



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. : 1-1801-01-03/09-A
Type identification : 182A01
Applicant : seca GmbH & Co. KG.
FCC ID : X6T182A01
IC Certification No : 8898A-182A01
Test standards : 47 CFR Part 2
47 CFR Part 15
RSS-210 Issue 7

Table of contents

| | | |
|----------|--|-----------|
| 1 | General information | 3 |
| 1.1 | Notes | 3 |
| 1.2 | Testing laboratory | 4 |
| 1.3 | Details of applicant | 4 |
| 1.4 | Application details | 4 |
| 2 | Test standard/s | 5 |
| 2.1 | Test Item | 6 |
| 2.2 | Test Setup | 7 |
| 2.3 | Test Specifications | 7 |
| 3 | Statement of Compliance | 8 |
| 3.1 | Summary of Measurement Results | 8 |
| 3.1.1 | CFR 47 Part 15 Radio frequency devices | 8 |
| 4 | Measurements and results | 9 |
| 5 | FCC Part 15 Subpart C | 10 |
| 5.1 | Timing of the transmitter | 10 |
| 5.2 | Field Strength of the Fundamental | 13 |
| 5.3 | Field Strength of the Harmonics and Spurious | 14 |
| 5.4 | Receiver Spurious Emission (radiated) | 27 |
| 5.5 | Conducted Limits | 32 |
| 5.6 | Occupied bandwidth 20dB (conducted) | 35 |
| 6 | Test equipment and ancillaries used for tests | 37 |

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.

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 laboratory manager:

| | | |
|-------------------|-----------------------|-------------|
| 2010-07-07 | Andreas Keller | i.A. |
| Date | Name | Signature |

Technical responsibility for area of testing:

| | | |
|-------------------|-------------------|-------------|
| 2010-07-07 | Stefan Bös | i.A. |
| 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: | seca GmbH & Co. KG. |
| Street: | Hammer Steindamm 9-25 |
| Town: | 22089 Hamburg |
| Country: | Germany |
| Telephone: | +49 (0) 40 20 00 000 |
| Fax: | +49 (0) 40 20 00 00 3171 |
| Contact: | Rüdiger Leuner |
| E-mail: | ruediger.leuner@seca.com |
| Telephone: | +49 (0) 40 20 00 00 171 |

1.4 Application details

| | |
|--|------------------------------|
| Date of receipt of order: | 2010-02-02 |
| Date of receipt of test item: | 2010-06-08 |
| Date of start test: | 2010-06-08 |
| Date of end test: | 2010-06-30 |
| Persons(s) who have been present during the test: | Mr. Grünwald (2008-06-08/09) |

2 Test standard/s

| | | |
|-----------------|---------|--|
| 47 CFR Part 2 | 2009-10 | Title 47 of the Code of Federal Regulations; Chapter I- Federal Communications Commission Frequency allocations and radio treaty matters; general rules and regulations |
| 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 | Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment |

2.1 Test Item

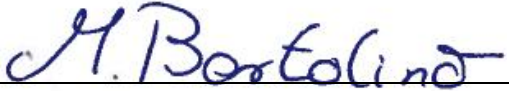
| | | |
|--|---|---|
| Type of equipment | : | SUF USB radio module |
| Model name | : | 182A01 |
| Manufacturer | : | seca GmbH & Co. KG. |
| Address | : | Hammer Steindamm 9-25 |
| City | : | Hamburg |
| Country | : | Germany |
| Tested to Radio Standards Specification(RSS) No. | : | 210 Issue 7 |
| Open Area Test Site Industry Canada Number | : | 3462C-1 |
| Frequency Range (or fixed frequency) | : | 3 test samples: 2433MHz, 2456.4MHz, 2480.4MHz |
| Field Strength (at what distance) | : | 79.7µV/m (dBµV/m) in 3m |
| Occupied Bandwidth (99% BW) | : | 200kHz |
| Type of Modulation | : | OQPSK |
| Antenna Information | : | Printed PCB antenna |
| Emission Designator (TRC-43) | : | 200kG7D |
| Transmitter Spurious (worst case) | : | 50dBµV/m in 3m (noise floor) |
| Receiver Spurious (worst case) | : | 50dBµV/m in 3m (noise floor) |
| IC no. | : | 8898A-182A01 |
| FCC ID | : | X6T182A01 |

ATTESTATION:

DECLARATION OF COMPLIANCE:

I declare 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.

Testing Engineer:

| | | |
|------------|----------------|---|
| 2010-07-07 | Andreas Keller | i.A.  |
| Date | Name | Signature |

2.2 Test Setup

| | | |
|----------|---|-----------|
| Hardware | : | unknown |
| Software | : | 1.24 -4dB |

2.3 Test Specifications

| | | |
|-----|---|------------------|
| FCC | : | CFR Part 15.249 |
| IC | : | RSS 210, Issue 7 |

3 Statement of Compliance

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

3.1 Summary of Measurement Results

3.1.1 CFR 47 Part 15 Radio frequency devices

| Section in this Report | Test Name / Section FCC Part 15 | Test Name / Section RSS 210 Issue 7 | Measurement applicable | Verdict |
|------------------------|--|---|------------------------|---------|
| 4.1 | § 15.35 (c) Timing of the transmitter (Duty cycle correction factor) | 6.5 Pulsed Operation | No | |
| 4.2 | § 15.249 (a) FIELDSTRENGTH OF FUNDAMENTAL | 6.2.2 (m2)(1) 902-928, 2400-2483.5 and 5725-5875 MHz | YES | pass |
| 4.3 | § 15.249 (a) (d) FIELDSTRENGTH OF HARMONICS and SPURIOUS | 6.2.2 (m2)(1)(3) 902-928, 2400-2483.5 and 5725-5875 MHz | YES | pass |
| 4.4 | § 15.109 Receiver spurious emissions (radiated) | 7.3 Receiver Spurious Emissions (Radiated) | YES | pass |
| 4.5 | § 15.107 / 15.207 Conducted Limits | Section 6.6 , 7.4 | YES | pass |
| 4.6 | Occupied bandwidth | | YES | pass |

4 Measurements and results

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 20 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 conform 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 set-ups 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 conform with ANSI C63.2-1996 item 15.

