measurement uncertainty	± 2.0 dB		

Result: The result of the measurement is passed.

Plot 1: Channel 00 / GFSK (conducted)



Plot 2: Channel 39 / GFSK (conducted)

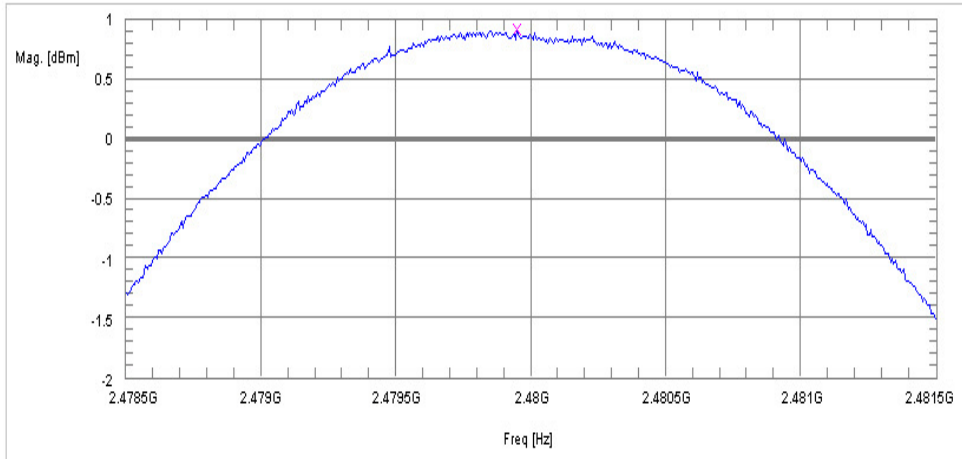


Plot 3: Channel 78 / GFSK (conducted)

C.BER by Cetecom Saarbruecken Germany

Ref. Level Offset [dB]	Detector	SweepTime [s]
12.5	POS	2.5m

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



Start Freq [Hz]	Stop Freq [Hz]	TraceM.	Found Peak [dBm]	Found Peak [Hz]
2.4785G	2.4815G	MAXH	0.8268007278	2.479946G

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 Higher Band Edge: 2478 – 2489 MHz
Trace-Mode:	Max Hold

Limits:

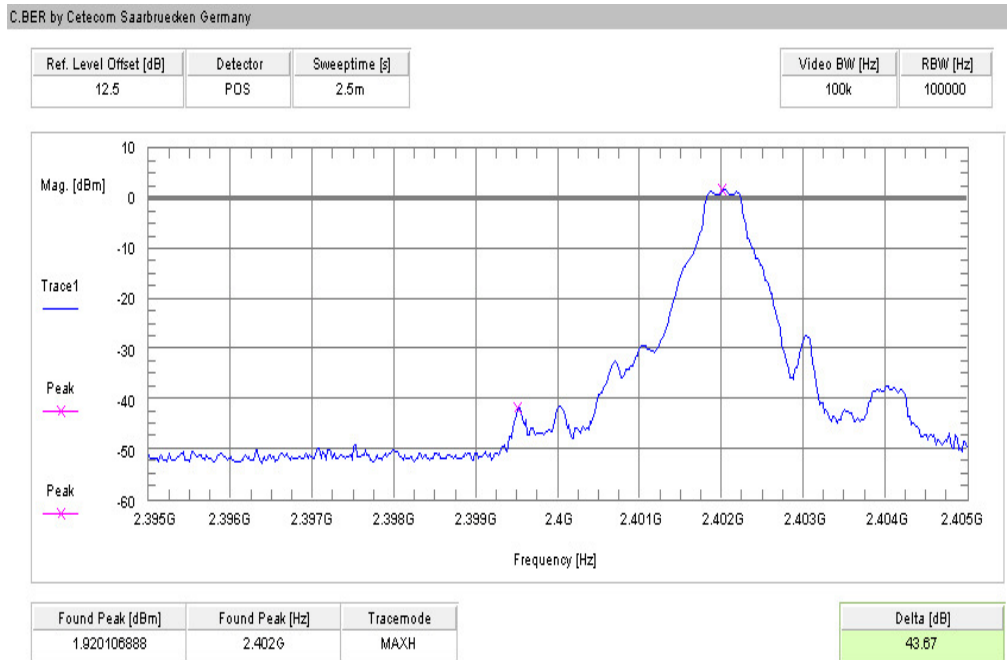
FCC	IC
CFR Part 15.247 (d)	RSS 210, Issue 8, A 8.5
Band edge compliance conducted	
<p>In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall 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.</p>	

Result: Also see plots

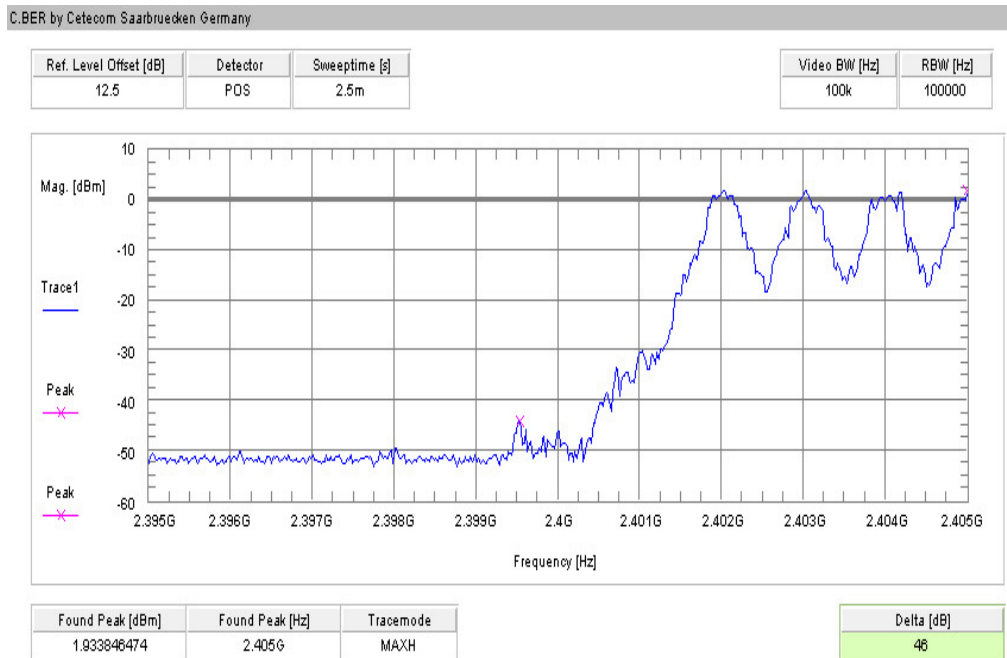
Scenario Modulation	Band edge compliance conducted [dB]		
	GFSK	-/-	-/-
Lower band edge – hopping off	> 20 dB		
Lower band edge – hopping on	> 20 dB		
Upper band edge – hopping off	> 20 dB		
Upper band edge – hopping on	> 20 dB		
Measurement uncertainty	± 1.5 dB		

Result: The result of the measurement is passed.

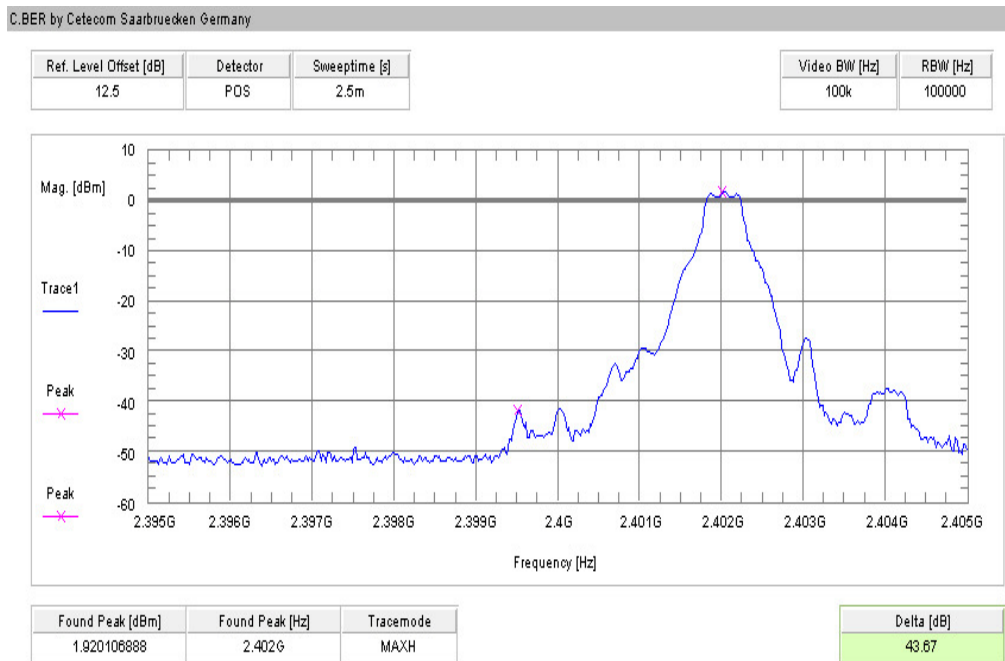
Plot 1: Lower band edge – hopping off / GFSK (conducted)



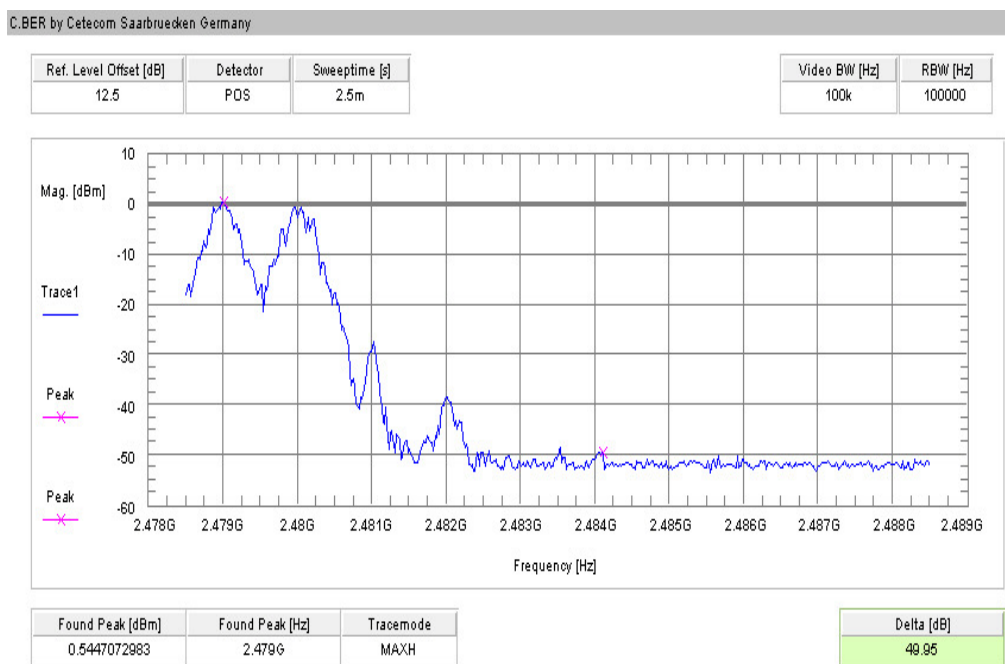
Plot 2: Lower band edge – hopping on / GFSK (conducted)



