



Accredited testing-laboratory

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

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

Recognized by the Federal Communications Commission

Anechoic chamber registration no.: 90462 (FCC)

Anechoic chamber registration no.: 3462C-1 (IC)

Certification ID: DE 0001

Accreditation ID: DE 0002

Accredited Bluetooth® Test Facility (BQTF)

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Test report no. : 1-1531-01-05/09
Type identification : TEK Connect / ConnexxLink
Applicant : SIEMENS Audiologische Technik GmbH
FCC ID : SGI-WL201AP
IC Certification No : 267AB-WL200AP
Test standards : 47 CFR Part 15
RSS - 210 Issue 7

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1 General information

1.1 Notes

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

Test laboratory manager:

2010-06-15	Jakob Reschke	
Date	Name	Signature

Technical responsibility for area of testing:

2010-06-15	Joerg Warken	
Date	Name	Signature

1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10

66117 Saarbrücken

Germany

Phone: + 49 681 5 98 - 0

Fax: + 49 681 5 98 - 9075

e-mail: info@ICT.cetecom.de

Internet: http://www.cetecom-ict.de

State of accreditation:

The test laboratory (area of testing) is accredited according to

DIN EN ISO/IEC 17025

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

Accredited by:

Federal Motor Transport Authority (KBA)

DAR registration number: KBA-P 00070-97

Testing location, if different from CETECOM ICT Services GmbH:

Name :
Street :
Town :
Country :
Phone :
Fax :

1.3 Details of applicant

Name:	SIEMENS Audiologische Technik GmbH H WS AU QM 4
Street:	Gebbertstrasse 125
Town:	91058 Erlangen
Country:	GERMANY
Fax:	+49 9131 308-3207
Contact:	Clemens Meythaler
E-mail:	clemens.meythaler@siemens.com
Telephone:	+49 9131 308-3000

1.4 Application details

Date of receipt of order:	2010-02-05
Date of receipt of test item:	2010-05-19
Date of start test:	2010-05-19
Date of end test:	2010-06-15
Persons(s) who have been present during the test:	-/-

2 Test standard/s

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

3 Technical tests

3.1 Details of manufacturer

Name:	SIEMENS Audiologische Technik GmbH
	H WS AU QM 4
Street:	Gebbertstrasse 125
Town:	91058 Erlangen
Country:	GERMANY

3.1.1 Test item

Kind of test item	:	TEK Connect / ConnexxLink
Type identification	:	TEK Connect / ConnexxLink
S/N serial number	:	Rad. not labeled (see photos) Cond. RW81082
HW hardware status	:	0033 245 00039
SW software status	:	V2.1
Frequency Band [MHz]	:	ISM band 2.400 - 2.483,5
Type of Modulation	:	FHSS - QPSK
Number of channels	:	79
Antenna	:	Surface mounted internal antenna! For more information, please take a look at the sub-clause 7 → photos of the EUT
Power Supply	:	4.0 DC by battery
Temperature Range	:	-20 °C to 55 °C

Max. power radiated: 0.28 dBm EIRP

Max. power conducted: 3.17 dBm

3.1.2 Additional EUT information For IC Canada (appendix 2)

IC Registration Number:	267AB-WL200AP
Model Name:	TEK Connect / ConnexxLink
Manufacturer (complete Address):	SIEMENS Audiologische Technik GmbH Gebbertstrasse 125 91058 Erlangen GERMANY
Tested to Radio Standards Specification (RSS) No.:	RSS-210 Issue 7
Open Area Test Site Industry Canada Number:	IC 3462C-1
Frequency Range (or fixed frequency) [MHz]:	ISM band 2400 – 2483.5 MHz
RF: Power [W] (max):	Rad. EIRP: 1.07m Conducted : 2.07m
Antenna Type:	Surface mounted internal antenna! For more information, please take a look at the sub-clause 7 → photos of the EUT
Occupied Bandwidth (99% BW) [kHz]:	794
Type of Modulation:	GFSK
Emission Designator (TRC-43):	794KFXD
Transmitter Spurious (worst case) [μ V/m in 3m]:	371 @ 9606 MHz (Avg)
Receiver Spurious (worst case) [μ V/m in 3m]:	355 @ 11969 MHz (Pk)

ATTESTATION:

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

Signature:

Test engineer: Jörg Warken

Date: 2010-06-24

3.1.3 EUT operating modes

EUT operating mode no. *)	Description of operating modes	Additional information
Op. 0	normal mode	normal temperature and power source conditions
Op. 1		low temperature, low power source conditions
Op. 2		low temperature, high power source conditions
Op. 3		high temperature, low power source conditions
Op. 4		high temperature, high power source conditions

*) EUT operating mode no. is used to simplify the test plan

3.1.4 Extreme conditions testing values

Description	Shortcut	Unit	Value
Nominal Temperature	T _{nom}	°C	20
Nominal Humidity	H _{nom}	%	-20
Nominal Power Source	V _{nom}	V	55

Type of power source: DC by battery

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

No deviations from the technical specifications were ascertained

There were deviations from the technical specifications ascertained

TC identifier	Description	verdict	date	Remark
RF-Testing	FCC Part 15 §15.247 - CANADA RSS-210	PASS	2010-06-24	-/-

Test Specification Clause	Test Case	Modulation	Pass	Fail	N/A	Not performed
None	Antenna Gain	GFSK	Yes			
§15.247(a1)	Carrier frequency separation	GFSK	Yes			
§15.247(a1)	Number of hopping channels	GFSK	Yes			
§15.247(a)(1)(iii)	Time of occupancy (dwell time)	--	Yes			
§15.247(e)	Power Spectral density (Hybrid system in Inquiry mode/Page scan)	--			Yes	
§15.247(a)(1)	Spectrum Bandwidth of a FHSS System / 20dB Bandwith	GFSK Pi/4 DQPSK 8 DPSK	Yes -- --		-- NA NA	
§ 15.247 (b)(1)	Maximum output power (conducted)	GFSK Pi/4 DQPSK 8 DPSK	Yes -- --		-- NA NA	
§ 15.247 (b)(1)	Max. peak output power (radiated)	GFSK	Yes			
§ 15.247 (d)	Band-edge compliance of conducted emissions	GFSK	Yes			
§ 15.205	Band-edge compliance of radiated emissions	GFSK	Yes			
§ 15.247 (d)	Spurious Emission - conducted (Transmitter)	GFSK	Yes			
§ 15.247 (d)	Spurious Emission - radiated (Transmitter) >30 MHz	GFSK	Yes			
§ 15.109	Spurious Emissions - radiated (Receiver)	GFSK	Yes			
§ 15.209	Spurious Emissions - radiated (Transmitter) <30 MHz	GFSK	Yes			
§ 15.107/207	Conducted Emissions <30 MHz	GFSK	Yes			

5 RF measurement testing

5.1 Description of test set-up

5.1.1 Radiated measurements

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 25 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are confirmed with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2003 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63-4-2003 clause 4.2. Antennas are confirmed with ANSI C63.2-1996 item 15.

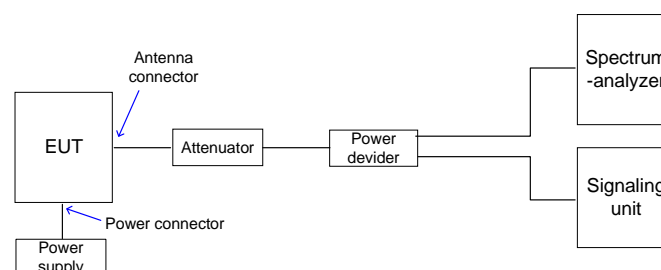
- 9 kHz - 150 kHz: Quasi Peak measurement, 200 Hz Bandwidth, active loop antenna.
- 150 kHz - 30 MHz: Quasi Peak measurement, 9 kHz Bandwidth, active loop antenna.
- 30 MHz - 1GHz: Quasi Peak measurement, 120 kHz Bandwidth, Trilog antenna
- >1GHz: Average, RBW 1MHz, VBW 10 Hz, waveguide horn

All measurements are done in accordance with the Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems DA 00-705 and Appendix A “BLUETOOTH APPROVALS”

The EUT is powered by an external power supply with nominal voltage. The signalling is performed from outside the chamber with a signalling unit (CMU200 or other) by air link using signalling antenna.

5.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch). One of the signal paths is connected to the communication base Station (CMU200 or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm.



5.2 Referenced documents

None

5.3 Additional comments

None

5.4 Antenna gain

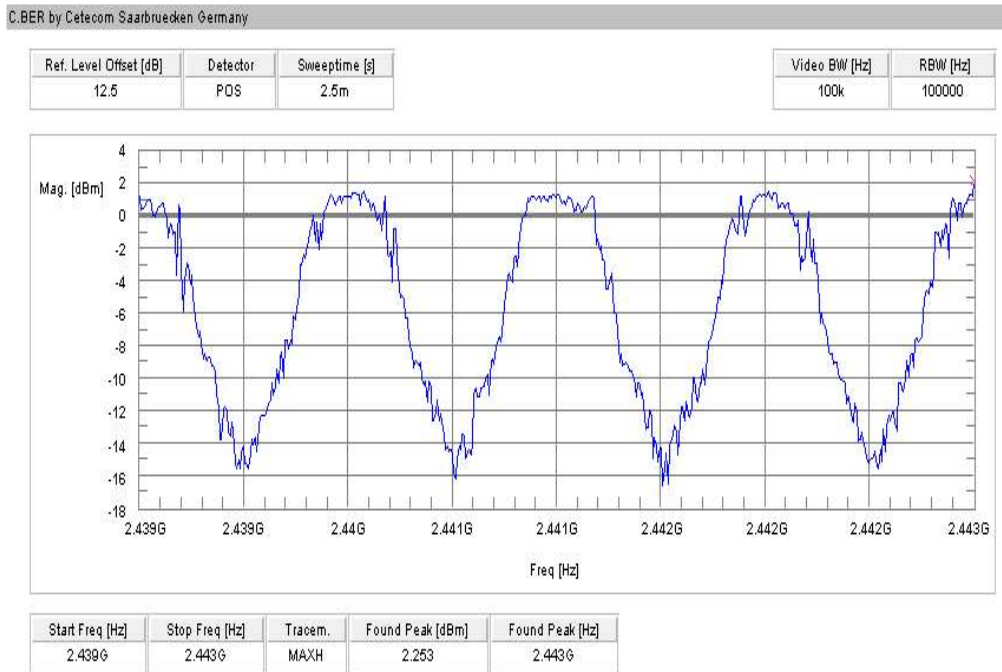
The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

	low channel 2402 MHz	mid channel 2441 MHz	high channel 2480 MHz
Conducted power [dBm] Measured, GFSK modulation	2.13	3.17	2.96
Radiated power [dBm] Measured, GFSK modulation	0.28	-0.35	-0.14
Gain [dBi] Calculated	-1.9	-3.52	-3.1

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

Modulation: GFSK

Plot 1 of 1:



Result: Channel separation is: ~ 1 MHz

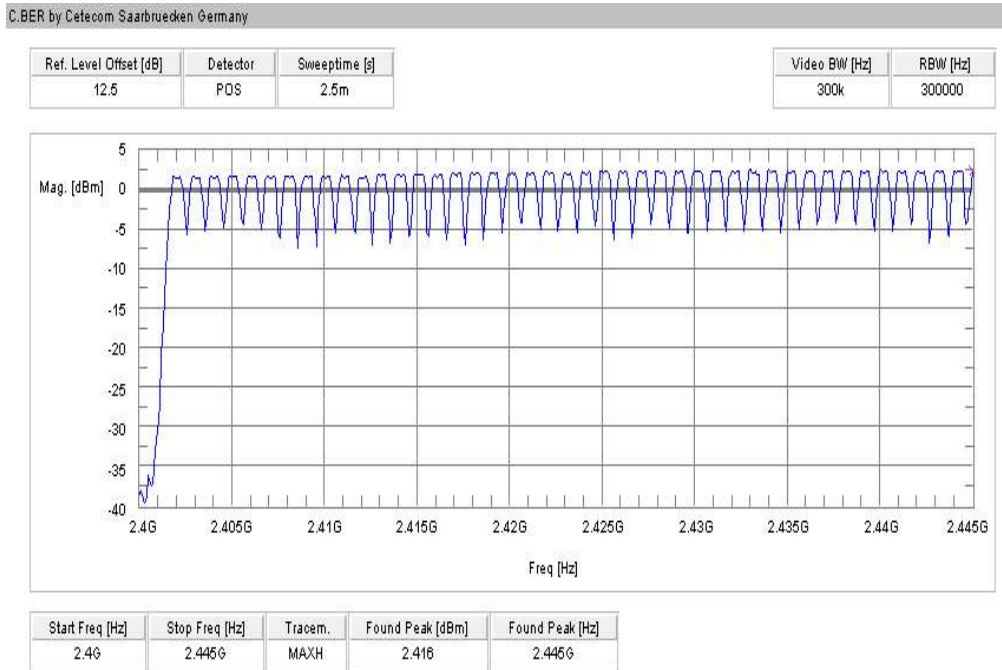
Limits:

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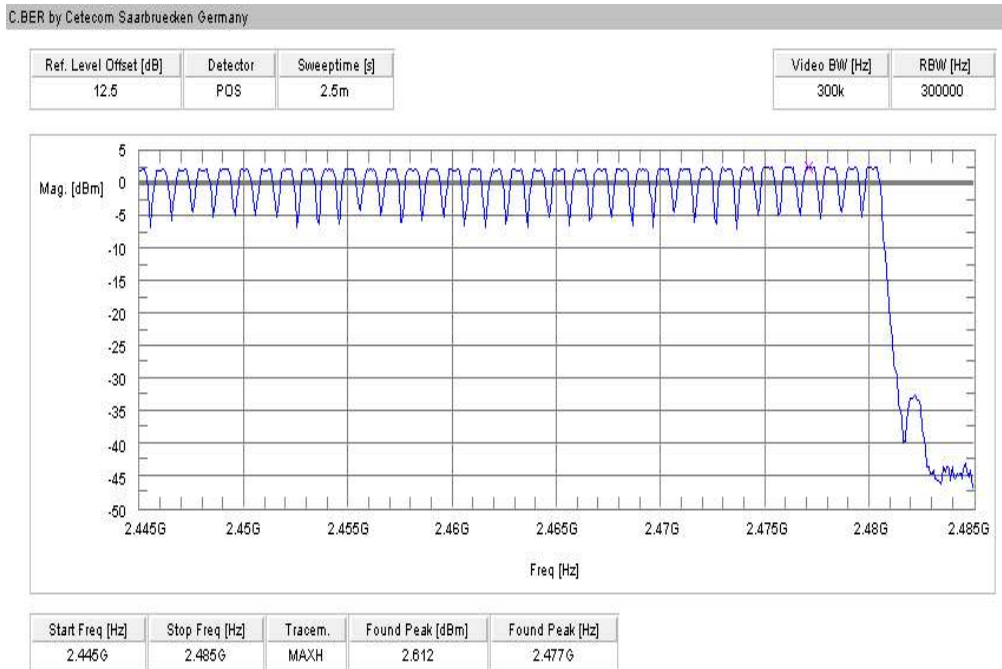
5.6 Number of hopping channels §15.247(a)(1)

Modulation: GFSK

Plot 1 of 2:



Plot 2 of 2:



Result: The number of hopping channels is: 79

Limits:

Under normal test conditions only	at least 15 non-overlapping channels
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5.7 Time of occupancy (dwell time) §15.247(a)(1)(iii)

For Bluetooth devices:

The dwell time of 0.4 s within a 31.6 second period in data mode is independent from the packet type (packet length). The calculation for a 31.6 second period is as follows:

Dwell time = time slot length * hop rate / number of hopping channels * 31.6 s

Example for a DH1 packet (with a maximum length of one time slot)

Dwell time = $625 \mu\text{s} * 1600 \text{ 1/s} / 79 * 31.6 \text{ s} = 0.4 \text{ s}$ (in a 31.6 s period)

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

Example for a DH5 packet (with a maximum length of five time slots)

Dwell time = $5 * 625 \mu\text{s} * 1600 * 1/5 * 1/s / 79 * 31.6 \text{ s} = 0.4 \text{ s}$ (in a 31.6 s period)

This is according to the Bluetooth Core Specification V 1.1 & V 1.2 & V2.0 (+ critical errata) for all Bluetooth devices. Therefore, all Bluetooth devices comply with the FCC dwell time requirement in the data mode.

This was checked during the Bluetooth Qualification tests.

The Dwell time in hybrid mode is approximately 2.6 ms (in a 12.8s period)

**5.8 Power Spectral density (Hybrid system in Inquiry mode/Page scan)
§15.247(e)**

Plot 1 of 1:

Not applicable

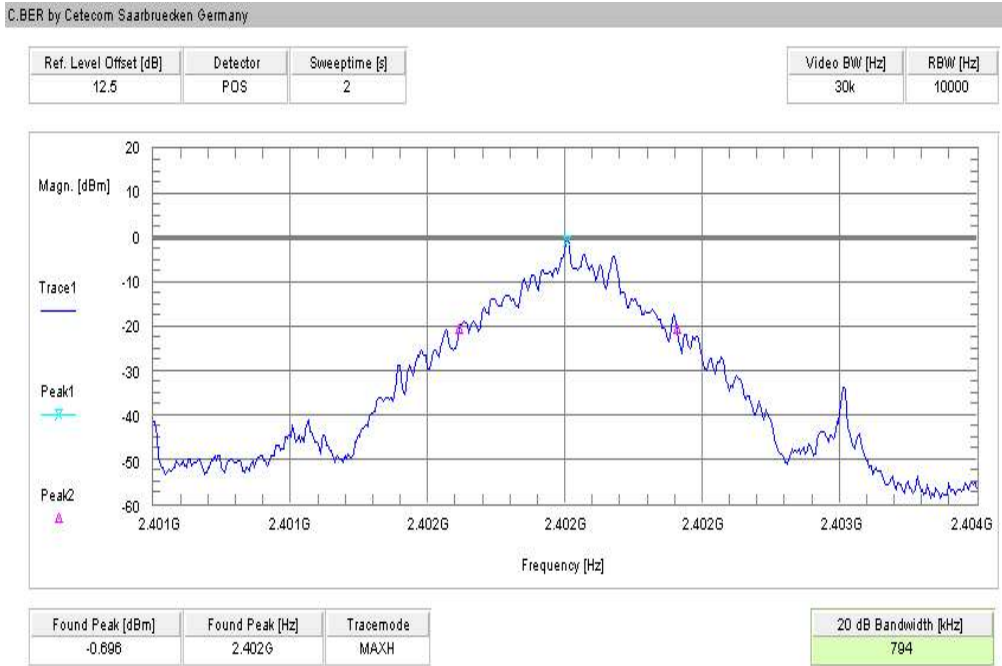
Result: Power density: - dBm/Hz = - dBm / 3 kHz
Correction factor from dBm/Hz to dBm / 3 kHz is +34,8 dB

Limits:

Under normal test conditions only	For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission
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5.9 Spectrum Bandwidth of a FHSS System / 20dB Bandwidth §15.247(a)(1)

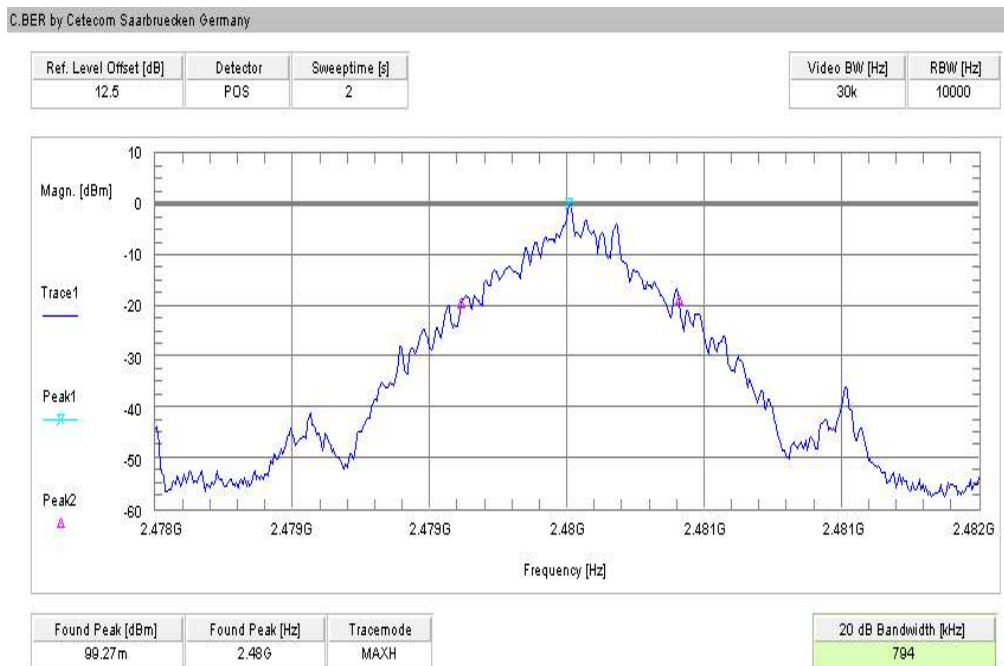
Plot 1: GFSK



Plot 2: GFSK



Plot 3: GFSK



Results:

Modulation	20 dB BANDWIDTH [kHz]		
	2402	2441	2480
Frequency [MHz]			
<i>GFSK</i>	794	788	794
<i>Pi/4 DQPSK</i>	NA	NA	NA
<i>8DPSK</i>	NA	NA	NA
Measurement uncertainty	±1kHz		

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

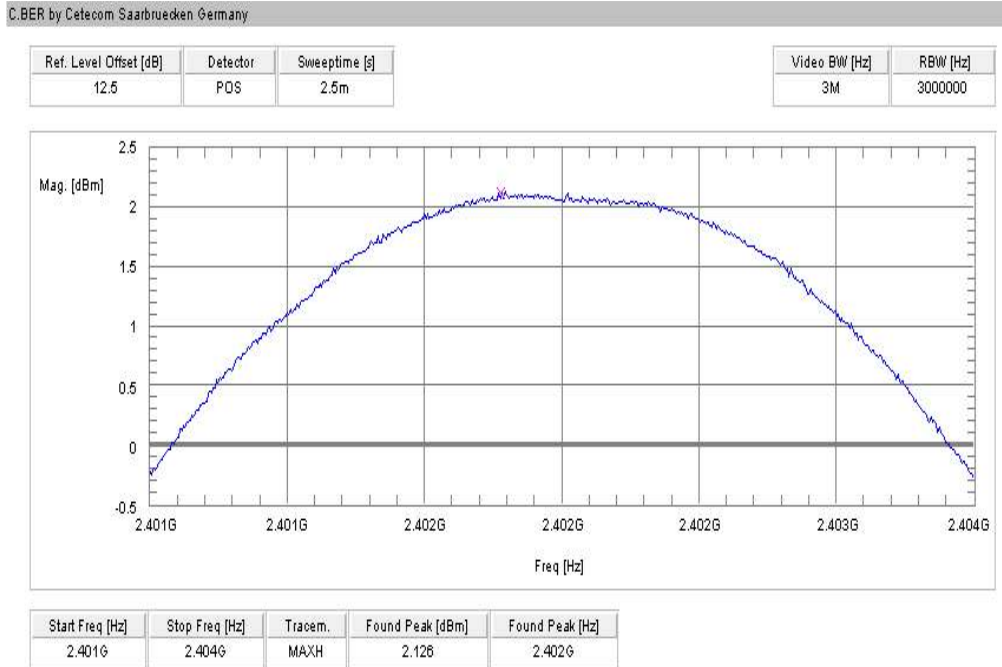
RBW: 10 kHz / VBW 10 kHz

Limits:

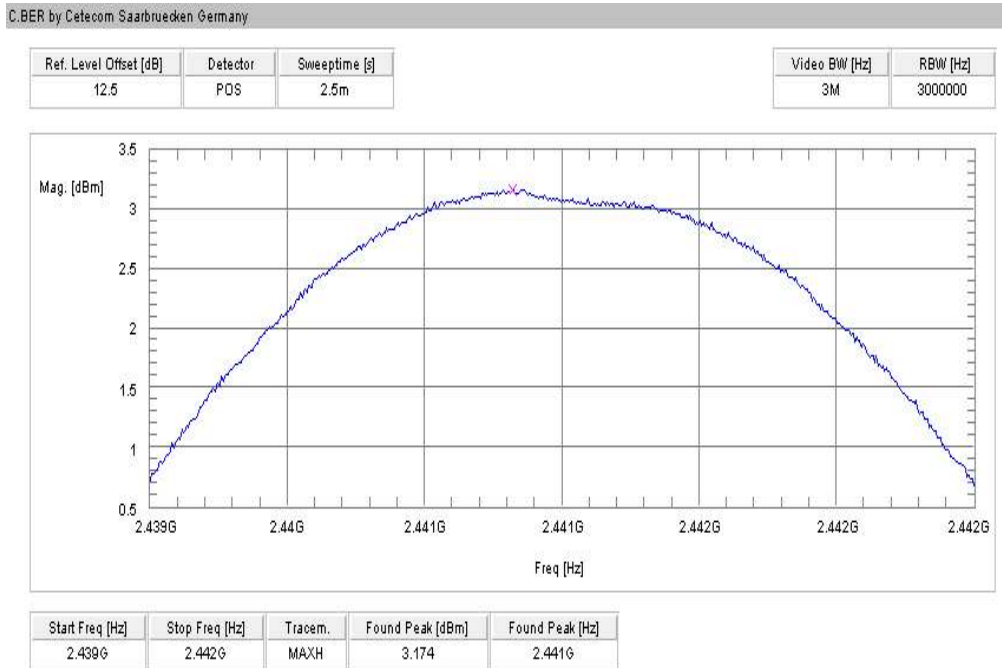
Under normal test conditions only	<p>GFSK < 1000 kHz</p> <p>Pi/4 DQPSK < 1500</p> <p>8DPSK < 1500</p>
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5.10 Maximum output power (conducted) § 15.247 (b)(1)

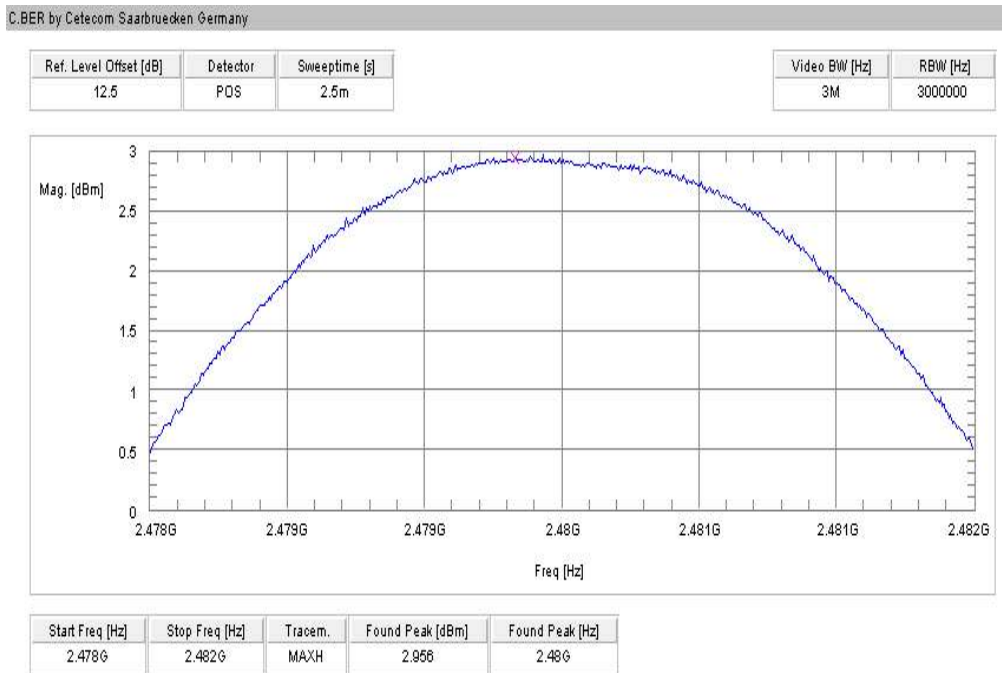
Plot 1: GFSK



Plot 2: GFSK



Plot 3: GFSK



Results:

Modulation	Max. peak output power [dBm]		
	2402	2441	2480
Frequency [MHz]			
<i>GFSK</i>	2.13	3.17	2.96
<i>Pi/4 DQPSK</i>	NA	NA	NA
<i>8DPSK</i>	NA	NA	NA
Measurement uncertainty	±2dB		

RBW / VBW: 3 MHz

Limits:

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

5.11 Max. peak output power (radiated) § 15.247 (b)(1)

Modulation: GFSK

Results:

Test conditions		Max. peak output power EIRP [dBm]		
Frequency [MHz]		2402	2442	2480
T _{nom}	V _{nom}	0.28	-0.35	-0.14
Measurement uncertainty		±3dB		

RBW / VBW: 3 MHz

Measured at a distance of 3m

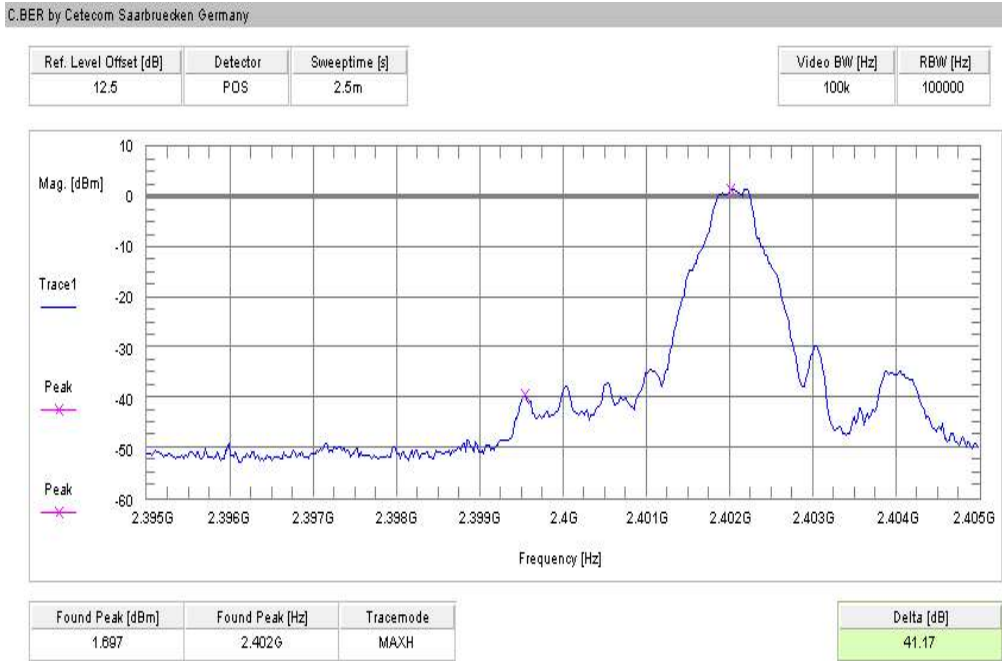
Limits:

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

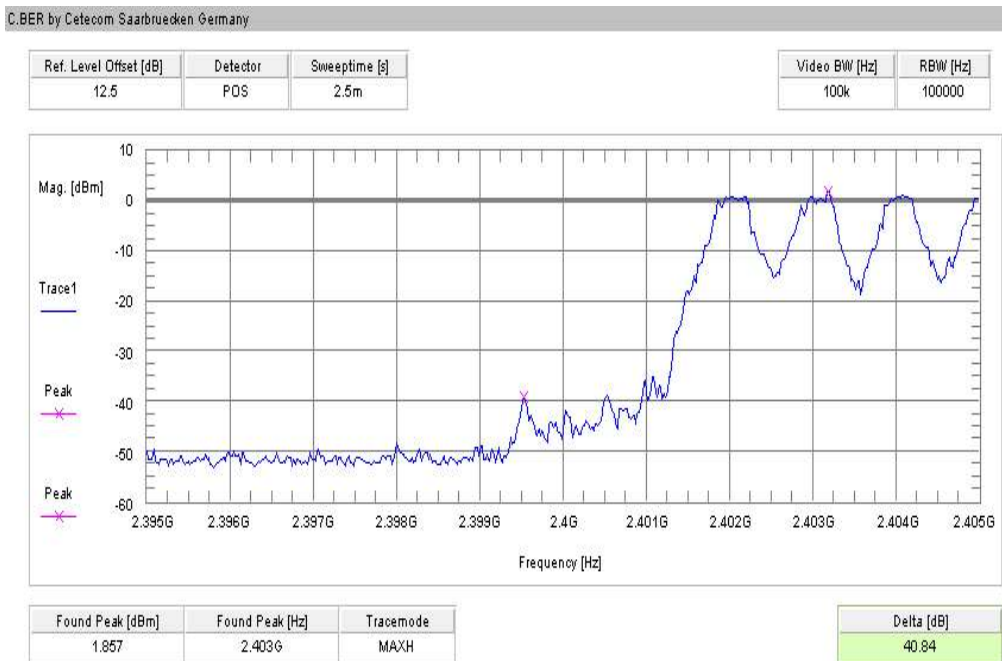
5.12 Band-edge compliance of conducted emissions §15.247 (d)

Modulation: GFSK

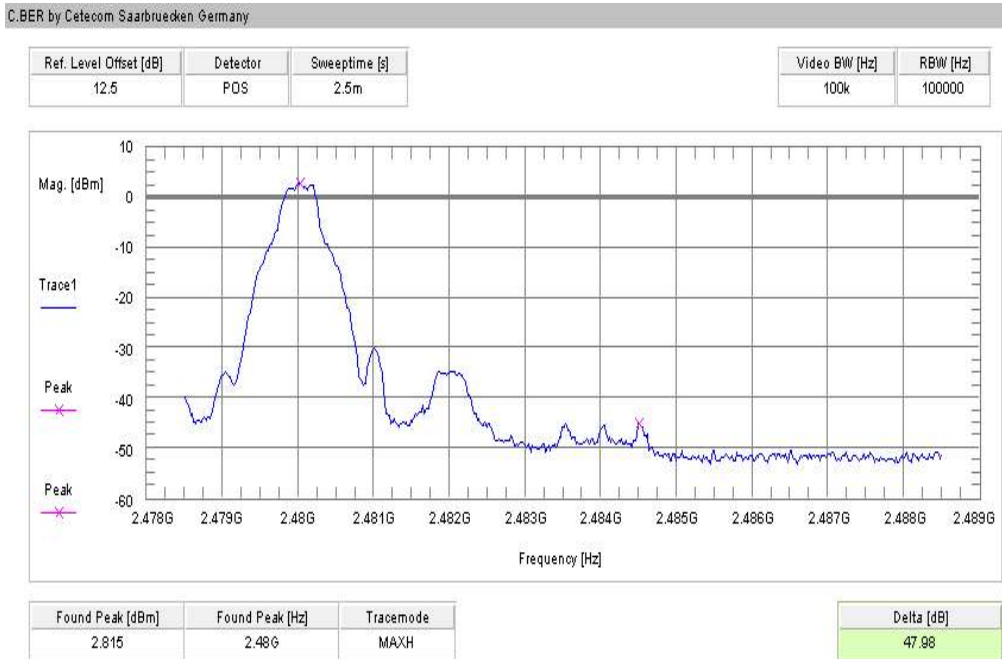
Plot 1 of 4 (hopping off, lowest frequency):