150 kHz - 30 MHz: Quasi Peak measurement, 9 kHz Bandwidth, active loop antenna.

30 MHz - 1GHz: Quasi Peak measurement, 120 kHz Bandwidth, trilob antenna

>1GHz: Average, RBW 1MHz, VBW 10 Hz, wave guide horn

All measurement settings are according to FCC 15.109 and 15.107

5 FCC Part 15 Subpart C

5.1 Timing of the transmitter

Reference

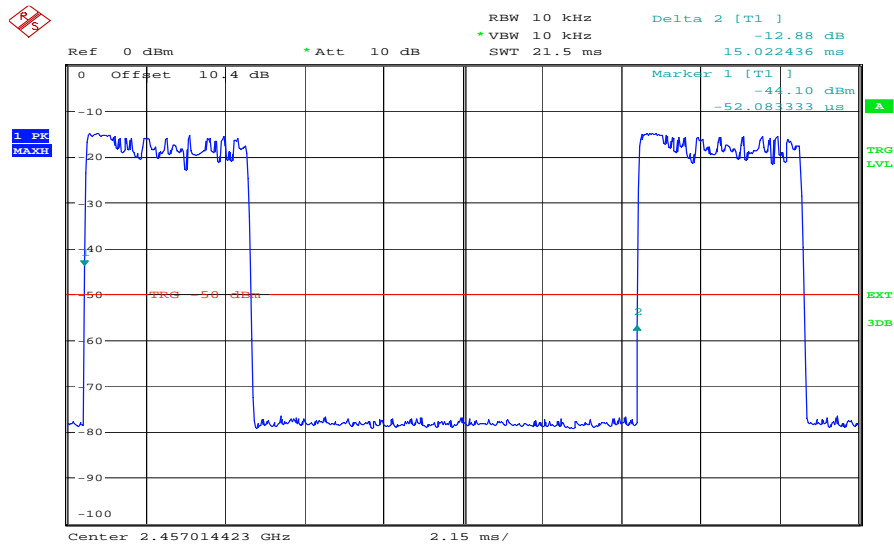
| | | |
|-----|---|---------------------------------------|
| FCC | : | CFR Part SUBCLAUSE § 15.35 (c) |
| IC | : | RSS 210, Issue 7 6.5 PULSED OPERATION |

Limits: § 15.35 (c)

(c) Unless otherwise specified, e.g. Section 15.255(b), when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

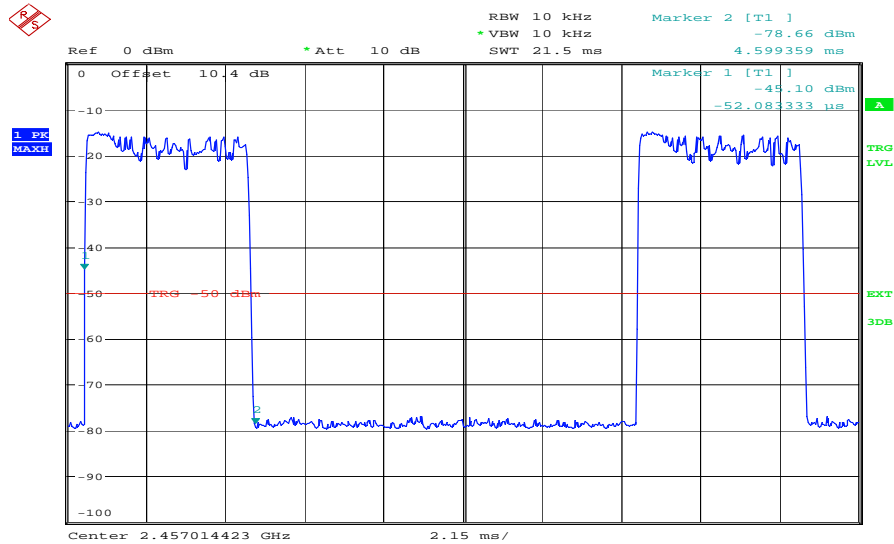
Duty cycle evaluation (test sample)

Plot 1: Period time (t_{tot})



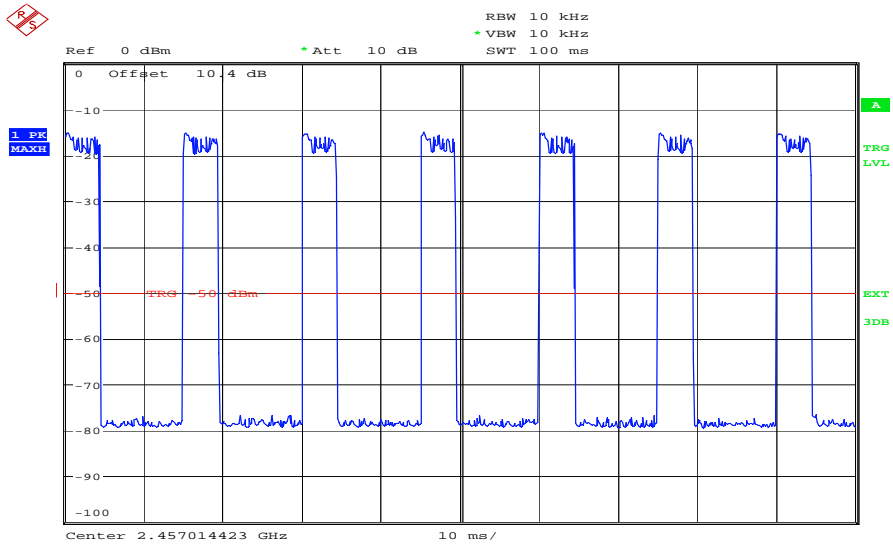
8UF CFH_1826C
 Date: 9.JUN.2010 09:09:39