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



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



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:

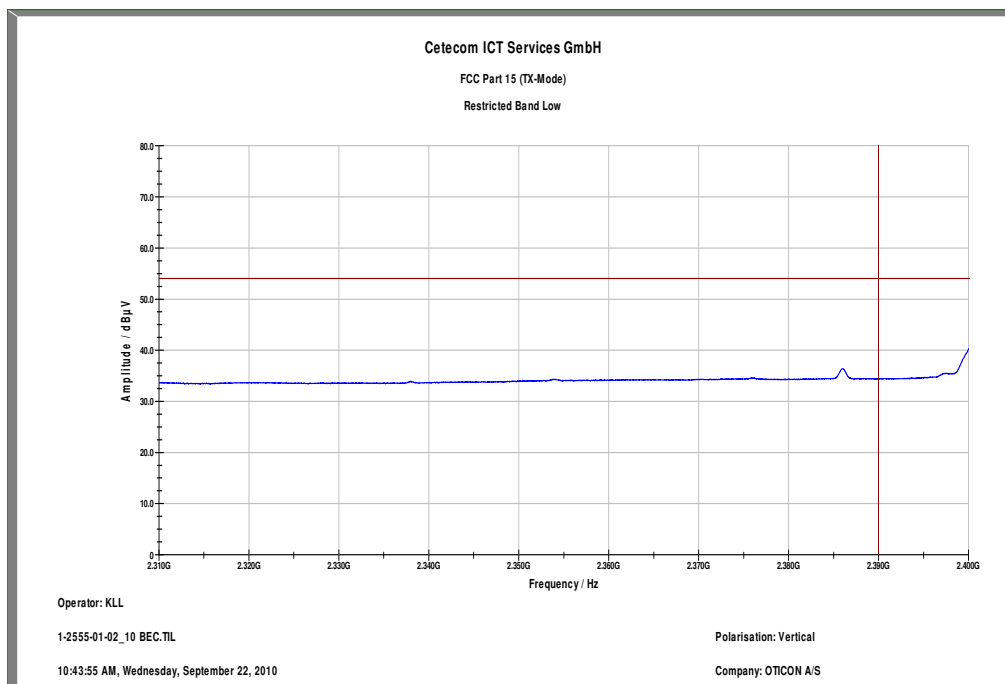
FCC	IC
CFR Part 15.205	RSS 210, Issue 8, A 8.5
Band edge compliance radiated	
<p>In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at 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)).</p>	
54 dBµV/m AVG	

Result: Also see plots

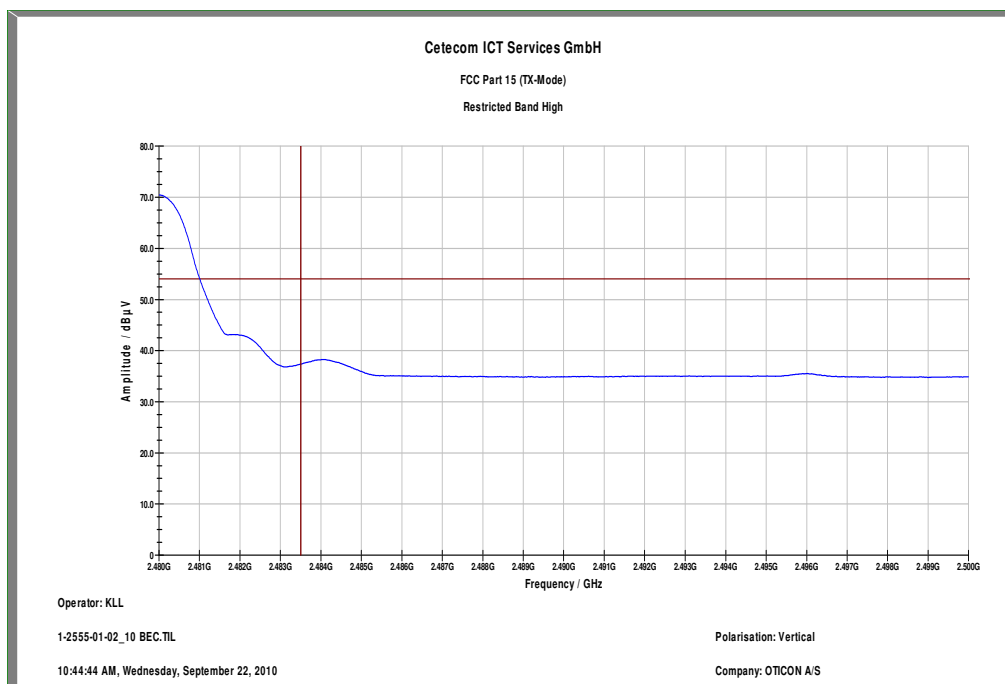
Scenario Modulation	Band edge compliance radiated [dB μ V/m]		
	GFSK	-/-	-/-
Lower restricted band	< 54 (see plot 1)		
Upper restricted band	< 54 (see plot 2)		
Measurement uncertainty	± 2 dB		

Result: The result of the measurement is passed.

Plot 1: Lower Restricted Band / GFSK (radiated)



Plot 2: Upper Restricted Band / GFSK (radiated)



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:

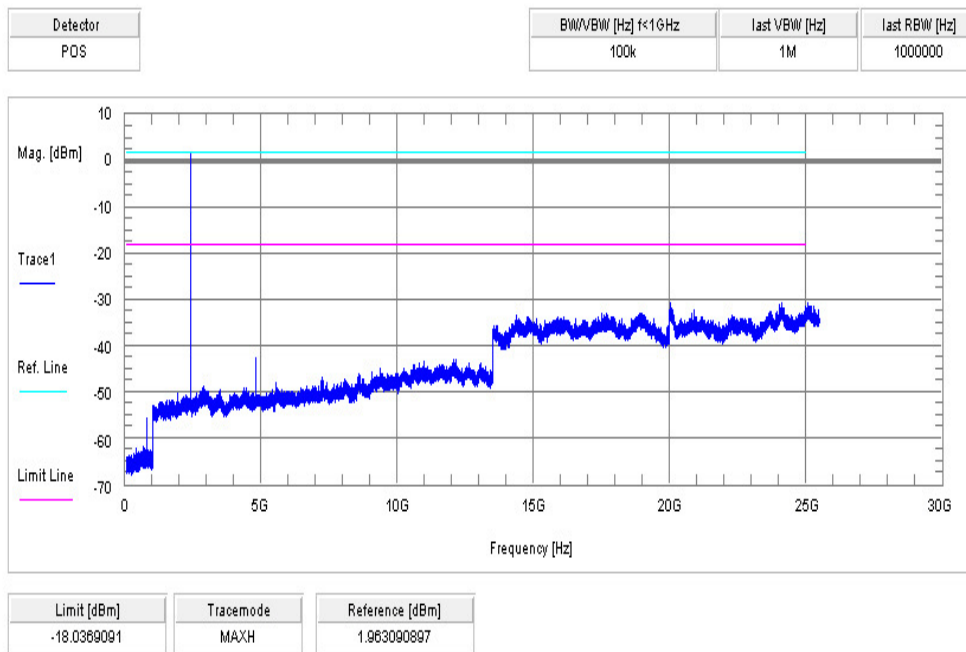
FCC	IC
CFR Part 15.247(d)	RSS 210, Issue 8, A 8.5
TX spurious emissions conducted	
<p>In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall 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</p>	

Result: Also see plots

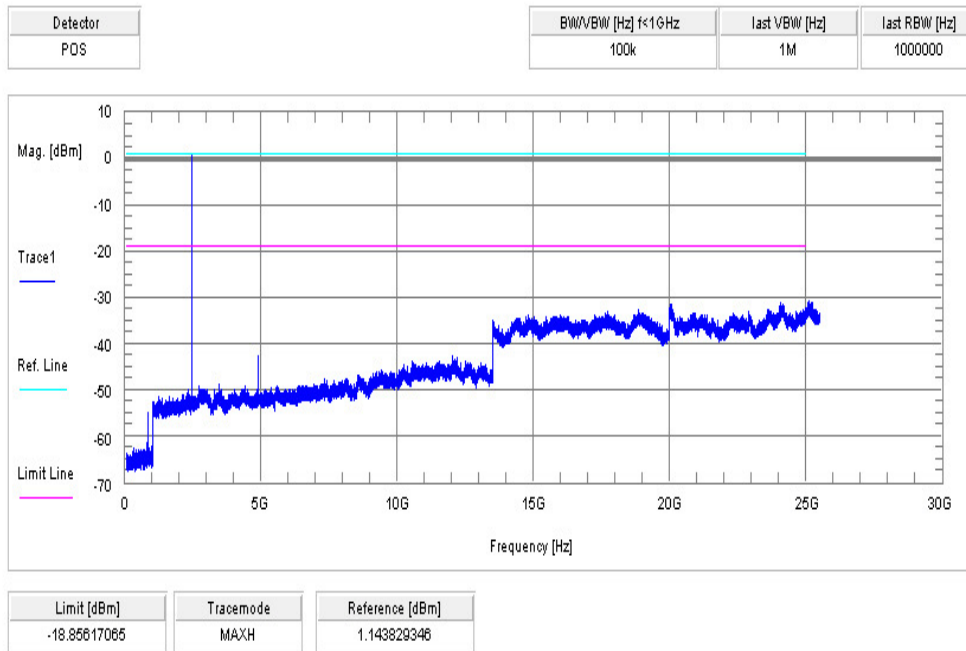
TX spurious emissions conducted					
GFSK - mode					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		1.96	30 dBm		Operating frequency
<i>No critical peaks found</i>			-20 dBc		complies
2441		1.14	30 dBm		Operating frequency
<i>No critical peaks found</i>			-20 dBc		complies
2480		0.61	30 dBm		Operating frequency
<i>No critical peaks found</i>			-20 dBc		complies
Measurement uncertainty		± 3 dB			

Result: The result of the measurement is passed.