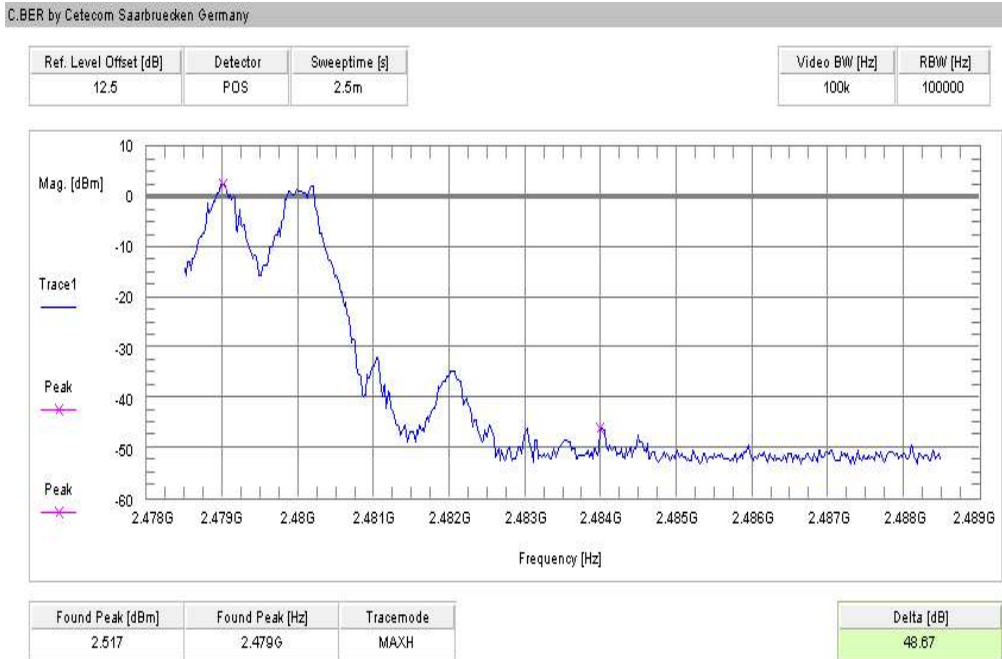
Plot 2 of 4 (hopping on, lowest frequency):



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



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



Results:

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

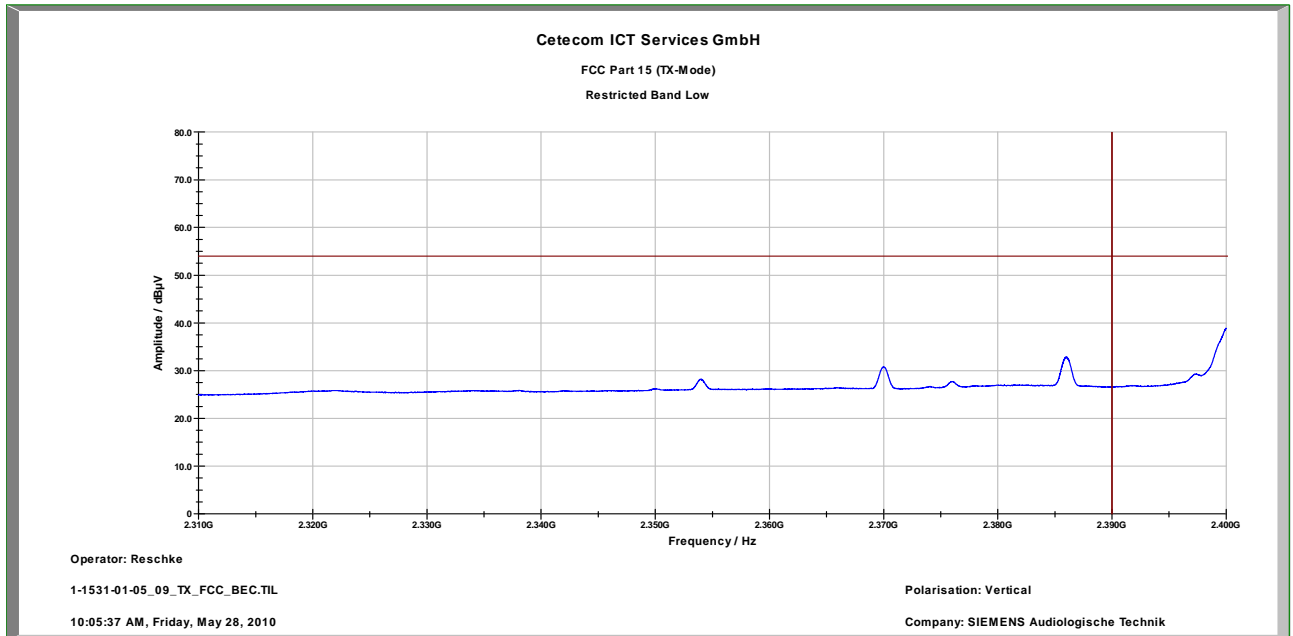
Limits:

Under normal test conditions only	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).
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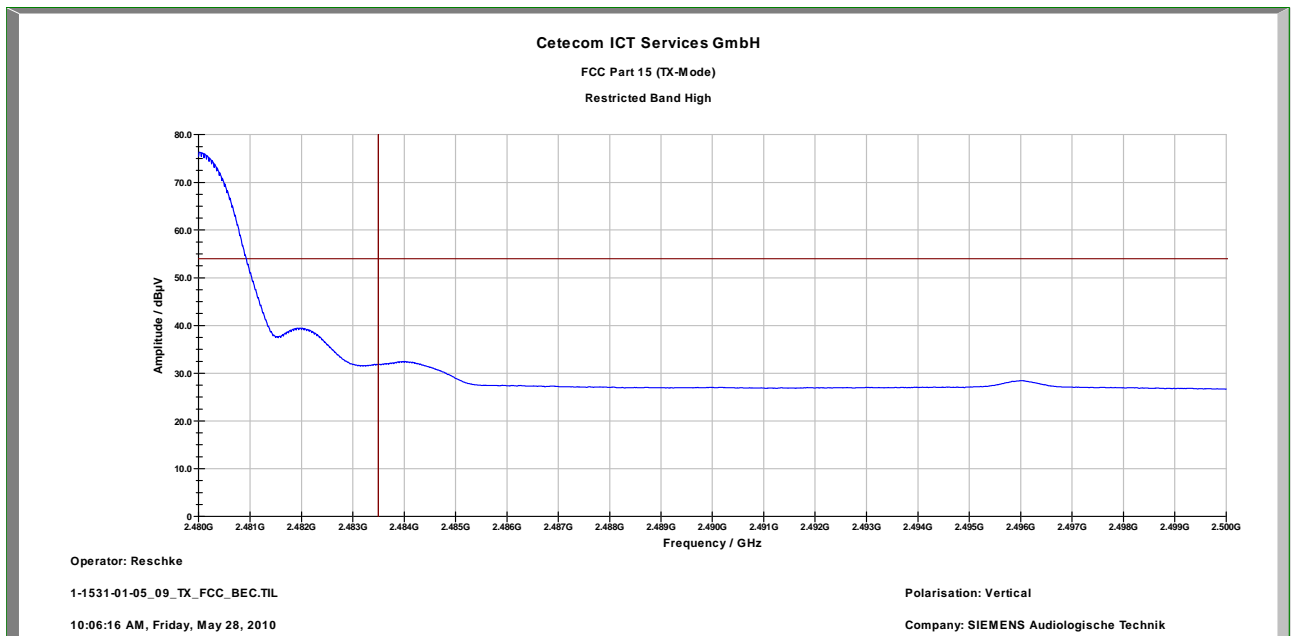
5.13 Band-edge compliance of radiated emissions §15.205

Modulation: GFSK

Plot 1 o 2: Lower restricted Band



Plot 2 o 2: Upper restricted Band

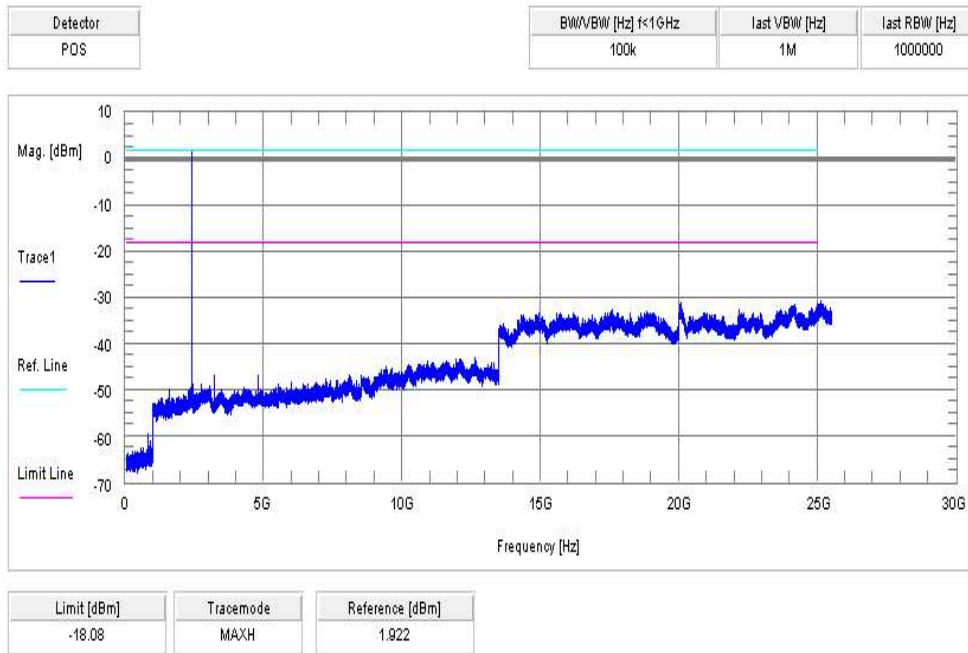


Result & Limits:
passed, see plots

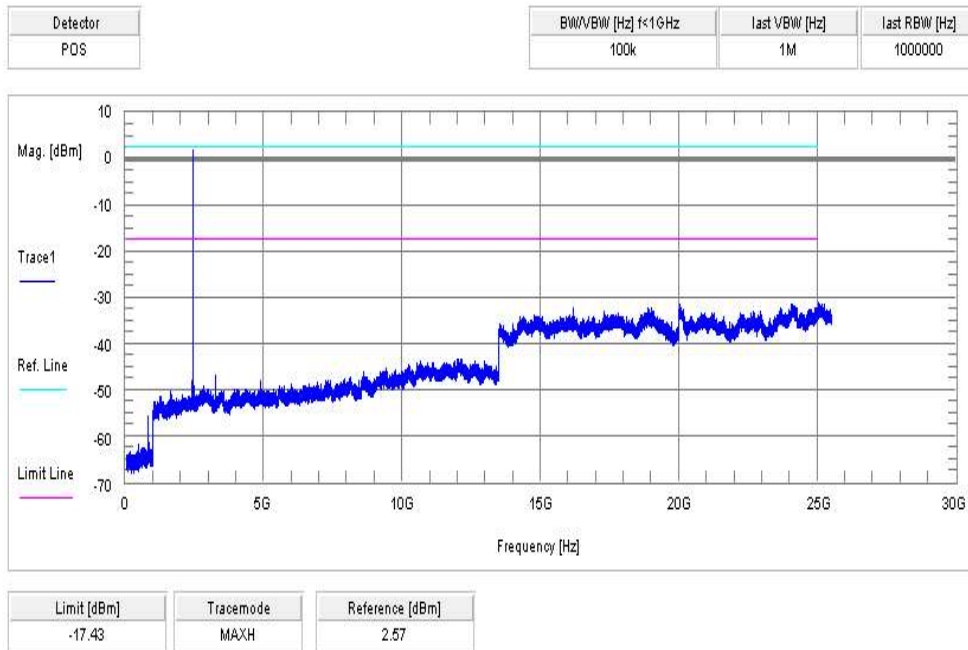
5.14 Spurious Emissions - conducted (Transmitter) § 15.247 (c)(1)