Plot 2: TX_{on} time (t_{on})



8UF CFH_1826C
 Date: 9.JUN.2010 09:07:20

Plot 3: TX_on time @100ms (t_on)



8UFCEH_1826C
Date: 9.JUN.2010 09:14:45

$(4.6 * 7 / 100) = 32\%$

5.2 Field Strength of the Fundamental

Reference

| | | |
|-----|---|--|
| FCC | : | CFR Part SUBCLAUSE § 15.249 (a) |
| IC | : | RSS 210, Issue 7, 6.2.2 (m2)(1) 902-928, 2400-2483.5 and 5725-5875 MHz |

MAXIMUM OUTPUT POWER/PEAK (RADIATED) without duty cycle correction factor

| TEST CONDITIONS | | MAXIMUM POWER (dB μ V/m) | | |
|-------------------------|------------------------|------------------------------|--------|--------|
| Frequency | | 2433 | 2456.4 | 2480.4 |
| T _{nom} 24 °C | V _{nom} 5.0 V | 87.5 | 87.1 | 87.8 |
| Measurement uncertainty | | ±3dB | | |

RBW/VBW : 1 MHz/1MHz Peak

MAXIMUM OUTPUT POWER/AVERAGE (RADIATED) without duty cycle correction factor

| TEST CONDITIONS | | MAXIMUM POWER (dB μ V/m) | | |
|-------------------------|------------------------|------------------------------|--------|--------|
| Frequency | | 2433 | 2456.4 | 2480.4 |
| T _{nom} 24 °C | V _{nom} 5.0 V | 79.7 | 78.9 | 79.5 |
| Measurement uncertainty | | ±3dB | | |

RBW/VBW : 1 MHz /10Hz AVG

Limits

SUBCLAUSE § 15.249 (a)

| Fundamental Frequency (MHz) | Field strength of Fundamental (mV/m) | Field strength of Harmonics (μ V/m) |
|-----------------------------|--------------------------------------|--|
| 902-928 | 50 (94 dB μ V/m) | 500 (54 dB μ V/m) |
| 2400-2483.5 | 50 (94 dB μ V/m) | 500 (54 dB μ V/m) |
| 5725-5875 | 50 (94 dB μ V/m) | 500 (54 dB μ V/m) |
| 24.0-24.25 GHz | 250 (108 dB μ V/m) | 2500 (68 dB μ V/m) |

5.3 Field Strength of the Harmonics and Spurious

Reference

| | | |
|-----|---|---|
| FCC | : | CFR Part SUBCLAUSE § 15.249 (a)(d) |
| IC | : | RSS 210, Issue 7, 6.2.2 (m2)(1)(3) 902-928, 2400-2483.5 and 5725-5875 MHz |

| EMISSION LIMITATIONS | | | | | |
|-----------------------------------|--|--|---|--|---------------------|
| f (MHz) | | amplitude of emission (dBµV/m) Average/QP | Limit max. allowed emission power | actual attenuation below frequency of operation (dB) | results |
| No critical peaks detected | | | | | |
| | | | 94BµV/m | | Operating frequency |
| | | | 20 dBc or 46 dBµV/m | | Complies |
| | | | 20dBc or 54 dBµV/m | | Complies |
| | | | | Complies | |
| | | | | Complies | |
| | | | | Complies | |
| | | | | Complies | |
| | | | | Complies | |
| | | | | Complies | |
| | | | | Complies | |
| Measurement uncertainty | | | ± 3dB | | |

Limits

SUBCLAUSE § 15.249 (a)

| Fundamental Frequency (MHz) | Field strength of Fundamental (mV/m) | Field strength of Harmonics (µV/m) |
|-----------------------------|--------------------------------------|------------------------------------|
| 902-928 | 50 (94 dBµV/m) | 500 (54 dBµV/m) |
| 2400-2483.5 | 50 (94 dBµV/m) | 500 (54 dBµV/m) |
| 5725-5875 | 50 (94 dBµV/m) | 500 (54 dBµV/m) |
| 24.0-24.25 GHz | 250 (108 dBµV/m) | 2500 (68 dBµV/m) |