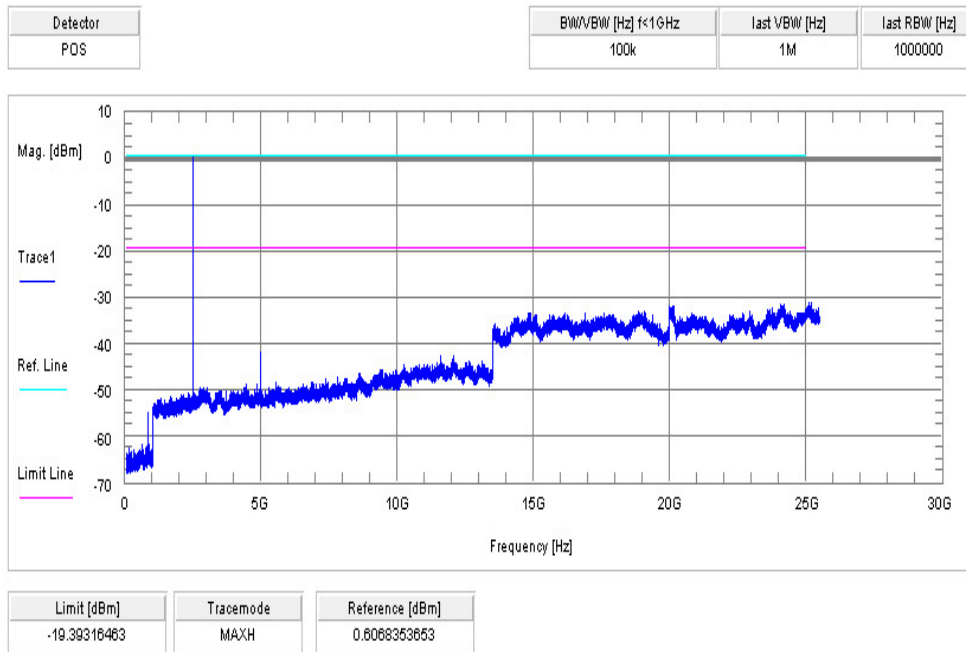
Plot 1: Channel 00 / GFSK



Plot 2: Channel 39 / GFSK



Plot 3: Channel 78 / GFSK



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:	<input checked="" type="checkbox"/> GFSK <input type="checkbox"/> Pi/4 DQPSK <input type="checkbox"/> 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.

Limits:

FCC		IC	
CFR Part 15.247(d)		RSS 210, Issue 8, A 8.5	
TX spurious emissions radiated			
<p>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)).</p>			
§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 [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]
1602.0	PK	27.7	1628.0	PK	27.4	1654.0	PK	25.9
3202.0	PK	31.2	4882.0	PK	40.0	4960.0	PK	40.8
4804.0	PK	39.8						
6408.0	PK	36.4						
7206.0	PK	37.0						
Measurement uncertainty			± 3 dB					

Re-measurements: RBW=1MHz/VBW=10Hz

Result: The result of the measurement is passed.

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

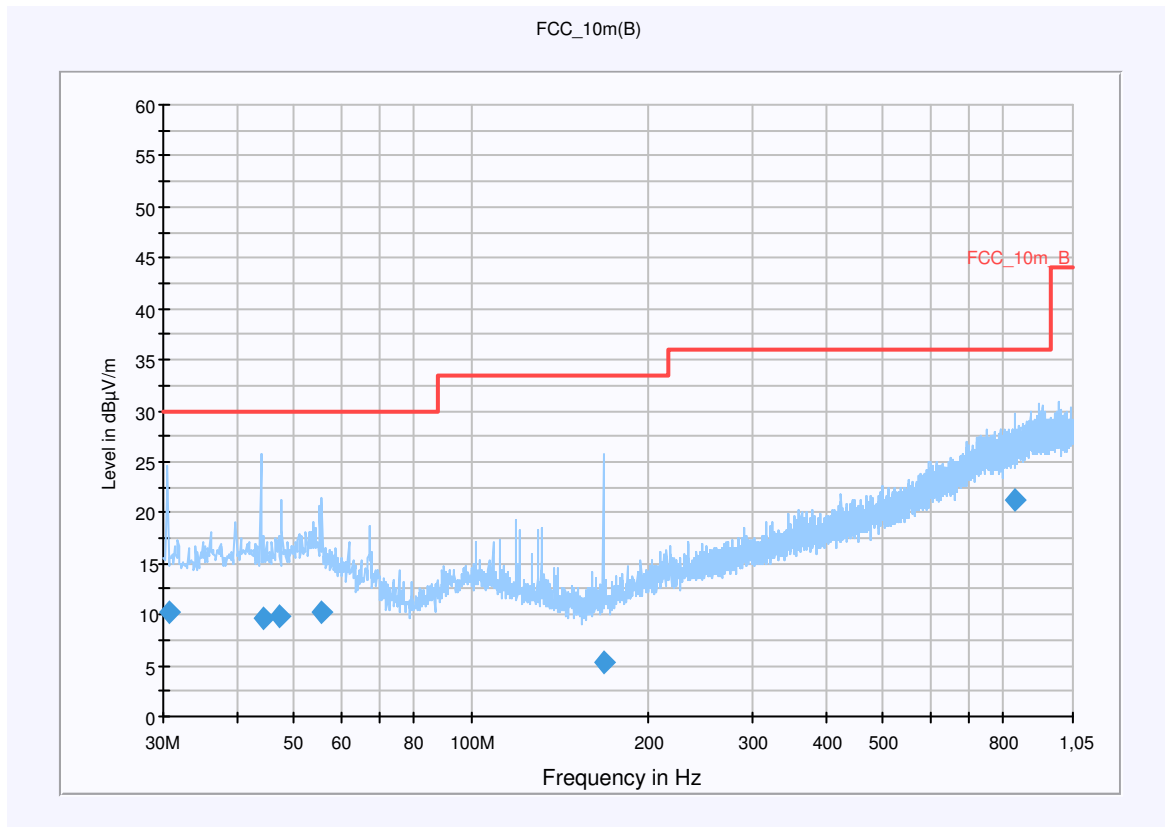
Common Information

EUT: Streamer 1.4
 Serial Number: 0346649
 Test Description: FCC
 Operating Conditions: BT testmode channel 0; /3,84MHz idle / charging
 Operator Name: Kraus
 Comment: Power 115V / 60Hz

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
30.698745	10.2	15000.000	120.000	237.0	V	3.0	12.6	19.8	30.0	
44.316750	9.7	15000.000	120.000	107.0	V	160.0	13.3	20.3	30.0	
47.125800	9.9	15000.000	120.000	100.0	V	236.0	13.3	20.1	30.0	
55.807050	10.3	15000.000	120.000	187.0	V	231.0	12.7	19.7	30.0	
167.521800	5.4	15000.000	120.000	251.0	V	157.0	9.7	28.1	33.5	
838.075050	21.3	15000.000	120.000	400.0	H	138.0	24.4	14.7	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

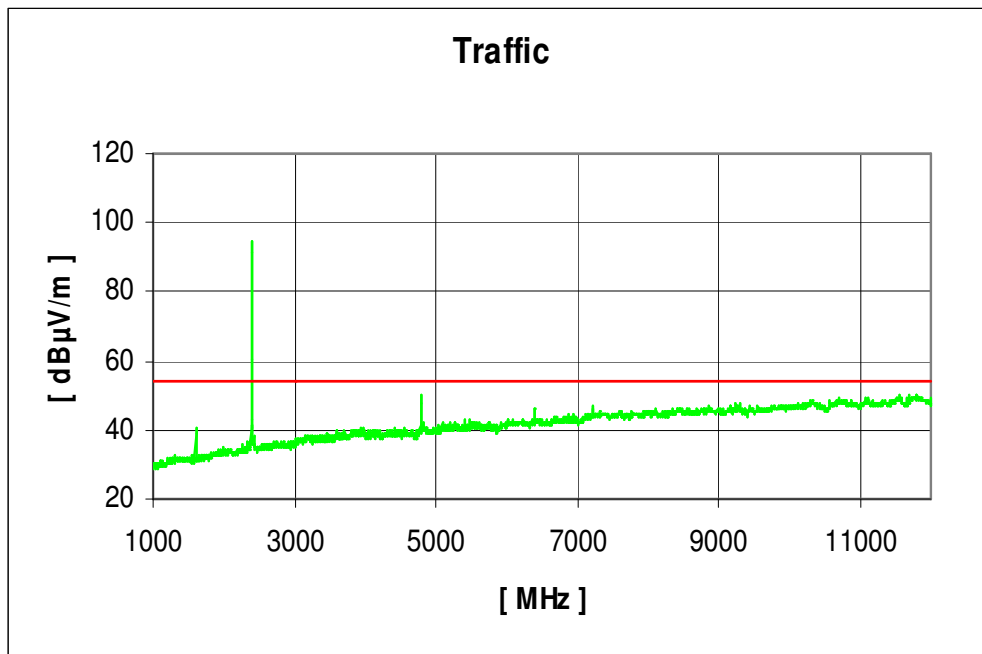
Antenna: VULB 9163
SN 9163-295, FW ---
Correction Table (vertical): VULP6113
Correction Table (horizontal): VULP6113
Correction Table: Cable_EN_1GHz (1005)

Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.12

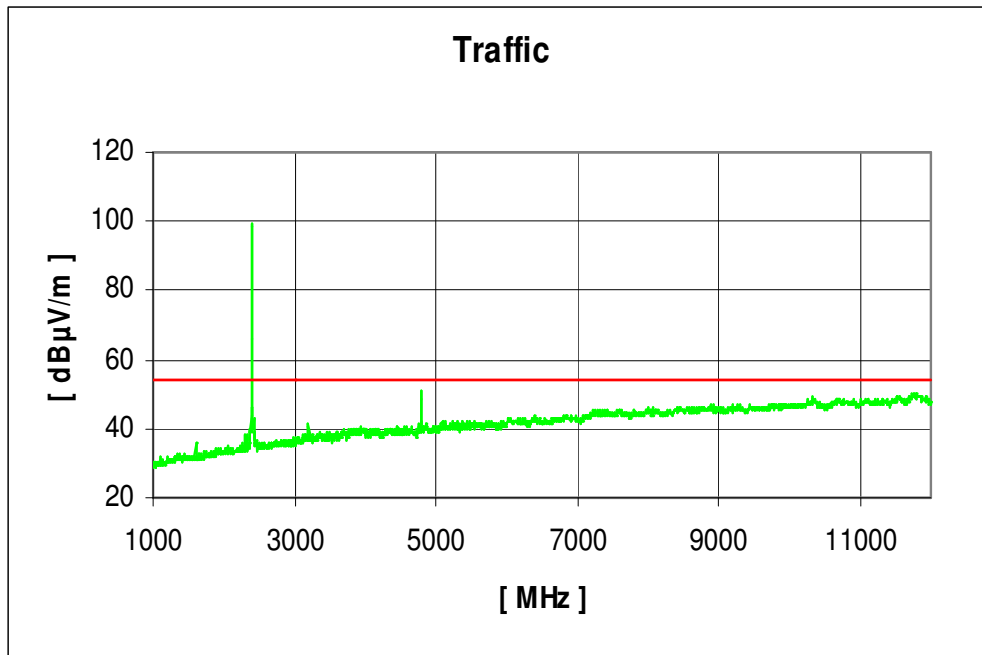
Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

Plot 2: 1 GHz to 12.75 GHz / channel 00 (vertical) Sample #0334391

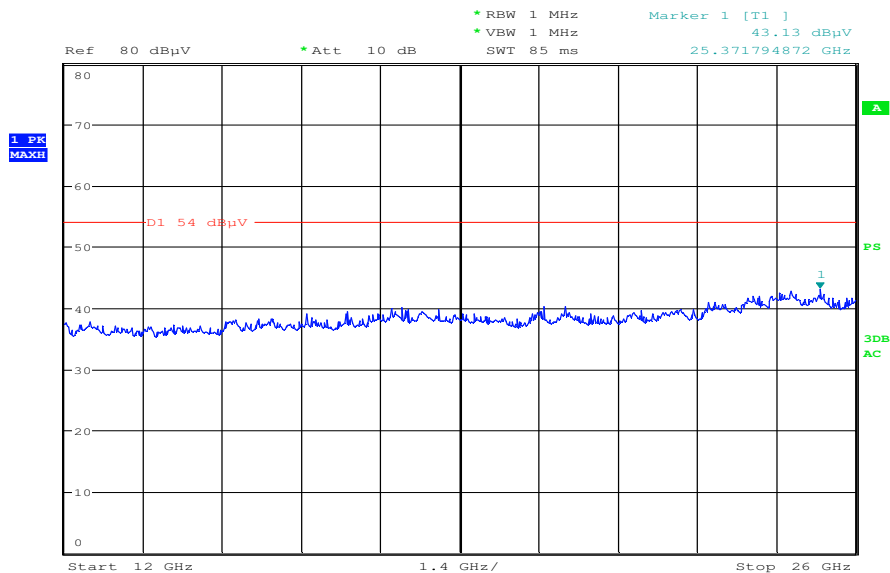


Plot 3: 1 GHz to 12.75 GHz / channel 00 (horizontal) Sample #0334391



Plot 4: 12 GHz to 26 GHz / channel 00 (horizontal/vertical max hold) – valid for all channels

Sample #0334391



Date: 21.SEP.2010 10:09:24

Plot 5: 30 MHz to 1 GHz / channel 39 (horizontal/vertical)

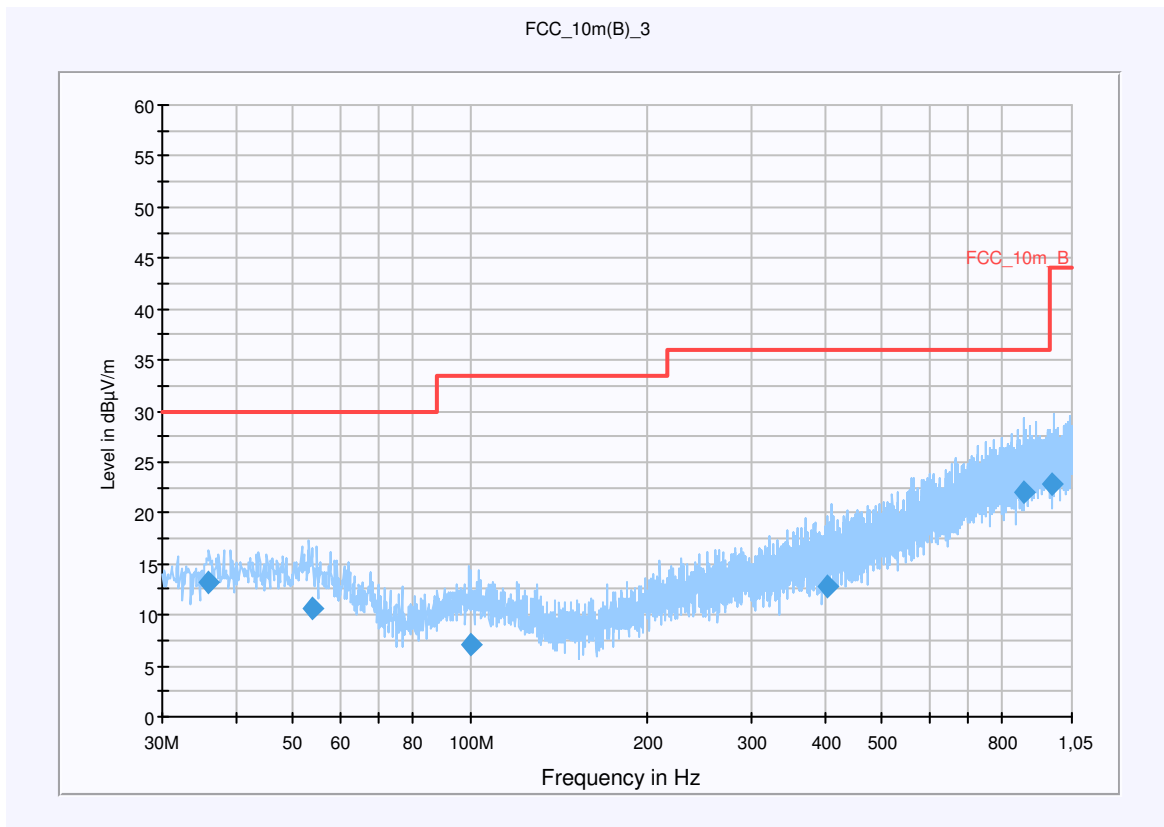
Common Information

EUT: Streamer 1.4
 Serial Number: 0346649
 Test Description: FCC
 Operating Conditions: BT testmode channel 39; /3,84MHz idle / charging
 Operator Name: Kraus
 Comment: Power 115V / 60Hz

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
35.982150	13.1	15000.000	120.000	98.0	V	189.0	13.1	16.9	30.0	
53.907600	10.6	15000.000	120.000	315.0	V	44.0	13.0	19.4	30.0	
100.101300	7.2	15000.000	120.000	220.0	H	89.0	11.9	26.3	33.5	
402.712200	12.8	15000.000	120.000	220.0	V	259.0	16.9	23.2	36.0	
871.226550	22.0	15000.000	120.000	127.0	H	2.0	24.8	14.0	36.0	
974.699700	22.8	15000.000	120.000	212.0	V	36.0	25.6	21.2	44.0	

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

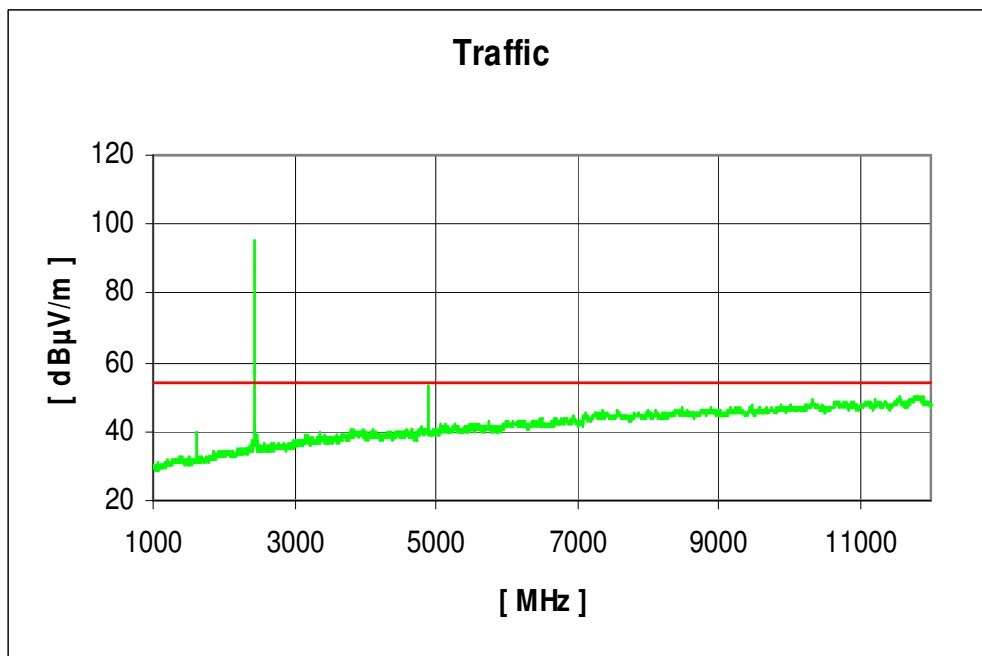
Antenna: VULB 9163
SN 9163-295, FW ---
Correction Table (vertical): VULP6113
Correction Table (horizontal): VULP6113
Correction Table: Cable_EN_1GHz (1005)

Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.12

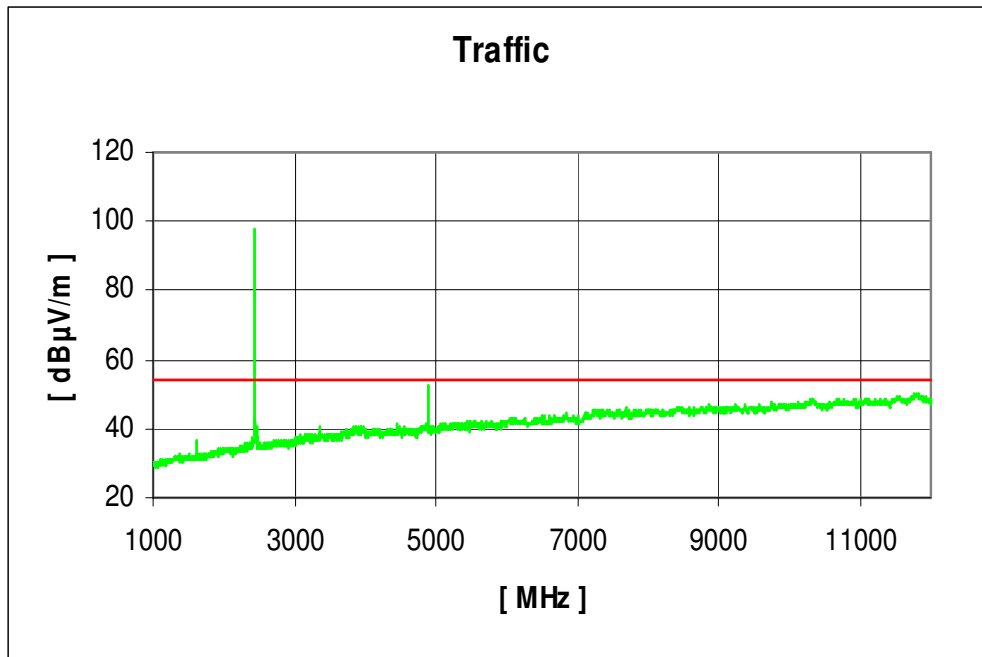
Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

Plot 6: 1 GHz to 12.75 GHz / channel 39 (vertical) Sample #0334391



Plot 7: 1 GHz to 12.75 GHz / channel 39 (horizontal) Sample #0334391



Plot 8: 30 MHz to 1 GHz / channel 78 (horizontal/vertical)

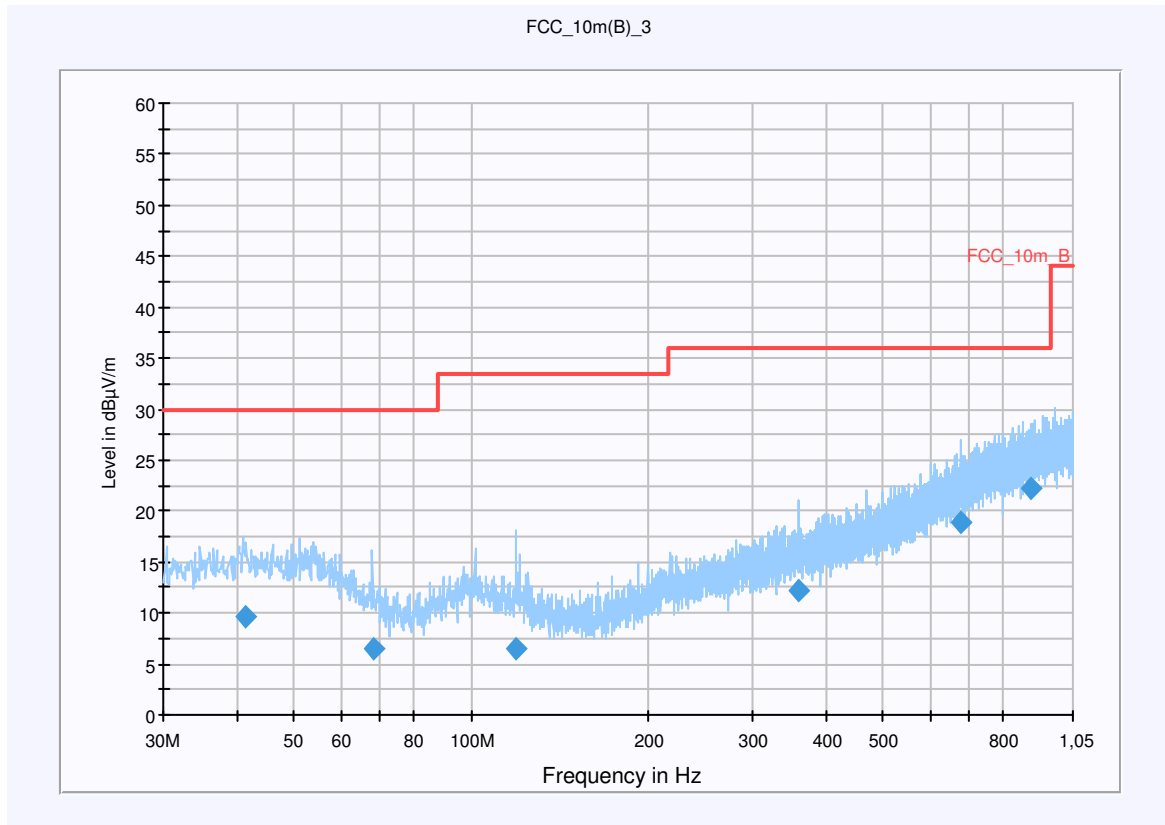
Common Information

EUT: Streamer 1.4
 Serial Number: 0346649
 Test Description: FCC
 Operating Conditions: BT testmode channel 78; /3,84MHz idle / charging
 Operator Name: Kraus
 Comment: Power 115V / 60Hz

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
41.295600	9.7	15000.000	120.000	220.0	H	236.0	13.4	20.3	30.0	
68.459550	6.5	15000.000	120.000	207.0	V	139.0	9.6	23.5	30.0	
119.236650	6.5	15000.000	120.000	220.0	V	236.0	10.3	27.0	33.5	
360.113700	12.2	15000.000	120.000	220.0	H	54.0	16.2	23.8	36.0	
676.033350	18.8	15000.000	120.000	220.0	H	40.0	21.8	17.2	36.0	
888.742950	22.1	15000.000	120.000	220.0	V	83.0	25.1	13.9	36.0	

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

Subrange 1

Frequency Range: 30 MHz - 2 GHz

Receiver: Receiver [ESCI 3]
@ GPIB0 (ADR 20), SN 100083/003, FW 4.32

Signal Path: without Notch
FW 1.0

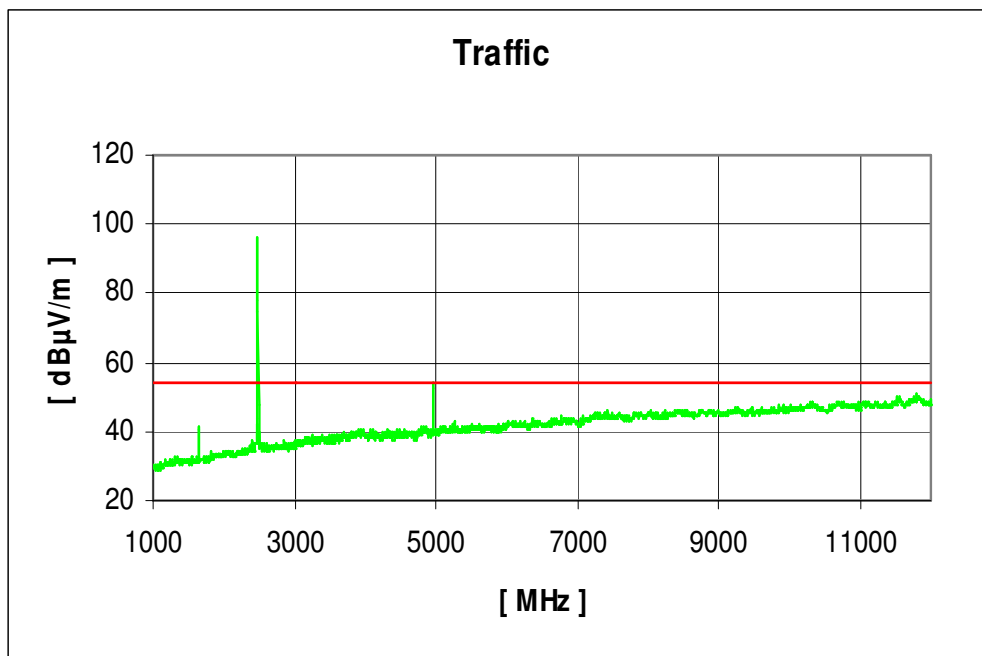
Antenna: VULB 9163
SN 9163-295, FW ---
Correction Table (vertical): VULP6113
Correction Table (horizontal): VULP6113
Correction Table: Cable_EN_1GHz (1005)

Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.12

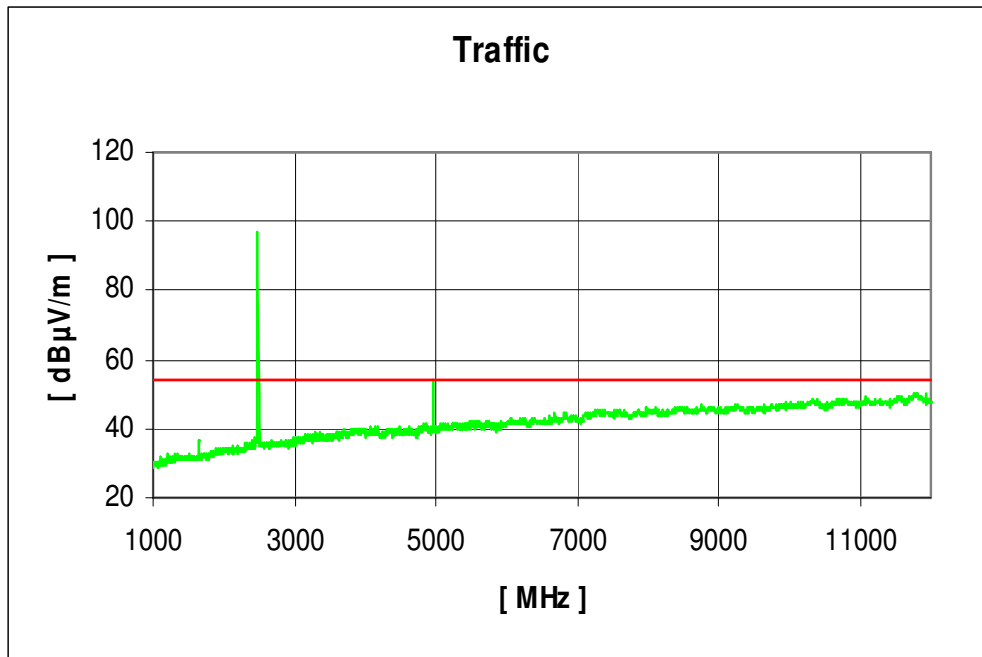
Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

Plot 9: 1 GHz to 12.75 GHz / channel 78 (vertical) Sample #0334391



Plot 10: 1 GHz to 12.75 GHz / channel 78 (horizontal) Sample #0334391



9.12 RX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in idle/receive mode. The EUT is detached so all oscillators 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 (dB μ V/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 [dB μ V/m]		
F [MHz]	Detector	Level [dB μ V/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)