Modulation: GFSK

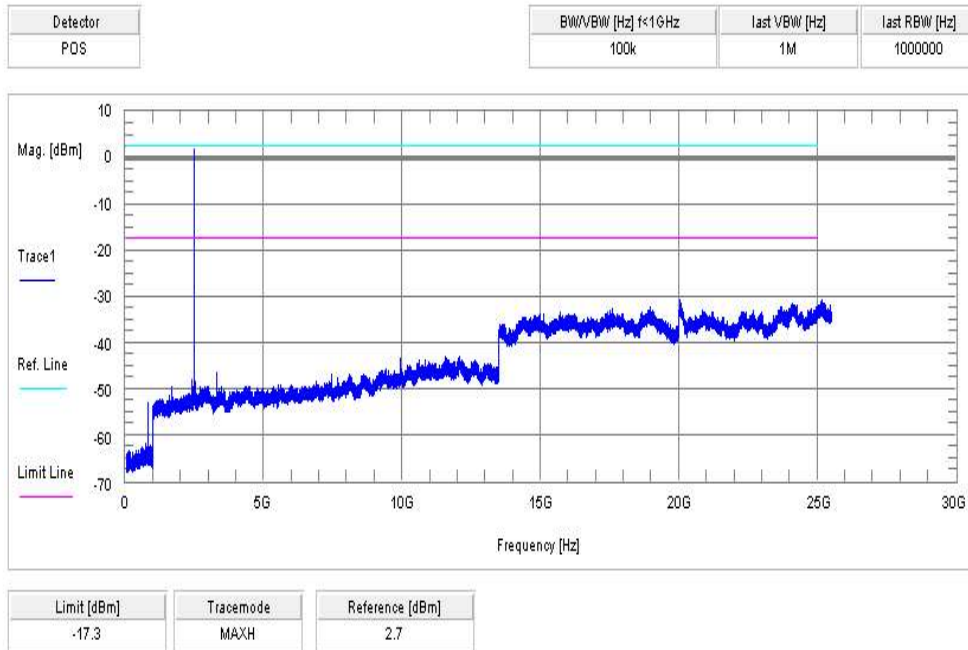
Plot 1 of 3: lowest channel



Plot 2 of 3: middle channel



Plot 3 of 3: highest channel



Result & Limits:

Emission Limitation					
f [MHz]		amplitude of emission [dBm]	limit max. allowed emission power	actual attenuation below frequency of operation [dB]	results
2402		1.92	30 dBm		Operating frequency
No critical peaks detected! All detected spurious emissions are below the 20 dBc criteria.			-20 dBc	--	complies
2441		2.57	30 dBm		Operating frequency
No critical peaks detected! All detected spurious emissions are below the 20 dBc criteria.			-20 dBc	--	complies
2480		2.70	30 dBm		Operating frequency
No critical peaks detected! All detected spurious emissions are below the 20 dBc criteria.			-20 dBc	--	complies
Measurement uncertainty		± 3dB			

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

5.15 Spurious Emissions > 30 MHz- radiated (Transmitter) § 15.247 (c)(1)

Modulation: GFSK

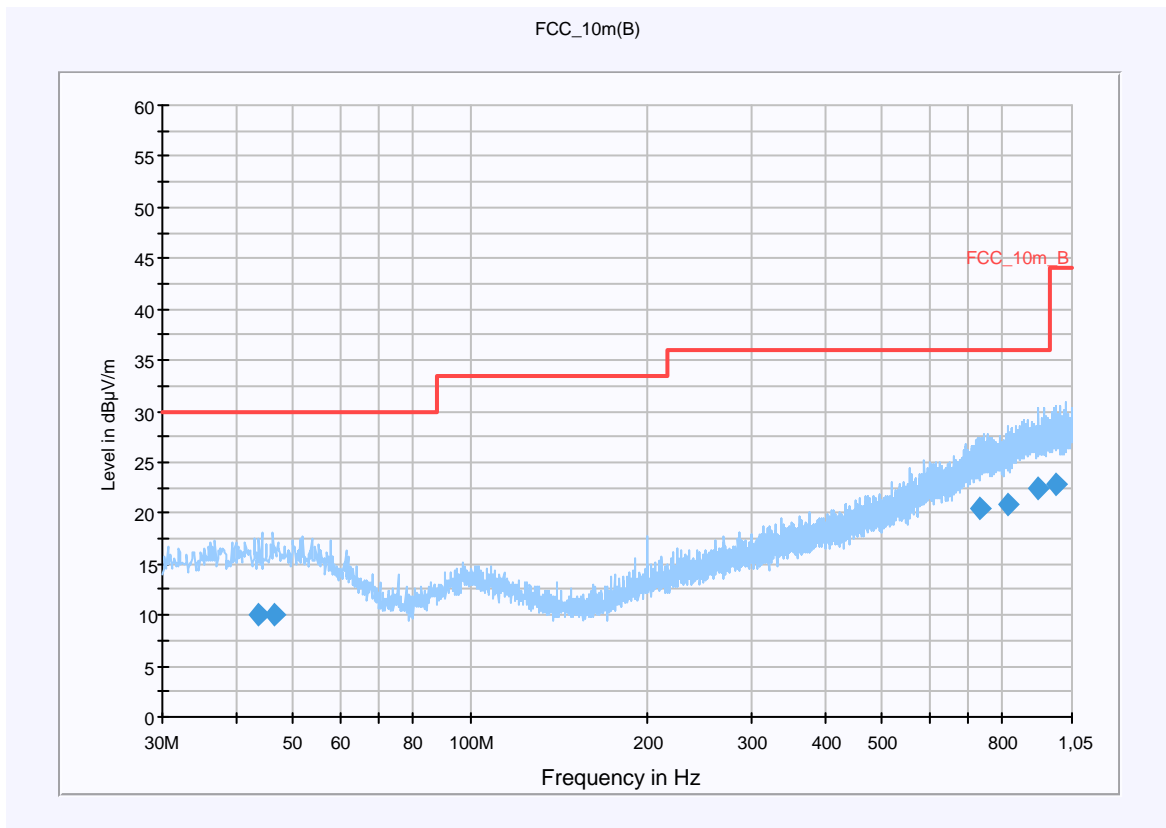
Plot 1: 0.03 - 1 GHz vertical/horizontal (lowest channel)

Common Information

EUT: TEK connect
 Serial Number: MEC: 001FF8F79BE6
 Test Description: FCC Part 15
 Operating Conditions: Bluetooth test mode TX, channel 0 / 2402MHz
 Operator Name: HNA / Kraus
 Comment:

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

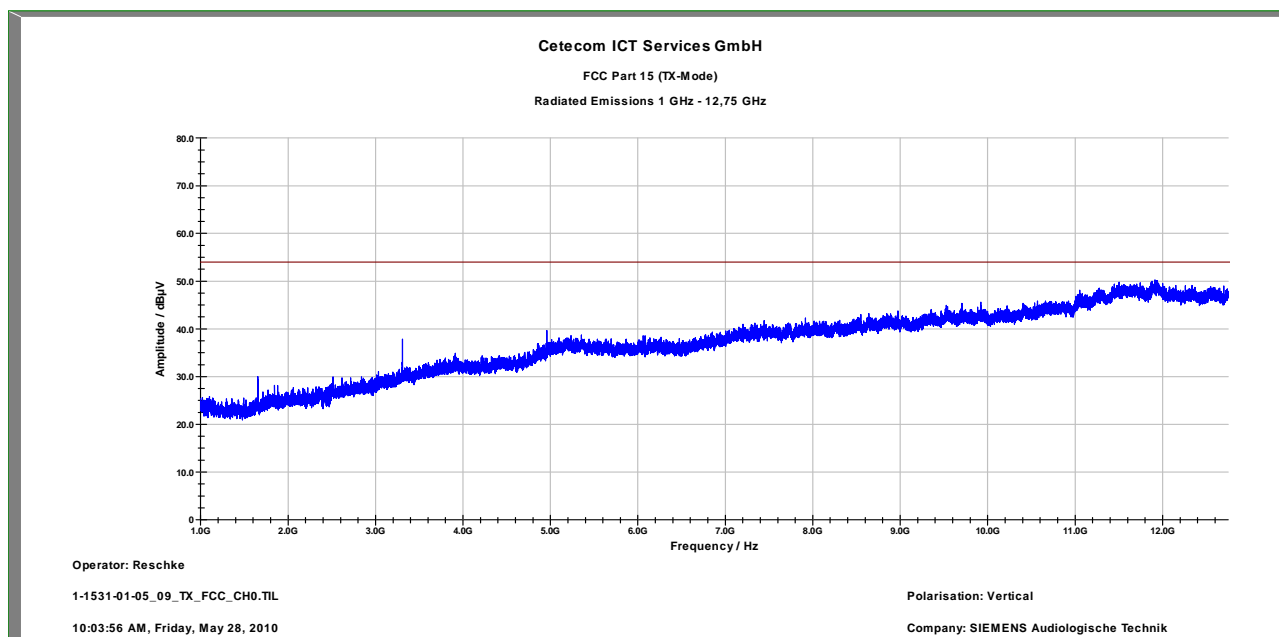
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
43.771800	10.0	15000.000	120.000	198.0	V	131.0	13.3	20.0	30.0	
46.587900	10.0	15000.000	120.000	98.0	V	116.0	13.3	20.0	30.0	
733.699950	20.4	15000.000	120.000	198.0	H	285.0	23.3	15.6	36.0	
817.003950	20.9	15000.000	120.000	154.0	H	41.0	24.1	15.1	36.0	
916.348650	22.4	15000.000	120.000	374.0	H	57.0	25.3	13.6	36.0	
983.254050	22.8	15000.000	120.000	246.0	V	107.0	25.7	21.2	44.0	

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

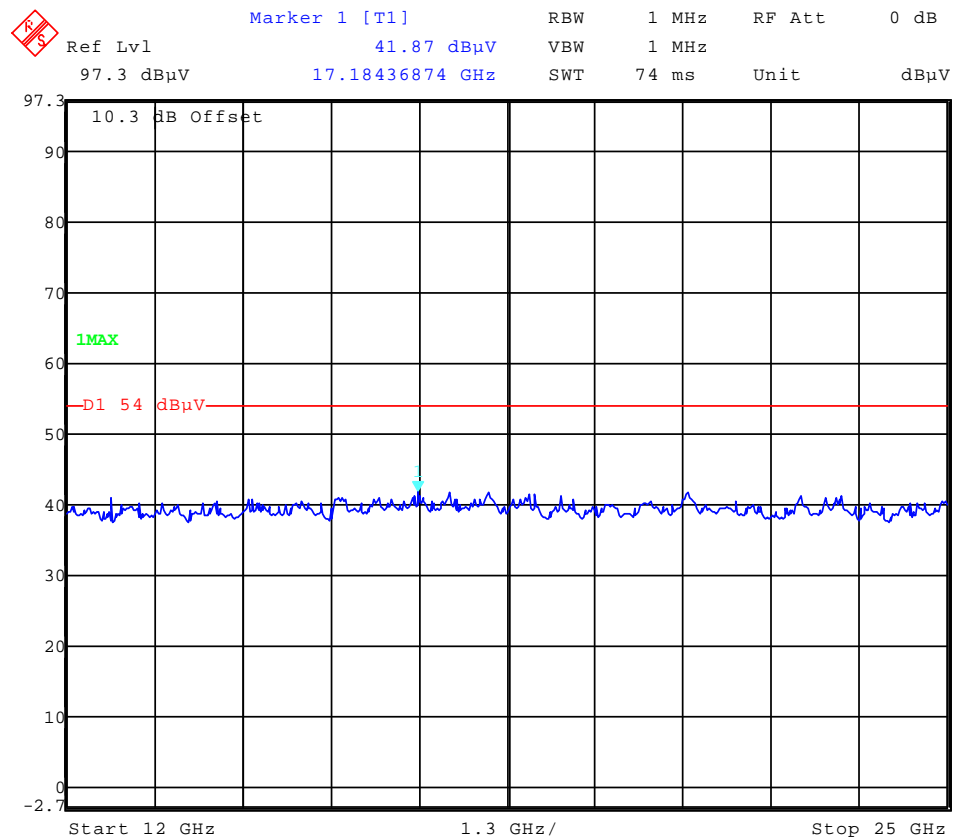
Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113 Correction Table: Cable_EN_1GHz (1005)
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 2: 1 - 12 GHz vertical/horizontal (lowest channel)



Plot 3: 12 - 25 GHz vertical/horizontal (valid for all channels)



Plot 4: 0.03 - 1 GHz vertical/horizontal (middle channel)