Limits

SUBCLAUSE § 15.249 (d)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

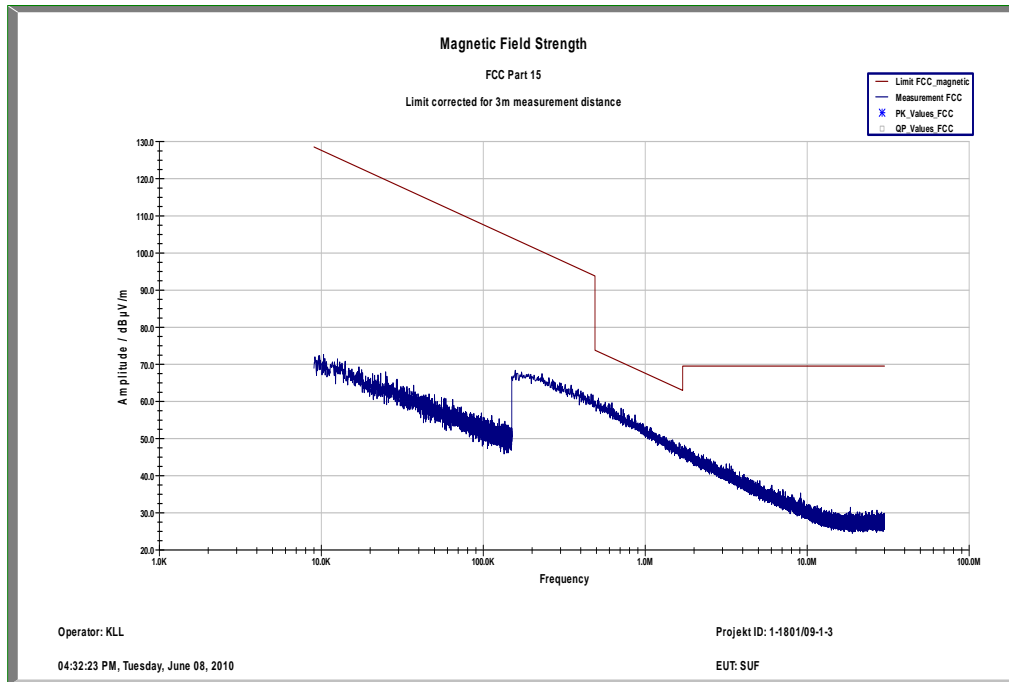
Part 15.109 Magnetics

(to convert the measuring distance from 3m to 30m and 30 to 300m a correction factor from 40 dB/decade was used.)

Measurement distance 3m

This measurement was done in 3 polarisation's, the plot shows the worst case

Plot 1:



Limits

SUBCLAUSE § 15.209

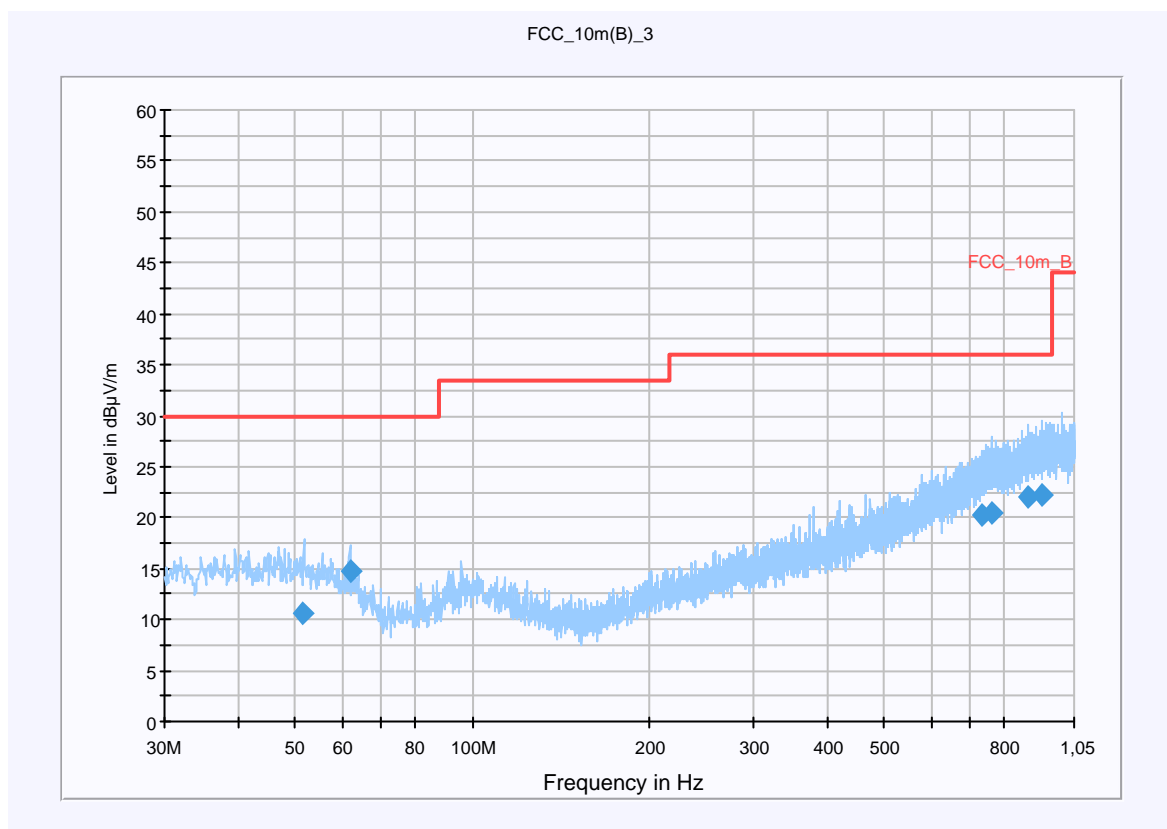
| Frequency (MHz) | Field strength (µV/m) | Measurement distance (m) |
|-----------------|-----------------------|--------------------------|
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 - 30 | 30 | 30 |
| 30 - 88 | 100 | 3 |
| 88 - 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| above 960 | 500 | 3 |

Plot:1 Lowest channel, 0.03 – 1GHz

| | |
|-----------------------|-----------------------------|
| EUT: | SUF |
| Serial Number: | Prototype |
| Test Description: | FCC part 15 C Class B @ 10m |
| Operating Conditions: | cont. Tx; CH:00 |
| Operator Name: | LNG |
| Comment: | powerd via USB (5 V DC) |

Scan Setup: STAN_Fin [EMI radiated]

| | | | | |
|-------------------|----------------------|---------------------|-------------------|-----------------|
| Hardware Setup: | Electric Field (NOS) | | | |
| Level Unit: | dB μ V/m | | | |
| Subrange | Detectors | IF Bandwidth | Meas. Time | Receiver |
| 30 MHz - 1,05 GHz | QuasiPeak | 120 kHz | 15 s | Receiver |