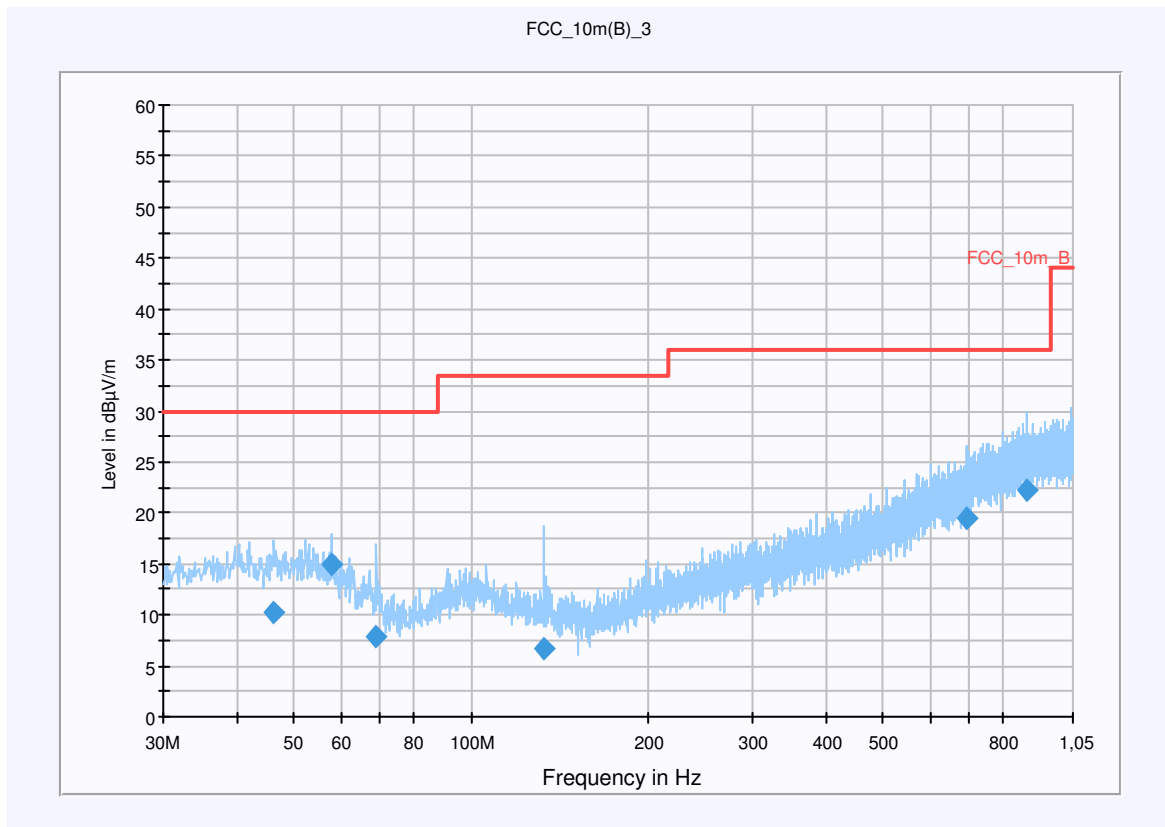
Common Information

EUT: Streamer 1.4
 Serial Number: 0346649
 Test Description: FCC
 Operating Conditions: BT testmode channel idle; /3,84MHz idle / charging
 Operator Name: Kraus
 Comment: Power 115V / 60Hz

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
45.979350	10.3	15000.000	120.000	98.0	V	155.0	13.3	19.7	30.0	
57.997200	14.9	15000.000	120.000	185.0	V	228.0	12.1	15.1	30.0	
68.873250	7.8	15000.000	120.000	220.0	V	173.0	9.5	22.2	30.0	
132.742800	6.6	15000.000	120.000	112.0	V	71.0	9.2	26.9	33.5	
694.519650	19.4	15000.000	120.000	143.0	H	220.0	22.4	16.6	36.0	
876.239400	22.2	15000.000	120.000	98.0	V	138.0	24.9	13.8	36.0	

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

Subrange 1

Frequency Range: 30 MHz - 2 GHz

Receiver: Receiver [ESCI 3]
@ GPIB0 (ADR 20), SN 100083/003, FW 4.32

Signal Path: without Notch
FW 1.0

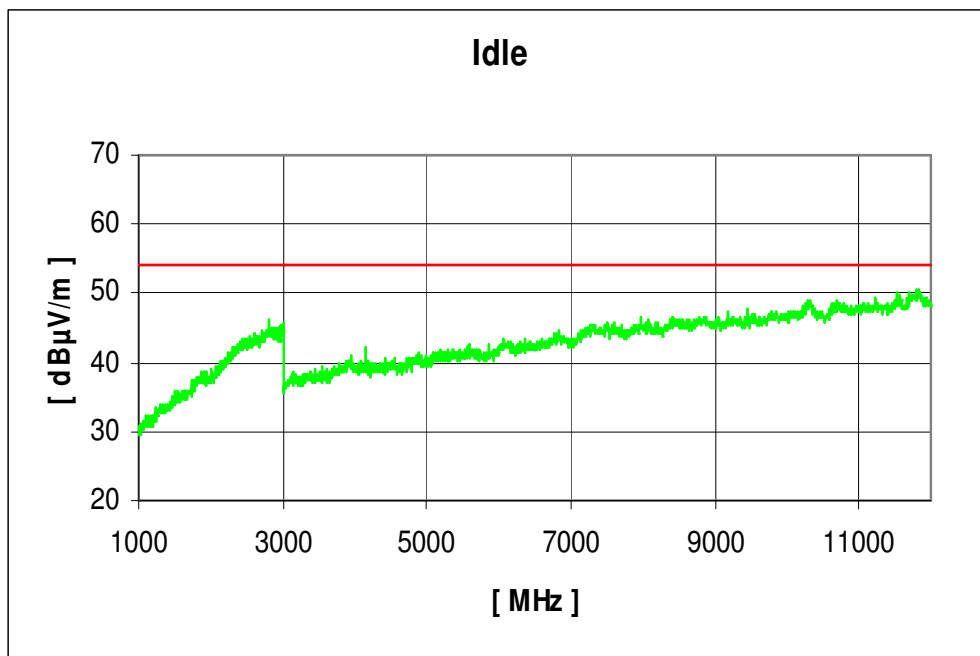
Antenna: VULB 9163
SN 9163-295, FW ---
Correction Table (vertical): VULP6113
Correction Table (horizontal): VULP6113
Correction Table: Cable_EN_1GHz (1005)

Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.12

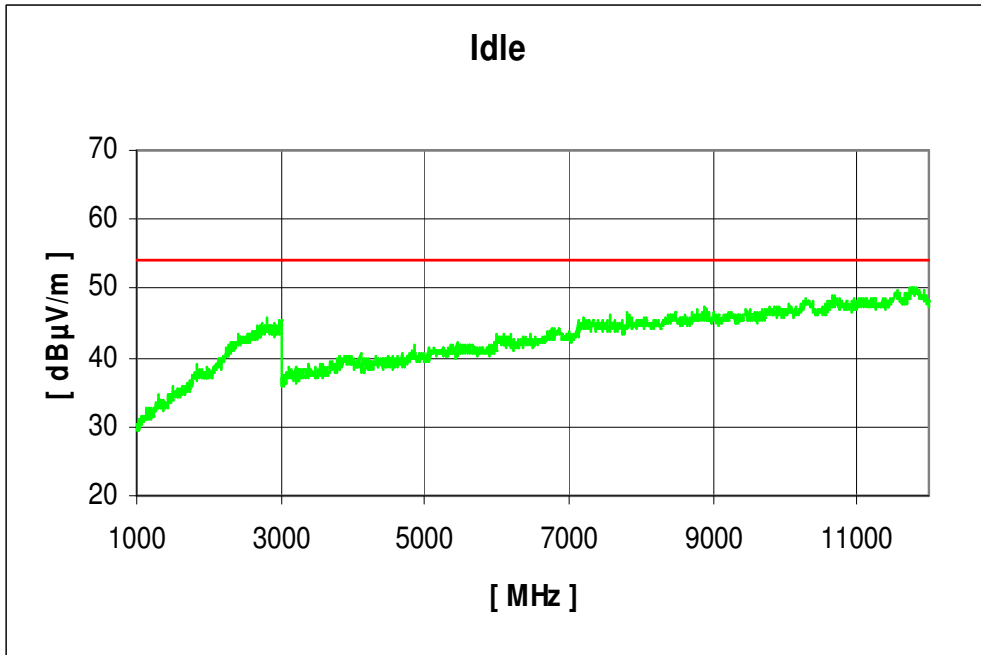
Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

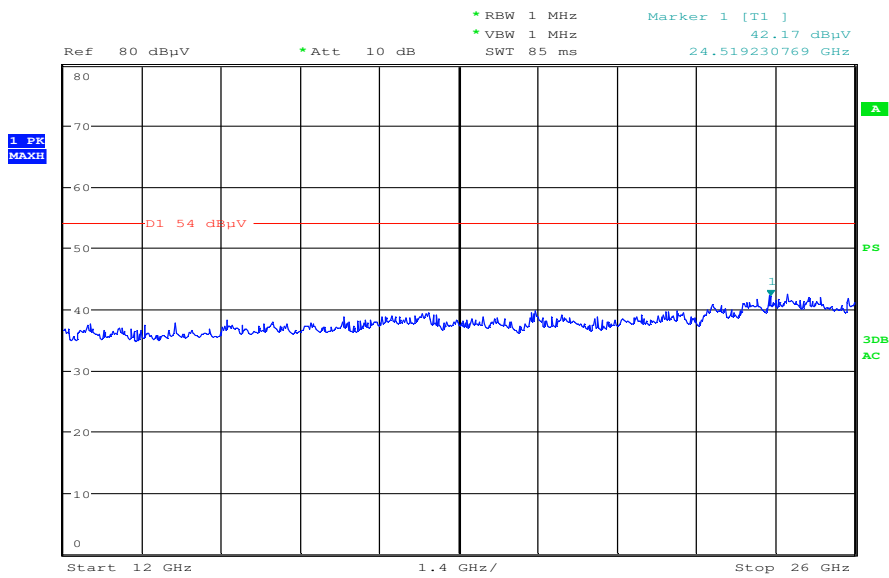
Plot 2: 1 GHz to 12.75 GHz / idle-mode (vertical) Sample #0334391