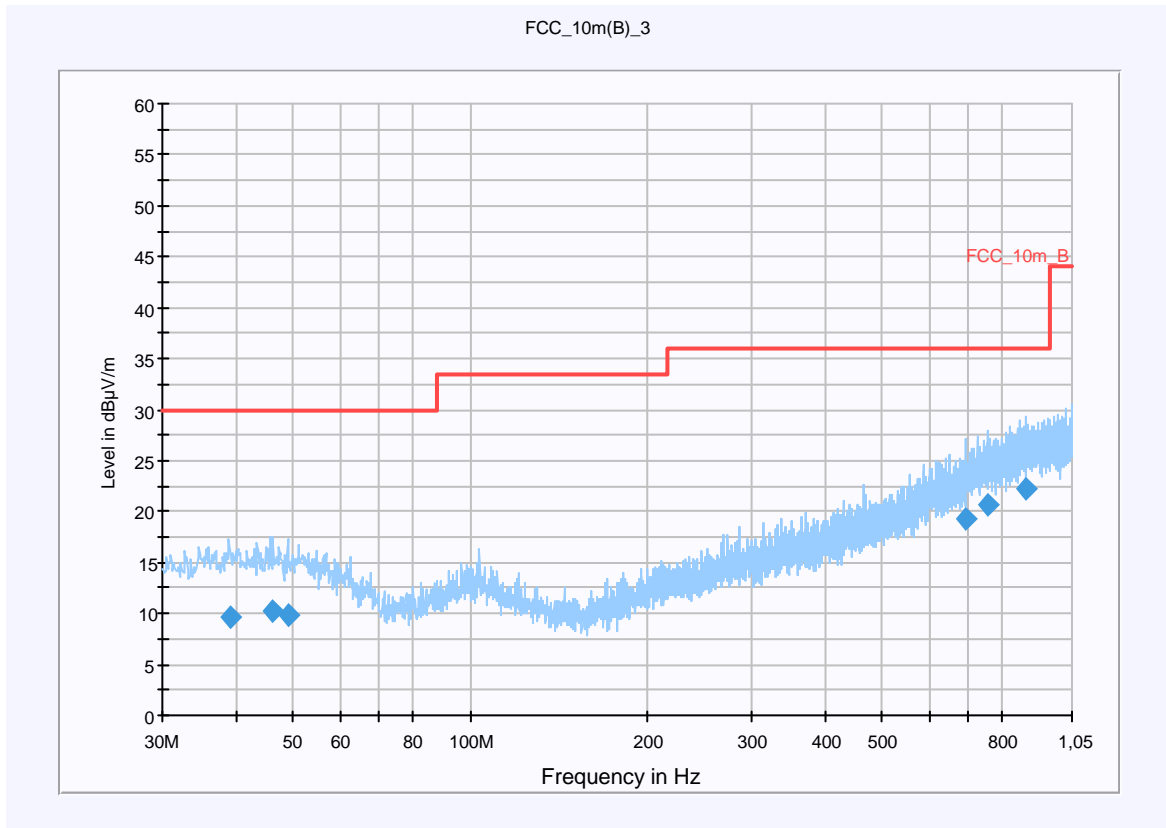
Common Information

EUT: TEK connect
 Serial Number: MEC: 001FF8F79BE6
 Test Description: FCC Part 15
 Operating Conditions: Bluetooth test mode TX, channel 39 / 2441MHz
 Operator Name: HNA / Kraus
 Comment:

Scan Setup: STAN_Fin [EMI radiated]

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

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



Final Result 1

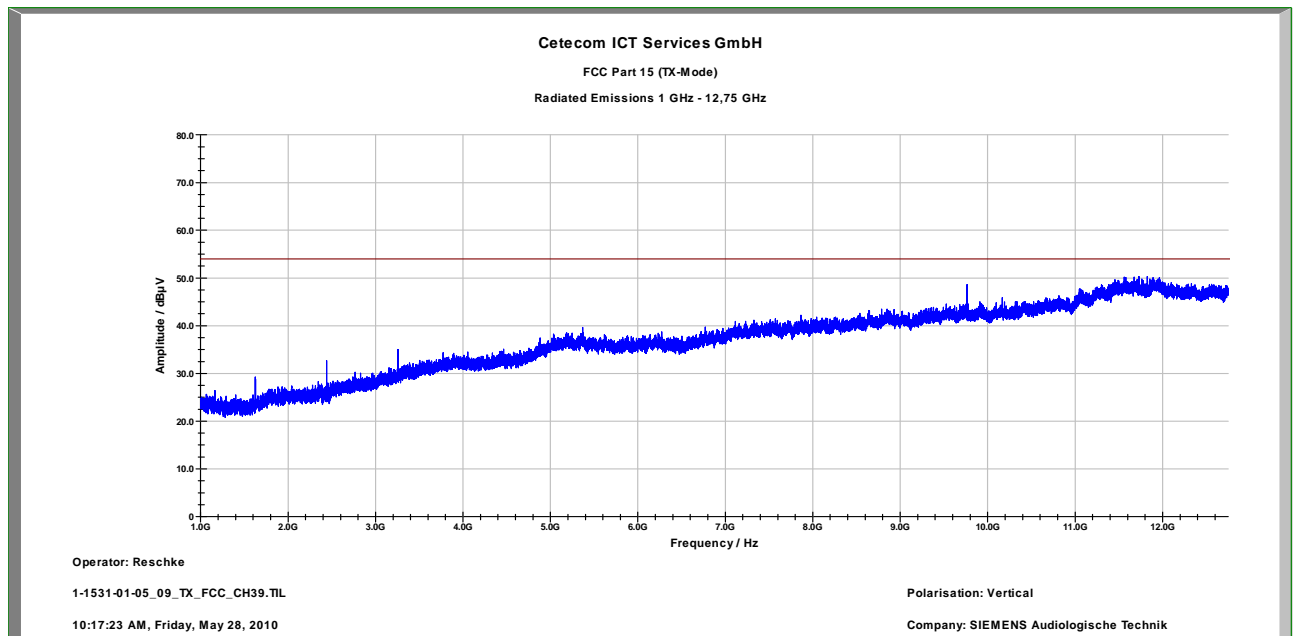
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
39.111000	9.6	15000.000	120.000	118.0	V	4.0	13.4	20.4	30.0	
46.074450	10.2	15000.000	120.000	203.0	V	78.0	13.3	19.8	30.0	
49.310100	9.8	15000.000	120.000	142.0	V	288.0	13.4	20.2	30.0	
692.637000	19.4	15000.000	120.000	220.0	V	12.0	22.3	16.6	36.0	
755.036850	20.6	15000.000	120.000	220.0	V	-2.0	23.7	15.4	36.0	
875.492850	22.1	15000.000	120.000	133.0	V	4.0	24.9	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
Antenna Tower:	Correction Table: Cable_EN_1GHz (1005) 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 - 12 GHz vertical/horizontal (middle channel)



Plot 6: 0.03 - 1 GHz vertical/horizontal (highest channel)

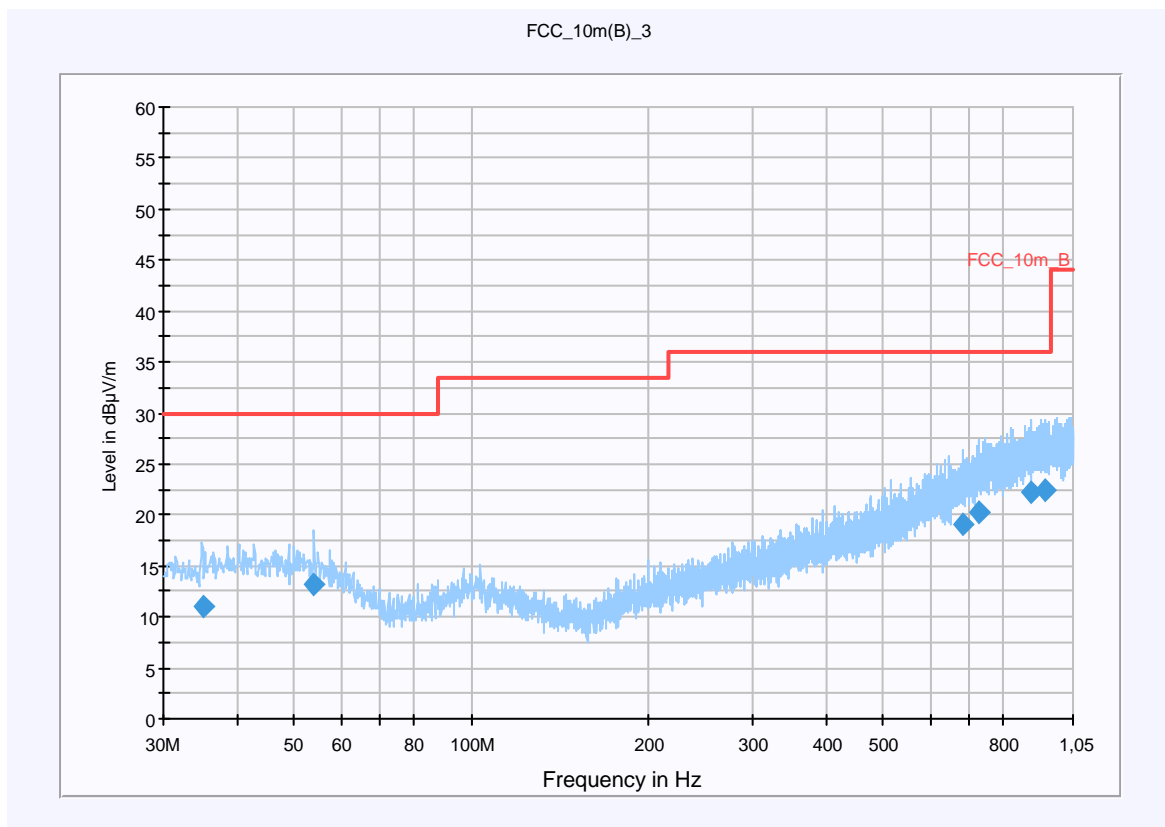
Common Information

EUT: TEK connect
 Serial Number: MEC: 001FF8F79BE6
 Test Description: FCC Part 15
 Operating Conditions: Bluetooth test mode TX, channel 78 / 2480MHz
 Operator Name: HNA / Kraus
 Comment:

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit:

30 MHz - 1,05 GHz QuasiPeak 120 kHz 15 s Receiver



Final Result 1

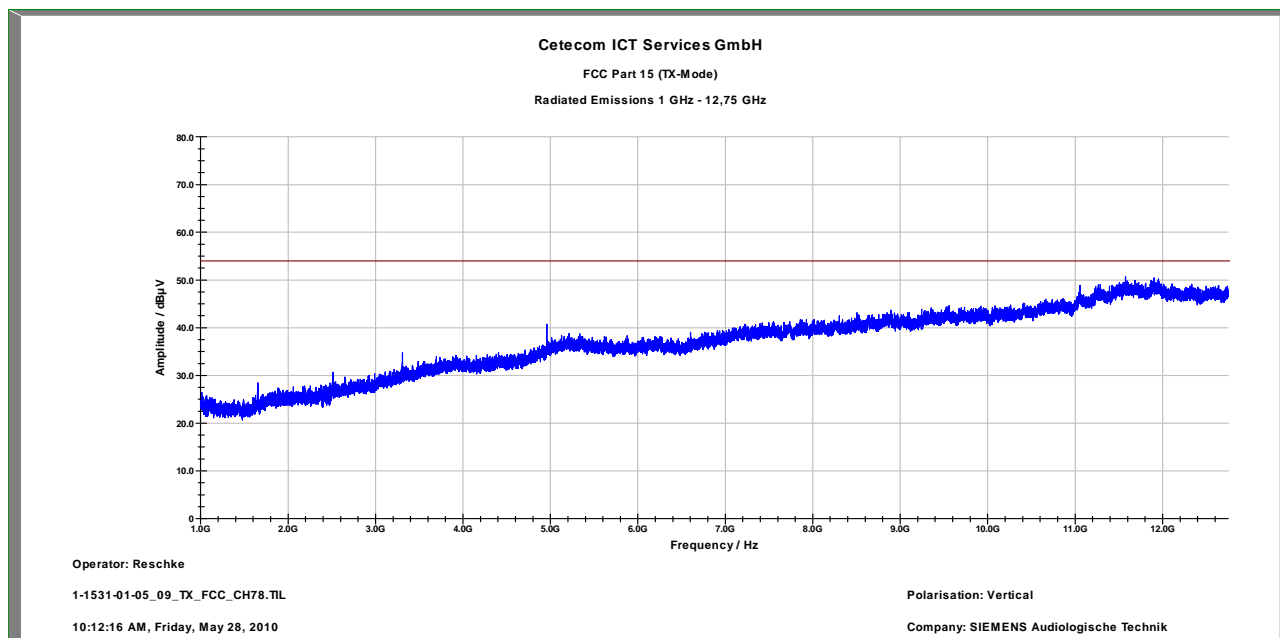
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
34.999200	11.1	15000.000	120.000	212.0	V	16.0	13.0	18.9	30.0	
54.012000	13.1	15000.000	120.000	220.0	V	94.0	13.0	16.9	30.0	
682.840050	19.0	15000.000	120.000	220.0	H	-1.0	22.0	17.0	36.0	
726.820950	20.2	15000.000	120.000	220.0	V	200.0	23.1	15.8	36.0	
891.048750	22.1	15000.000	120.000	98.0	V	-1.0	25.1	13.9	36.0	
943.255950	22.4	15000.000	120.000	220.0	H	186.0	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
Antenna Tower:	Correction Table: Cable_EN_1GHz (1005) 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 - 12 GHz vertical/horizontal (highest channel)