Final Result 1

| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Antenna height (cm) | Polarity | Turntable position (deg) | Corr. (dB) | Margin (dB) | Limit (dB μ V/m) | Comment |
|-----------------|--------------------------|-----------------|-----------------|---------------------|----------|--------------------------|------------|-------------|----------------------|---------|
| 51.390750 | 10.7 | 15000.000 | 120.000 | 220.0 | V | 200.0 | 13.2 | 19.3 | 30.0 | |
| 61.984650 | 14.8 | 15000.000 | 120.000 | 203.0 | V | 13.0 | 11.1 | 15.2 | 30.0 | |
| 731.466750 | 20.2 | 15000.000 | 120.000 | 151.0 | H | -1.0 | 23.2 | 15.8 | 36.0 | |
| 759.814950 | 20.4 | 15000.000 | 120.000 | 220.0 | H | 254.0 | 23.7 | 15.6 | 36.0 | |
| 877.720800 | 22.0 | 15000.000 | 120.000 | 141.0 | V | 110.0 | 24.9 | 14.0 | 36.0 | |
| 923.564100 | 22.3 | 15000.000 | 120.000 | 98.0 | H | 0.0 | 25.3 | 13.7 | 36.0 | |

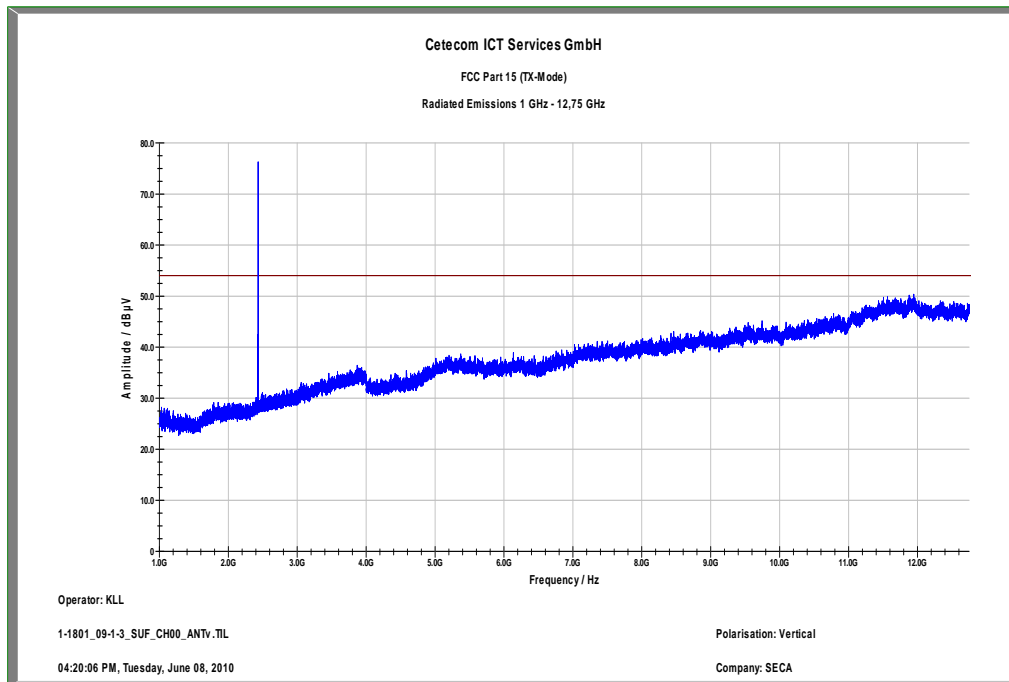
Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1

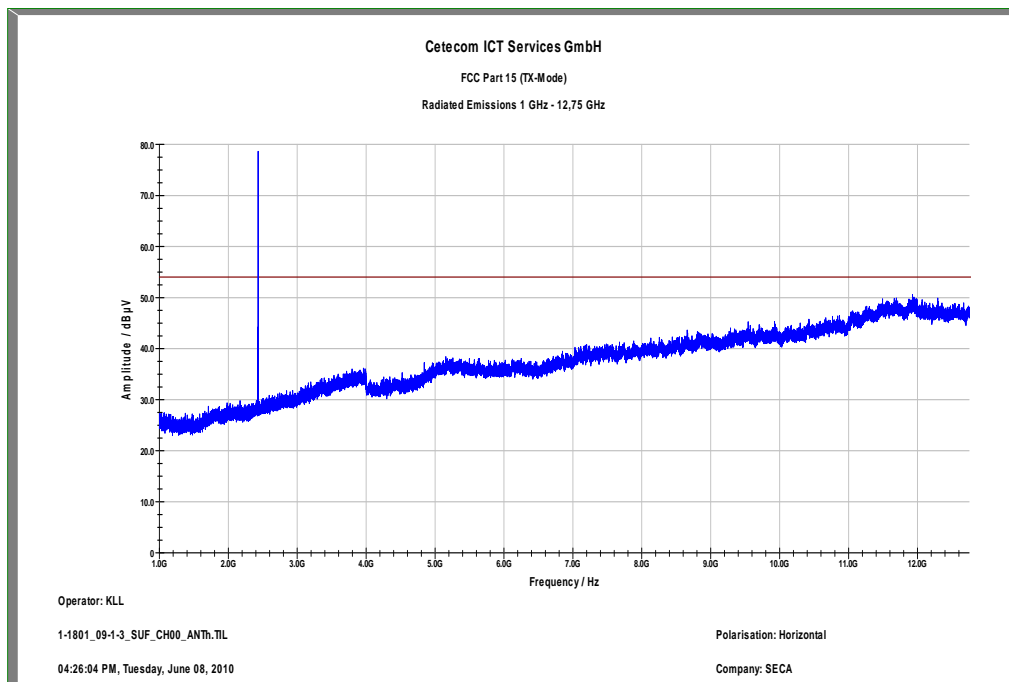
| | |
|------------------|--|
| Frequency Range: | 30 MHz - 2 GHz |
| Receiver: | Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32 |
| Signal Path: | without Notch FW 1.0 |
| Antenna: | VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113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