Plot 3: 1 GHz to 12.75 GHz / idle-mode (horizontal) Sample #0334391



Plot 4: 12 GHz to 25 GHz / idle-mode (horizontal/vertical) Sample #0334391



Date: 21.SEP.2010 10:10:45

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 8, 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	

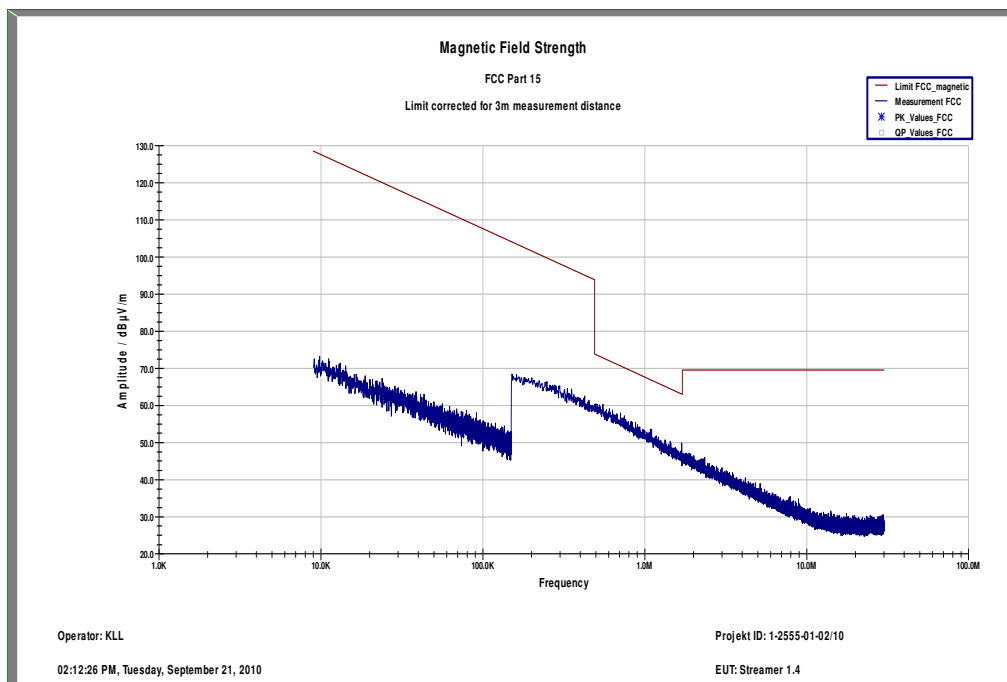
Result: Also see plot

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

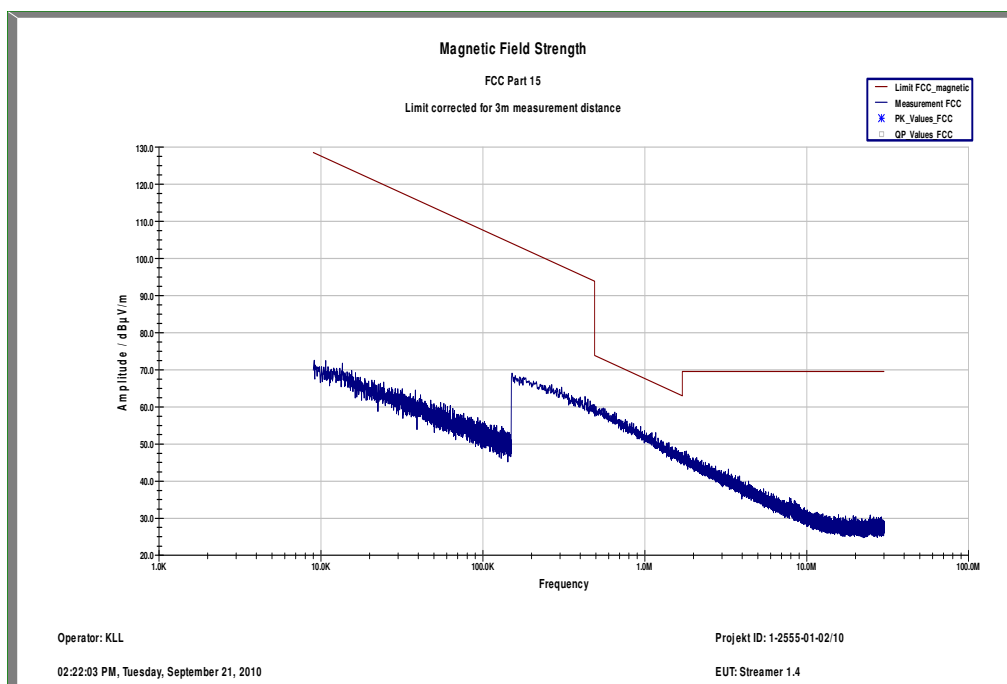
Sample #0334391

Result: The result of the measurement is passed.

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



Plot 2: 9 kHz to 30 MHz / idle



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

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

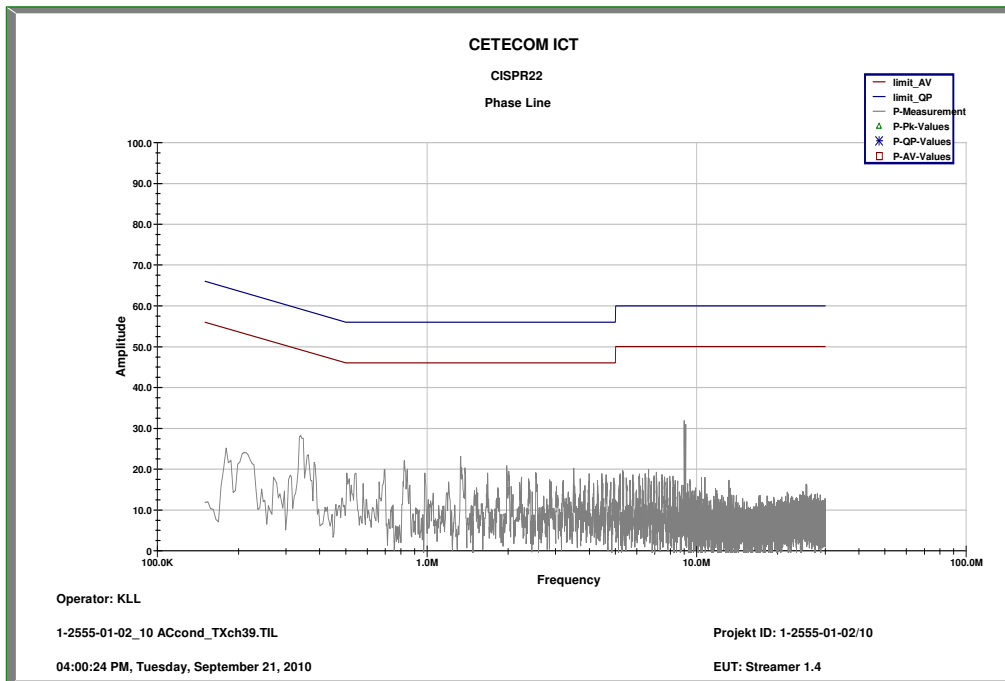
Result: Also see plots

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

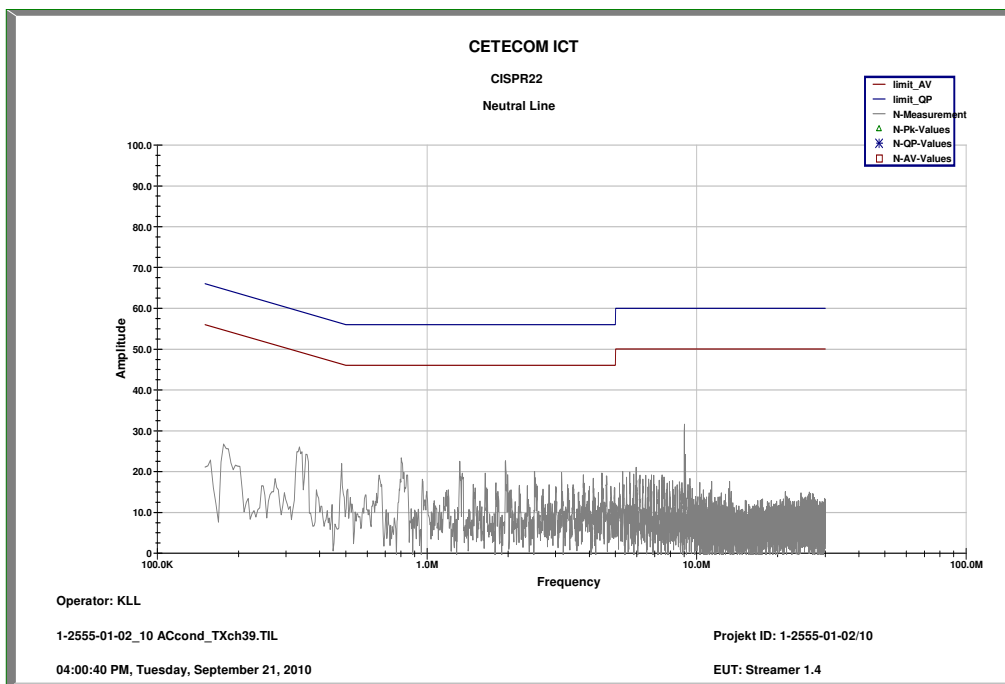
Sample #0334391

Result: The result of the measurement is passed.