Results:

SPURIOUS EMISSIONS LEVEL (dB μ V/m)								
2402 MHz			2441 MHz			2480 MHz		
F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]	F [MHz]	Detector	Level [dB μ V/m]
4804	Avg	42.9	4884	Avg	45.2	4960	Avg	44.3
9606	Avg	51.4	9768	Avg	51.0	9920	Avg	50.8
			1628	Avg	25.0			
			3256	Avg	28.8			
Measurement uncertainty			±3 dB					

f < 1 GHz : RBW/VBW: 100 kHz

f ≥ 1GHz : RBW/VBW: 1 MHz

Limits: § 15.247 (c)

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

Limits: § 15.209

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

5.16 Spurious Emissions - radiated (Receiver) § 15.109

Modulation: GFSK

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

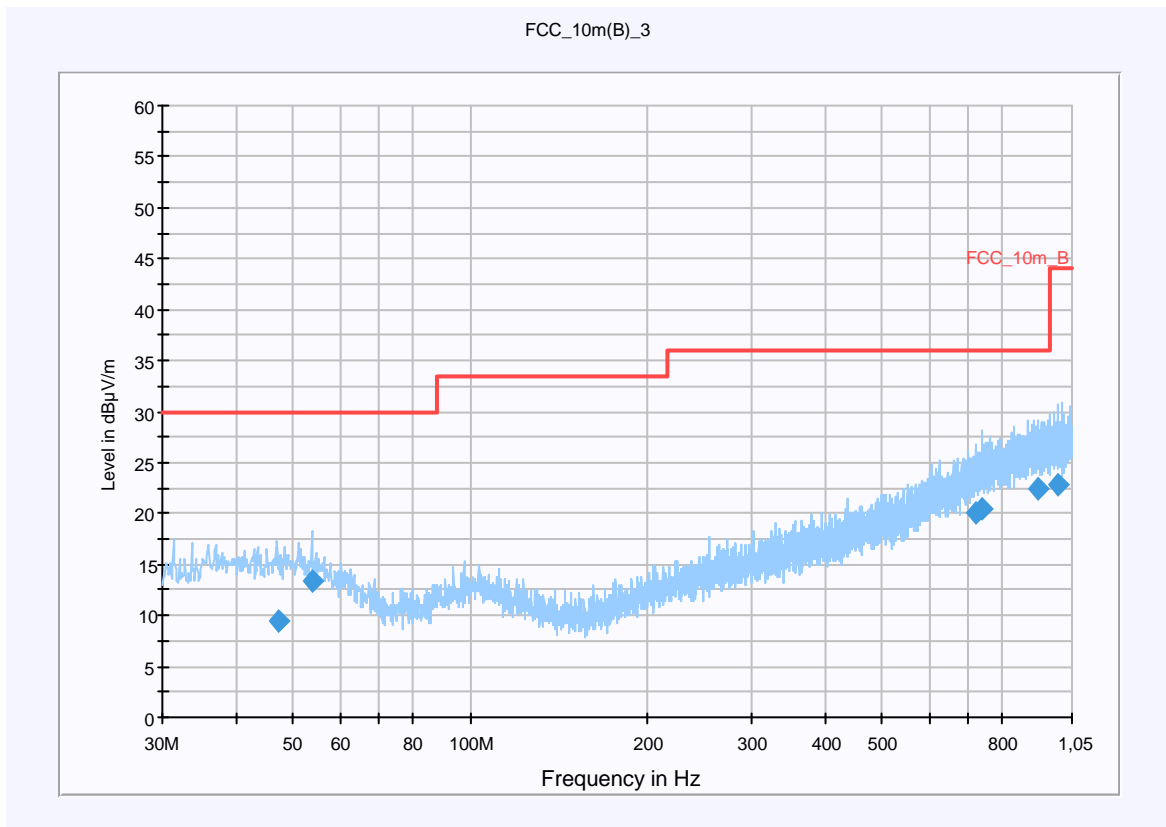
Common Information

EUT: TEK connect
 Serial Number: MEC: 001FF8F79BE6
 Test Description: FCC Part 15
 Operating Conditions: Bluetooth test mode RX, channel 78 / 2480MHz
 Operator Name: HNA / Kraus
 Comment: 3.7V battery

Scan Setup: STAN_Fin [EMI radiated]

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

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



Final Result 1

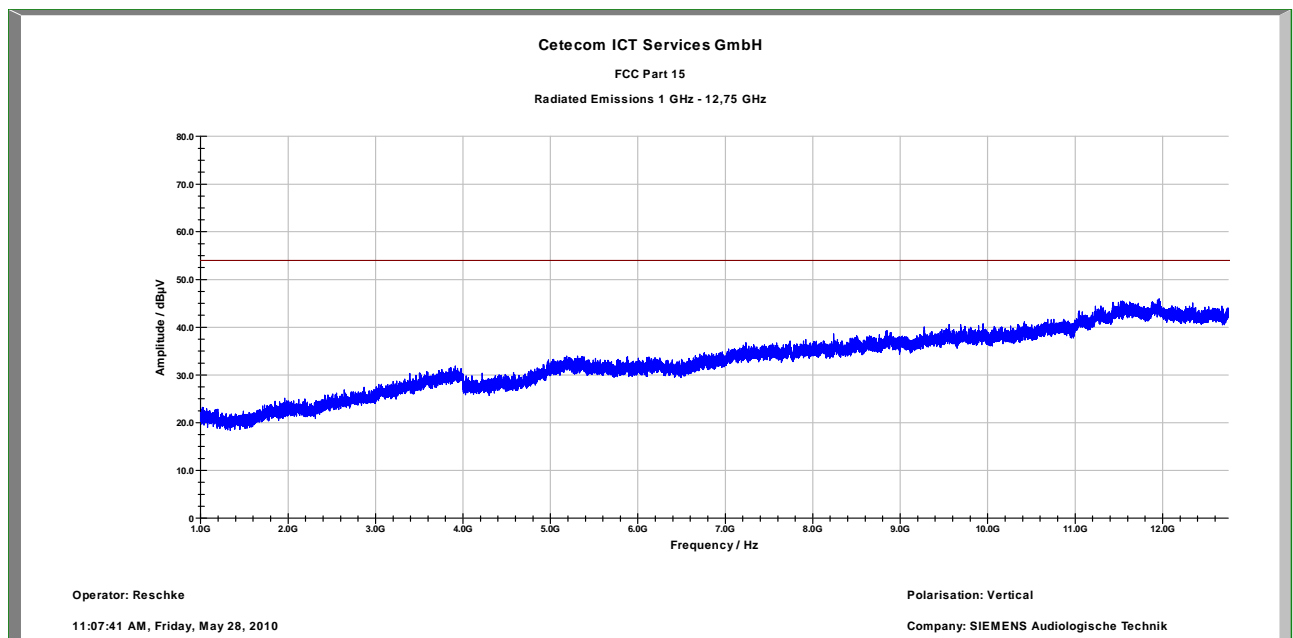
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
47.125050	9.4	15000.000	120.000	220.0	H	273.0	13.3	20.6	30.0	
53.996100	13.3	15000.000	120.000	105.0	V	92.0	13.0	16.7	30.0	
719.758200	20.1	15000.000	120.000	124.0	V	289.0	23.0	15.9	36.0	
740.843700	20.5	15000.000	120.000	220.0	H	260.0	23.4	15.5	36.0	
920.925000	22.4	15000.000	120.000	212.0	V	184.0	25.3	13.6	36.0	
992.649000	22.9	15000.000	120.000	98.0	V	107.0	25.7	21.1	44.0	

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

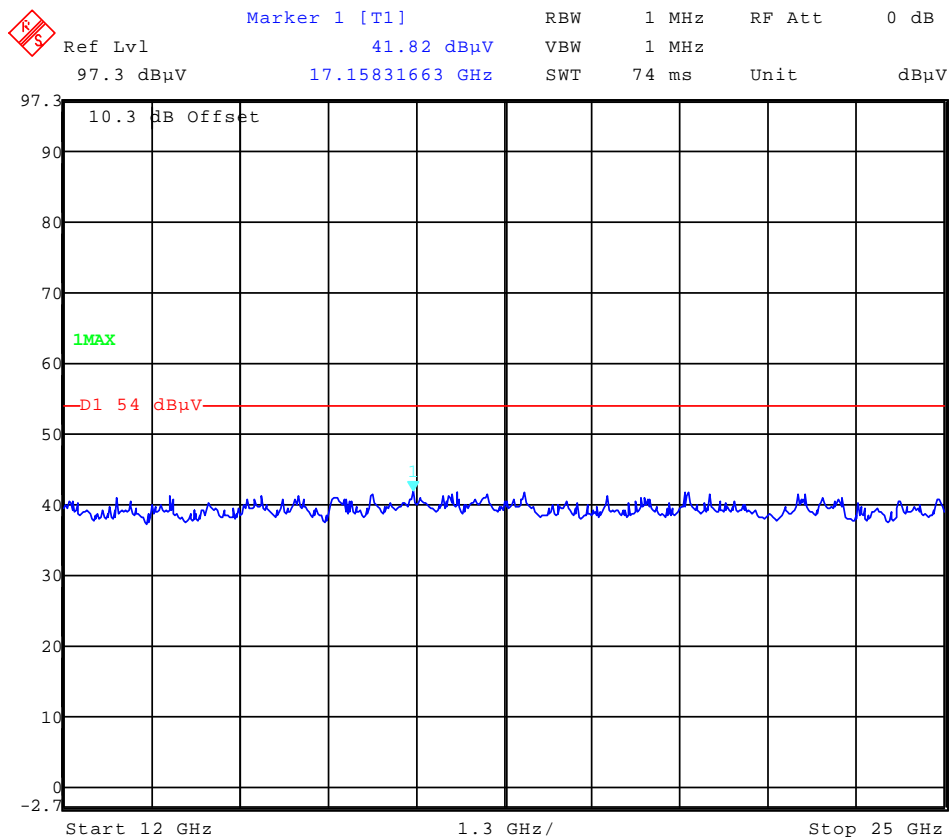
Subrange 1	
Frequency Range:	30 MHz - 2 GHz
Receiver:	Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32
Signal Path:	without Notch FW 1.0
Antenna:	VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113
Antenna Tower:	Correction Table: Cable_EN_1GHz (1005) Tower [EMCO 2090 Antenna Tower] @ GPIB0 (ADR 8), FW REV 3.12
Turntable:	Turntable [EMCO Turntable] @ GPIB0 (ADR 9), FW REV 3.12

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Plot 2: 1 - 12 GHz vertical/horizontal (receiver)