EMC 32 Version 8.10.00

Plot:2 Lowest channel, 1 – 12.75GHz, antenna vertical



Plot:4 Lowest channel, 1 – 12.75GHz, antenna horizontal

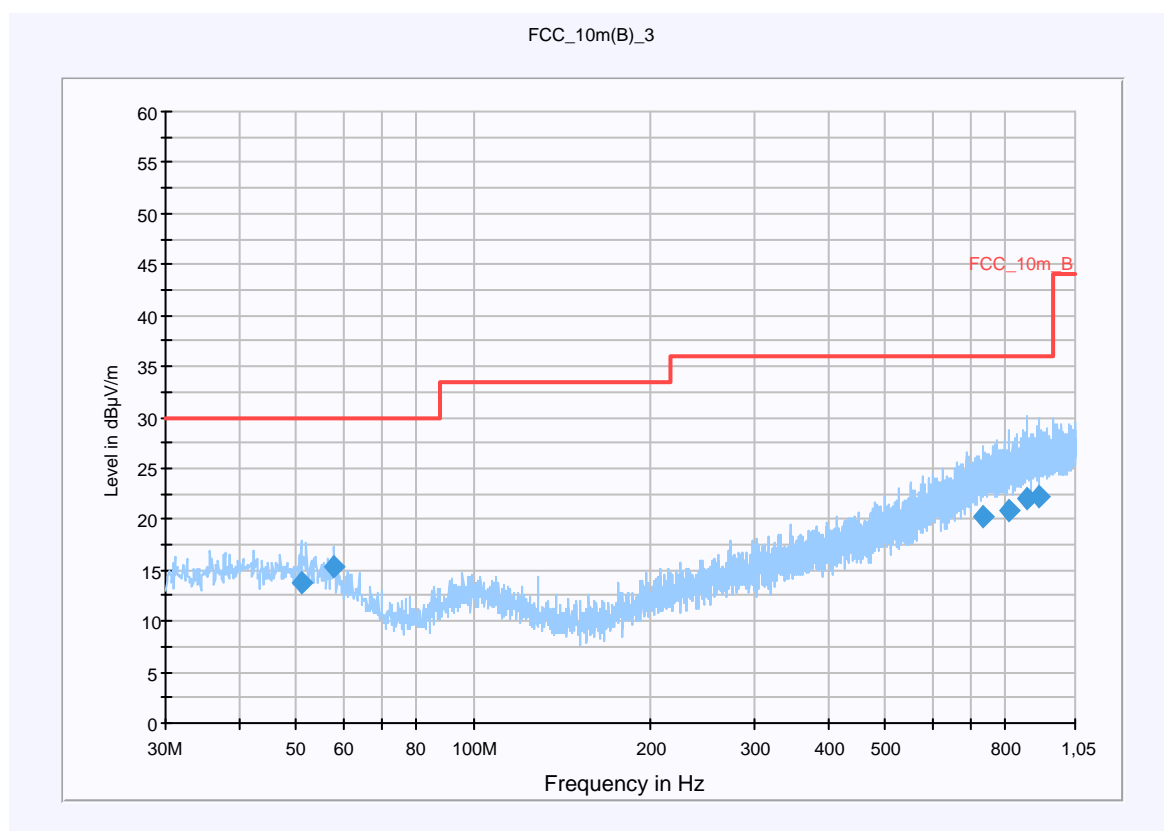


Plot:6 Middle channel, 0.03 – 1GHz

| | |
|-----------------------|-----------------------------|
| EUT: | SUF |
| Serial Number: | Prototype |
| Test Description: | FCC part 15 C Class B @ 10m |
| Operating Conditions: | cont. Tx; CH: 49 |
| Operator Name: | LNG |
| Comment: | powerd via USB (5 V DC) |

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 |
|-----------------|--------------------|-----------------|-----------------|---------------------|----------|--------------------------|------------|-------------|----------------|---------|
| 50.964300 | 13.7 | 15000.000 | 120.000 | 98.0 | V | 17.0 | 13.3 | 16.3 | 30.0 | |
| 58.018800 | 15.4 | 15000.000 | 120.000 | 178.0 | V | 290.0 | 12.1 | 14.6 | 30.0 | |
| 730.478250 | 20.2 | 15000.000 | 120.000 | 220.0 | V | 270.0 | 23.2 | 15.8 | 36.0 | |
| 813.680250 | 20.8 | 15000.000 | 120.000 | 220.0 | H | 180.0 | 24.0 | 15.2 | 36.0 | |
| 872.443800 | 21.9 | 15000.000 | 120.000 | 167.0 | H | 270.0 | 24.8 | 14.1 | 36.0 | |
| 913.708350 | 22.3 | 15000.000 | 120.000 | 159.0 | H | 110.0 | 25.2 | 13.7 | 36.0 | |