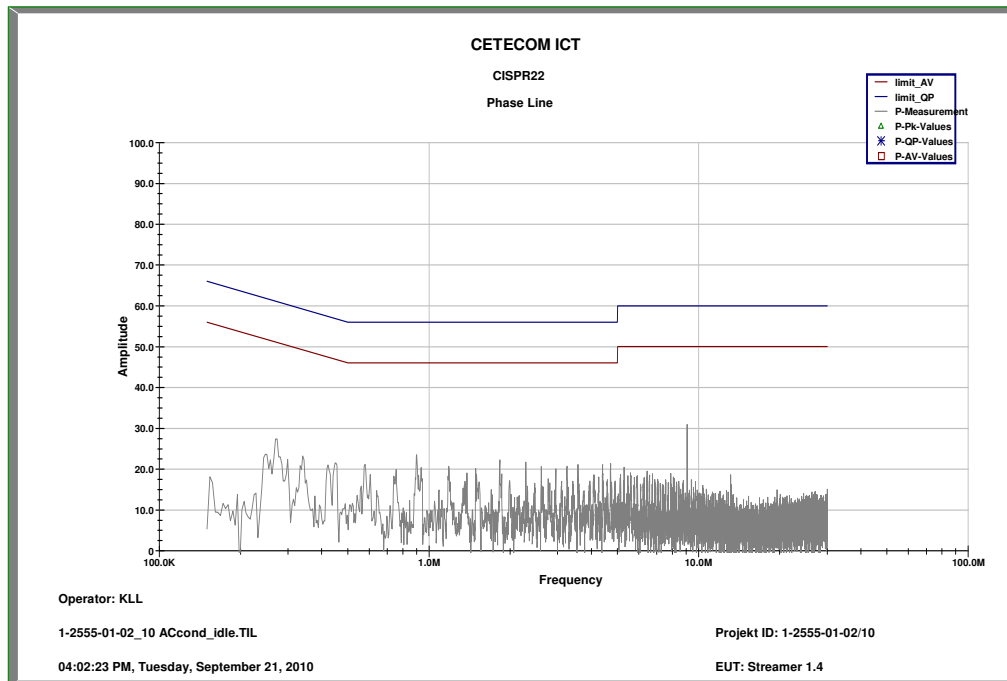
Plot 1: 9 kHz to 30 MHz, channel 39 / phase Line



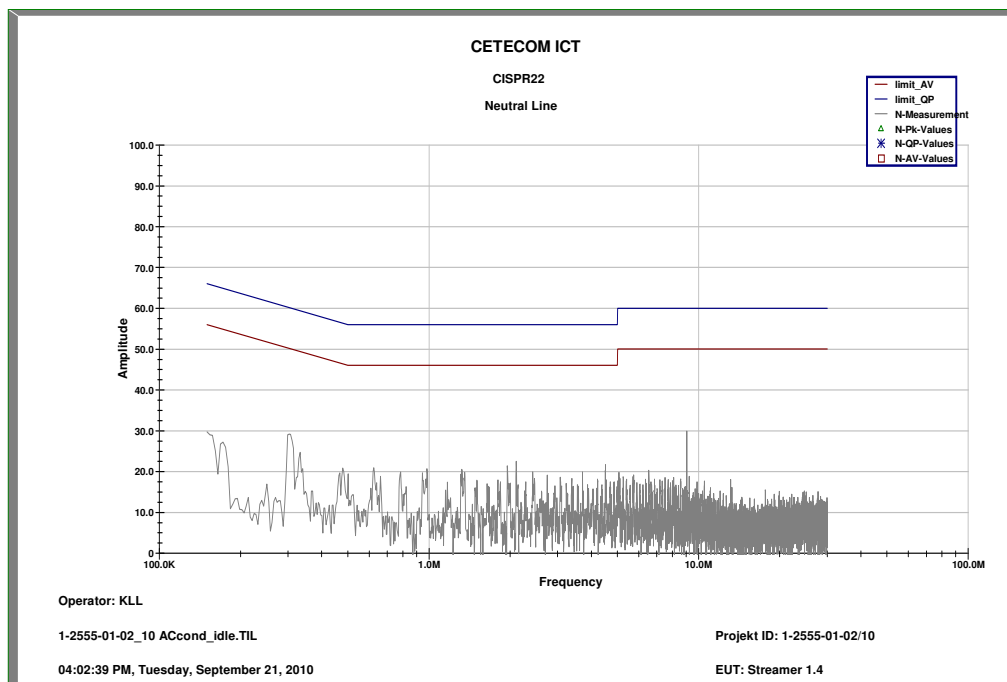
Plot 2: 9 kHz to 30 MHz, channel 39 / neutral Line



Plot 3: 9 kHz to 30 MHz, idle / phase Line (not mandatory)



Plot 4: 9 kHz to 30 MHz, idle / neutral Line (not mandatory)



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.	Switch / Control Unit	3488A	HP Meßtechnik		300001691	ne		
2	n. a.	Power Supply DC	NGPE 40/40	R&S	388	400000078	vKI!	27.08.2008	27.08.2010
3	n. a.	Power Sensor 50 Ohms, 10 MHz - 18 GHz, 1 nW - 20 mW	NRV-Z1	R&S	833894/011	300002681-0010	k	26.08.2008	26.08.2010
4	n. a.	Hygro-Thermometer	-/, 5-45 °C, 20-100%rF	Thies Clima	-/	400000080	k	04.05.2010	04.05.2011
5	n. a.	Vector Signal Generator, 300 kHz to 2.2 GHz	SMIQ03B	R&S	835541/055	300002681-0001	k	25.08.2008	25.08.2011
6	n. a.	Vector Signal Generator, 300 kHz to 2.2 GHz	SMIQ03B	R&S	835541/056	300002681-0002	k	26.08.2008	26.08.2011
7	n. a.	Signal Generator 0.01/2 - 20 GHz, Frequ. Resol. 0.1Hz	SMP02	R&S	835133/011	300002681-0003	k	26.08.2008	26.08.2011
8	n. a.	Dual Channel Power Meter	NRVD	R&S	835430/044	300002681-0004	k	26.08.2008	26.08.2010
9	n. a.	Switch / Control Unit	SSCU	R&S	338864/003	300002681-0006	ne		
10	n. a.	Precision Step Attenuator 50 Ohms, 0 - 2700MHz	RSP	R&S	834500/010	300002681-0007	NK!	26.08.2008	
11	n. a.	Frequency Standard (Rubidium Frequency Standard)	MFS (Rubidium)	R&S (Datum)	002	300002681-0009	Ve	27.08.2008	27.08.2010
12	n. a.	Power Sensor 50 Ohms, 10 MHz - 18 GHz, 1 nW - 20 mW	NRV-Z1	R&S	833894/012	300002681-0013	NK!	26.08.2008	
13	n. a.	Directional Coupler	101020010	Krytar	70215	300002840	ev		
14	n. a.	DC-Blocker	8143	Inmet Corp.	none	300002842	ne		
15	n. a.	Powersplitter	6005-3	Inmet Corp.		300002841	ev		
16	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	58566046820010	300003019	Ve	28.05.2009	28.05.2011
17	n. a.	CBT (Bluetooth Tester + EDR Signalling)	CBT 1153.9000K35	R&S	100185	300003416	vKI!		
18	n. a.	Spectrum Analyzer 9kHz to 30GHz -140..+30dBm	FSP30	R&S	100886	300003575	k		
19	n. a.	CBT-K57 Software-Option for CBT/CBT32	CBT-K57	R&S	101051	300003910	ne		
20	n. a.	Horn Antenne 1-26.5GHz	3115	EMCO	9005-3440	300002190			
21	n. a.	Netzgerät 0-20V	6632A	HP Meßtechnik	2851A01814	300000924	k		
22	n. a.	Horn Antenne 1-26.5GHz	3115	EMCO Elektronik	9709-5290	300000212			
23	n. a.	Universal Communication Tester	CMU200	R&S	106826	300003346	k	12.01.2010	12.01.2011
24	n. a.	Software Option für CMU 200	CMU-Kxx	R&S		300003345	k	12.01.2010	12.01.2011
25	n. a.	Ultra Stable Notch Filter	WRCD1887.82/1889.55-5EE	Wainwright	1	300000115	ev		
26	n. a.	Funkstörmessempfänger 20Hz- 26,5GHz	ESU26	R&S	100037	300003555	k	08.01.2010	08.01.2011
27	n. a.	HF-Schaltmatrixgrundgerät	TS-RSP 1144.1500K03	R&S	100300	300003556	ev		
28	n. a.	Spiral Antenne	3102L	EMCO	51924	300003385	ne		
29	n. a.	Spiral Antenne	3102L	EMCO	51918	300003384	k		
30	n. a.	Signalgenerator 1-20 GHz	SMR20	R&S	101697/020	300003593	k	08.01.2010	08.01.2012
31	n. a.	Turnable Band Reject	WRCT1850/2170-5/40-	Wainwright	7	300003386	ev		

			10EEK						
32	n. a.	Software Option für CMU 200	CMU-K62	R&S	103288	300003600	k	12.01.2010	12.01.2011
33	n. a.	Software Option für CMU 200	CMU-K61	R&S	103354	300003612	k	12.01.2010	12.01.2011
34	n. a.	Software Option für CMU 200	CMU-K64	R&S	102017	300003613	k	12.01.2010	12.01.2011
35	n. a.	Software Option für CMU 200	CMU-K56	R&S	100251	300003614	k	12.01.2010	12.01.2011
36	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	318	300003696	k		
37	n. a.	Tunable Band Reject	WRCT1850/2170-5/40-10EEK	Wainwright	40	300003872	ev		
38	n. a.	Tunable Band Reject	WRCT824/894-5/40-8EEK	Wainwright	27	300003873	ev		
39	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	08.01.2009	08.01.2012
40	n. a.	PowerAttenuator	8325	Byrd	1530	300001595			
41	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	05.03.2009	05.03.2011
42	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
43	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996		23.03.2009	
44	Spec.A. 2 2e	System rack for EMI measurement solution	85900	HP I.V.	*	300000222	ne		
45	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2010	06.01.2012
46	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
47	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
48	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
49	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
50	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
51	n. a.	Band Reject filter	WRCG1855/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
52	n. a.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
53	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
54	n. a.	Highpass Filter	WHKX2.9/18G-12SS	Wainwright	1	300003492	ev		
55	n. a.	Highpass Filter	WHK1.1/15G-10SS	Wainwright	3	300003255	ev		
56	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
57	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Technologies	MY48250080	300003812	k		
58	n. a.	MXG Microwave Analog Signal Generator	N5183A	Agilent Technologies	MY47420220	300003813	k		
59	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Technologies	MY48260003	300003825	vIKI!		
60	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vIKI!	17.12.2008	17.12.2010
61	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
62	n. a.	Spectrum Analyzer 20 Hz - 50 GHz	FSU50	R&S	200012	300003443	ve	01.07.2010	01.07.2012
63	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		
64	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	k	06.01.2009	06.01.2011
65	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081;B5979	300000210	ne		
66	n. a.	EMI Test Receiver	ESCI 1166.5950.03	R&S	100083	300003312	k	08.01.2010	08.01.2012
67	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	01.06.2009	01.06.2011
68	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
69	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
70	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
71	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
72	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	01.04.2010	01.04.2012
73	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	08.01.2010	08.01.2012

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
vlk!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

Annex A Document history

Version	Applied changes	Date of release
1.0	Initial release	2010-12-21
-A	IC standard up-date; pictures removed	2011-01-27

Annex B Further information**Glossary**

DUT	-	Device under Test
EMC	-	Electromagnetic Compatibility
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	not applicable
S/N	-	Serial Number
SW	-	Software