Plot 3: 12 - 25 GHz vertical/horizontal (receiver)

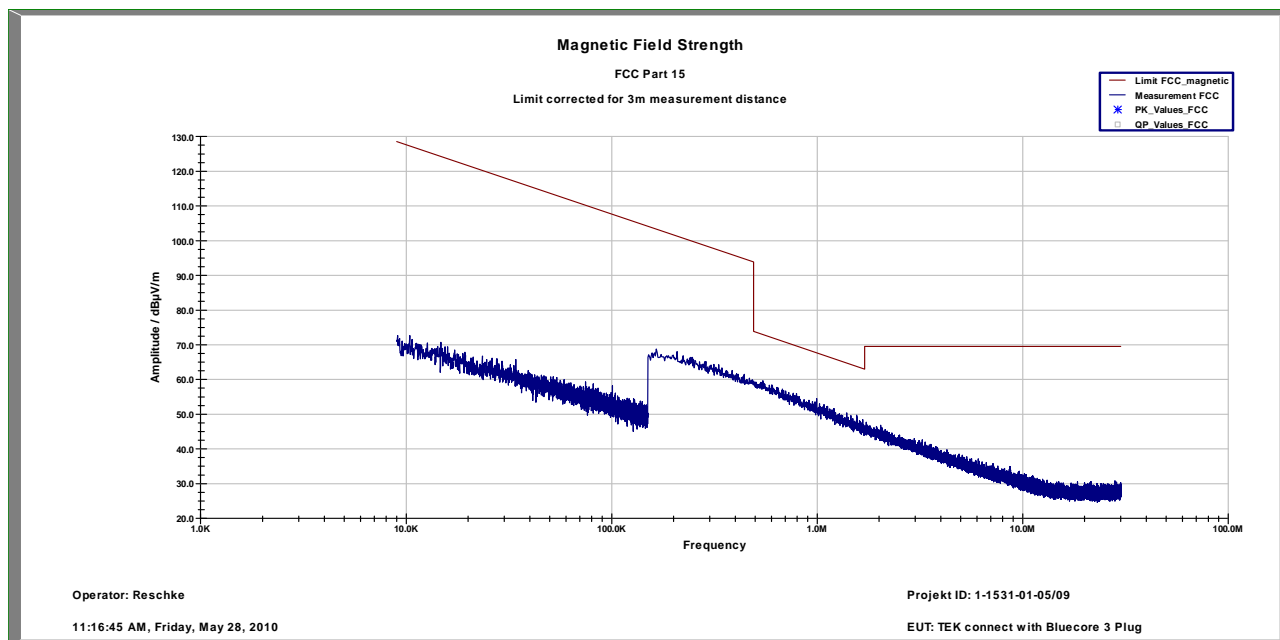


5.17 Spurious Emissions < 30 MHz - Transmitter radiated § 15.209

Modulation: GFSK

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

Plot 1:



Limits:

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30 / 29.5 dBµV/m	30

5.18 Conducted Emissions <30 MHz § 15.107/207

Modulation: GFSK

Not applicable

Limits:

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

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

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

No.	Labor / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kal. Art	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	vIKI!	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 Klima	-/-	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	k	26.08.2008	26.08.2010
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	k	26.08.2008	26.08.2010
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	vIKI!	27.08.2008	27.08.2010
18	n. a.	Spectrum Analyzer 9kHz to 30GHz - 140..+30dBm	FSP30	R&S	100886	300003575	k	25.08.2008	25.08.2010
19	n. a.	Software-Option for CBT/CBT32	CBT-K57	R&S	101051	300003910	ne		

20	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	08.01.2009	08.01.2012
21	n. a.	PowerAttenuator Double-Ridged Waveguide Horn	8325	Byrd	1530	300001595			
22	n. a.	Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	vIKI!	05.03.2009	05.03.2011
23	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
24	n. a.	Anechoic chamber		MWB	87400/02	300000996			
25	Spec.A. 2_2e	System rack for EMI measurement solution	85900	HP I.V.	*	300000222	ne		
26	9	Artificial Mains 9 kHz to 30 MHz, 4 x 25 Ampere	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2010	06.01.2012
27	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
28	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
29	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
30	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
31	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
32	n. a.	Band Reject filter	WRCG1855/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
33	n. a.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
34	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
35	n. a.	Highpass Filter	WHKX2.9/18G-12SS	Wainwright	1	300003492	ev		
36	n. a.	Highpass Filter	WHK1.1/15G-10SS	Wainwright	3	300003255	ev		
37	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
38	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Technologies	MY48250080	300003812	k	05.08.2008	05.08.2010
39	n. a.	MXG Microwave Analog Signal Generator	N5183A	Agilent Technologies	MY47420220	300003813	k	06.08.2008	06.08.2010
40	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Technologies	MY48260003	300003825	vIKI!	19.08.2008	19.08.2010
41	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vIKI!	17.12.2008	17.12.2010

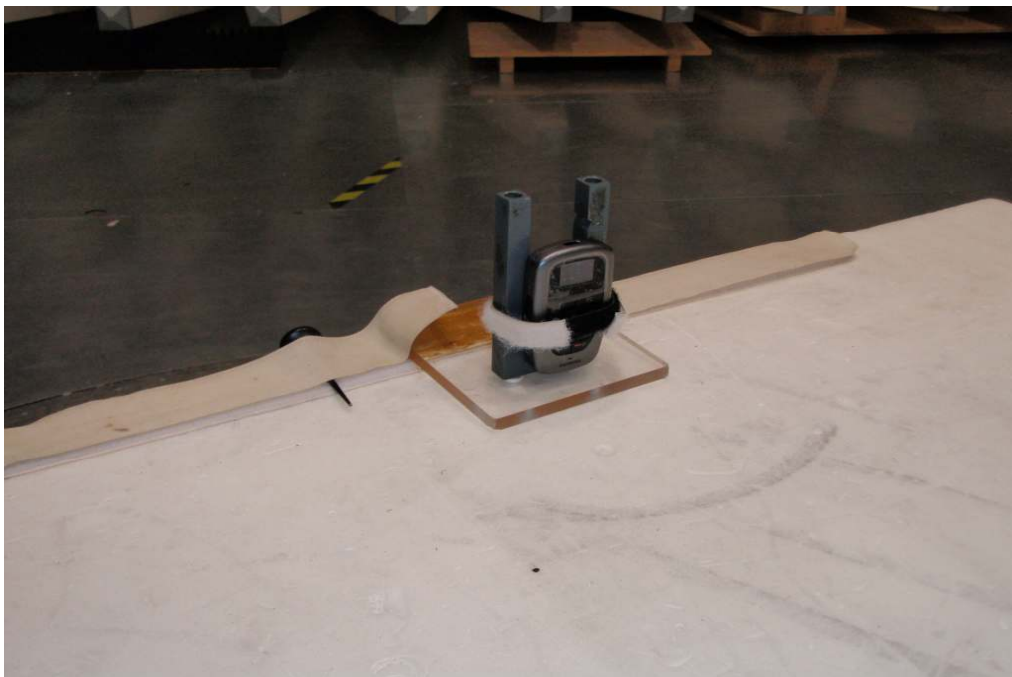
6 Photographs of the Test Set-up

Photo documentation:

Photo 1:



Photo 2:



7 Photographs of the EUT

Photo documentation:

Photo 1: conducted sample



Photo 2: conducted sample

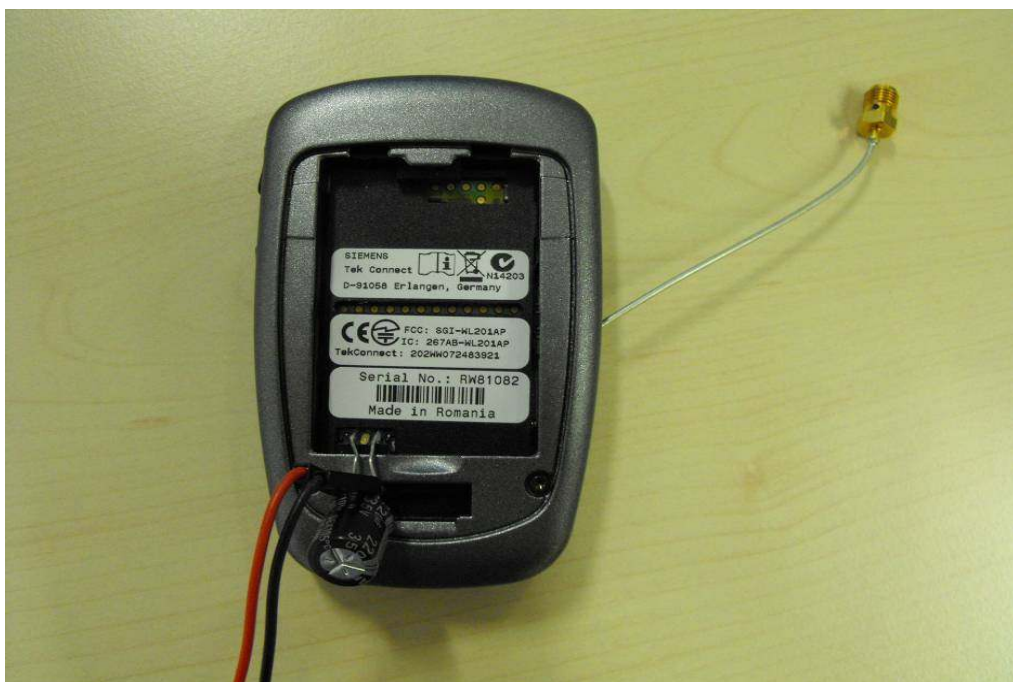


Photo 3: conducted sample



Photo 4: radiated sample



Photo 5: radiated sample



Photo 6: radiated sample



Photo 7: internal photo



Photo 8: internal photo



Photo 9: internal photo



Photo 10: internal photo

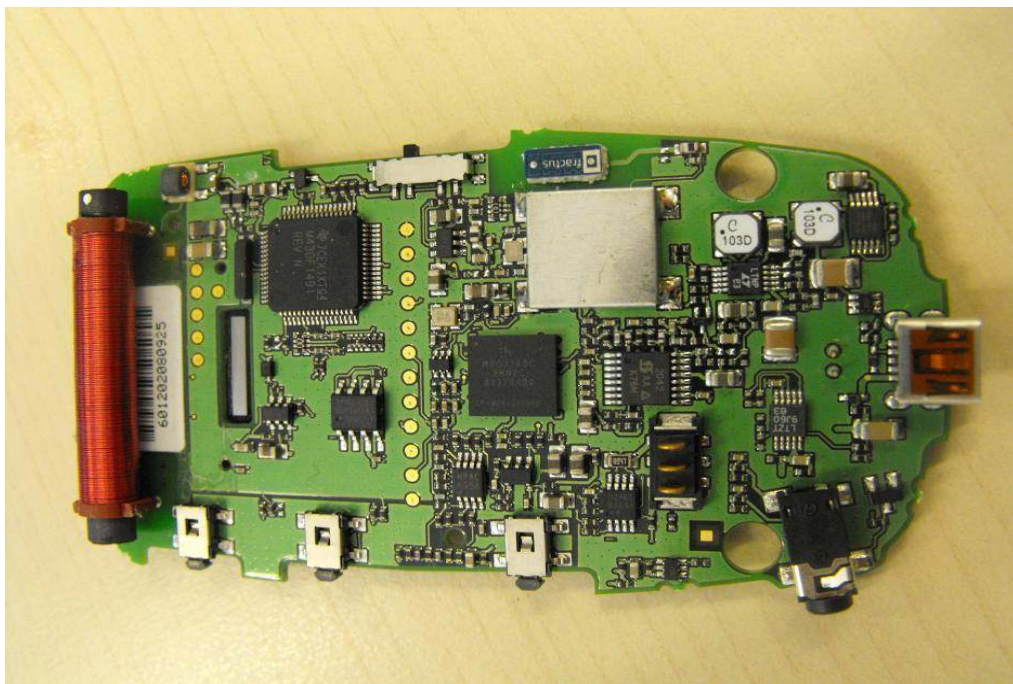


Photo 11: internal photo (shielding removed)