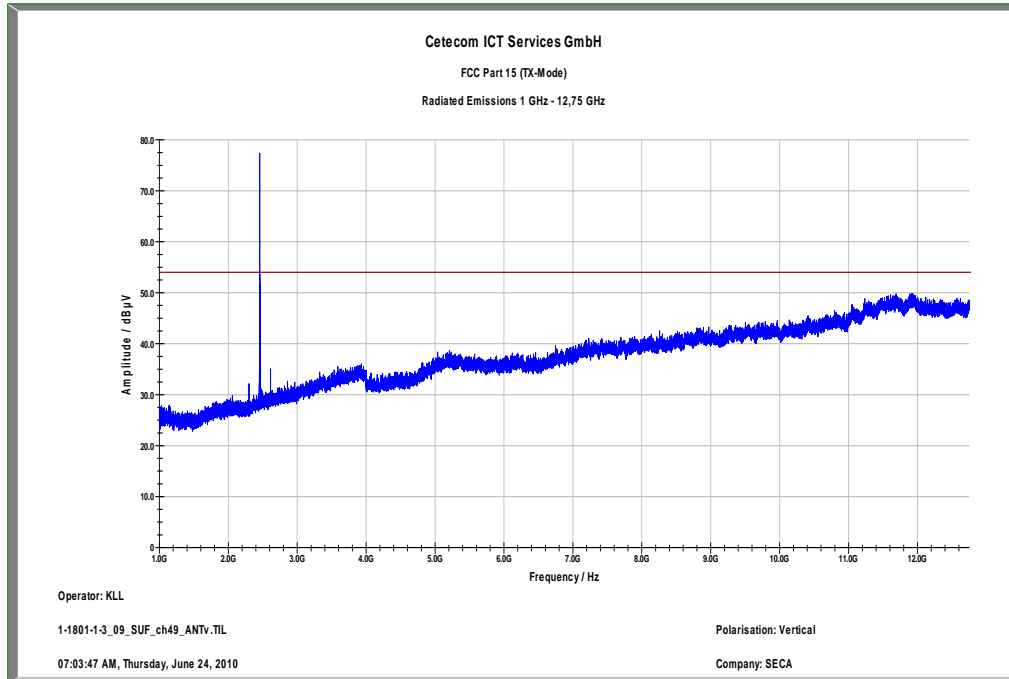
Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1

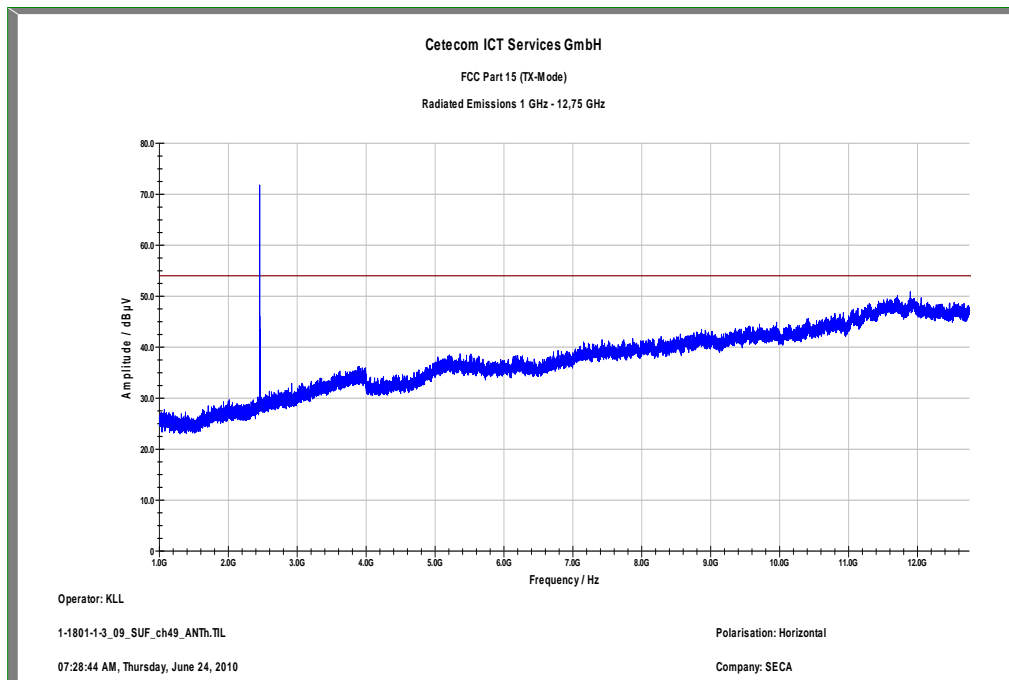
| | |
|------------------|--|
| Frequency Range: | 30 MHz - 2 GHz |
| Receiver: | Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32 |
| Signal Path: | without Notch FW 1.0 |
| Antenna: | VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113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

EMC 32 Version 8.10.00

Plot:7 Middle channel, 1 – 12.75GHz, antenna vertical



Plot:9 Middle channel, 1 – 12.75GHz, antenna horizontal

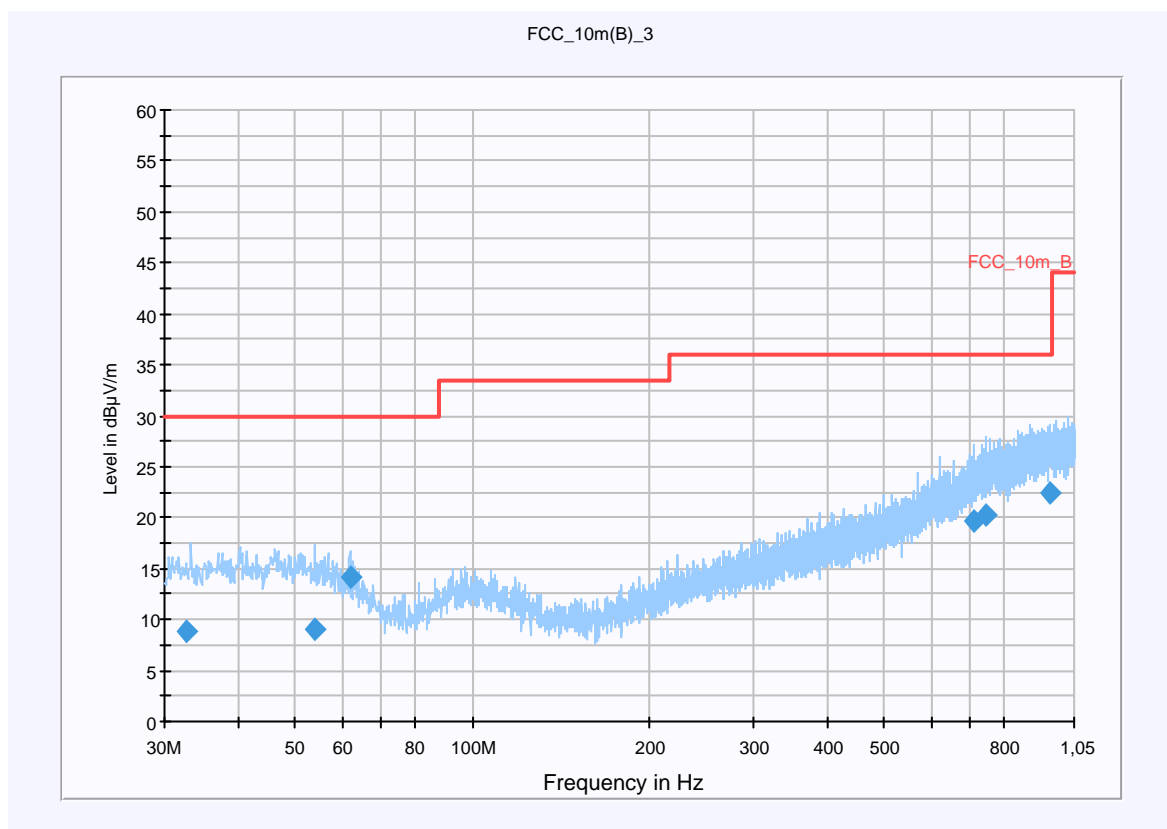


Plot: 10 Highest channel, 0.03 – 1GHz, antenna vertical

| | |
|-----------------------|-----------------------------|
| EUT: | SUF |
| Serial Number: | Prototype |
| Test Description: | FCC part 15 C Class B @ 10m |
| Operating Conditions: | cont. Tx; CH:99 |
| Operator Name: | HMN |
| Comment: | powerd via USB (5 V DC) |

Scan Setup: STAN_Fin [EMI radiated]

| | | | | |
|-------------------|----------------------|---------------------|-------------------|-----------------|
| Hardware Setup: | Electric Field (NOS) | | | |
| Level Unit: | dB μ V/m | | | |
| Subrange | Detectors | IF Bandwidth | Meas. Time | Receiver |
| 30 MHz - 1,05 GHz | QuasiPeak | 120 kHz | 15 s | Receiver |



Final Result 1

| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Antenna height (cm) | Polarity | Turntable position (deg) | Corr. (dB) | Margin (dB) | Limit (dB μ V/m) | Comment |
|-----------------|--------------------------|-----------------|-----------------|---------------------|----------|--------------------------|------------|-------------|----------------------|---------|
| 32.741850 | 8.8 | 15000.000 | 120.000 | 116.0 | H | 188.0 | 12.8 | 21.2 | 30.0 | |
| 53.933550 | 9.0 | 15000.000 | 120.000 | 220.0 | V | -3.0 | 13.0 | 21.0 | 30.0 | |
| 62.020500 | 14.1 | 15000.000 | 120.000 | 98.0 | V | 79.0 | 11.1 | 15.9 | 30.0 | |
| 707.673600 | 19.6 | 15000.000 | 120.000 | 220.0 | H | 92.0 | 22.7 | 16.4 | 36.0 | |
| 741.336600 | 20.4 | 15000.000 | 120.000 | 220.0 | H | 175.0 | 23.5 | 15.6 | 36.0 | |
| 957.894000 | 22.5 | 15000.000 | 120.000 | 193.0 | H | 110.0 | 25.4 | 13.5 | 36.0 | |

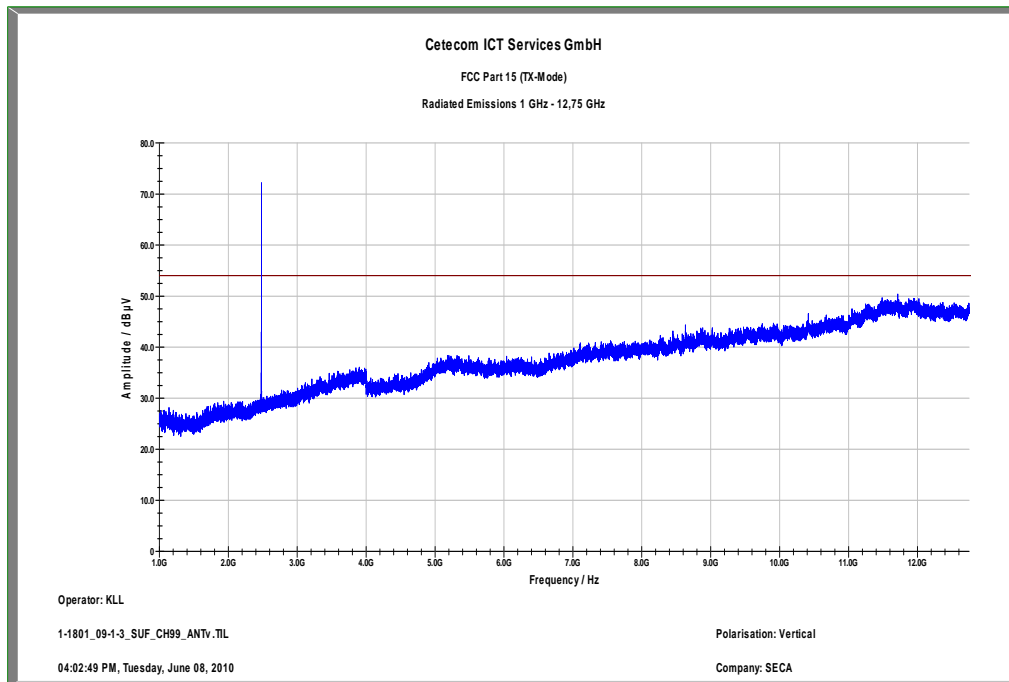
Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1

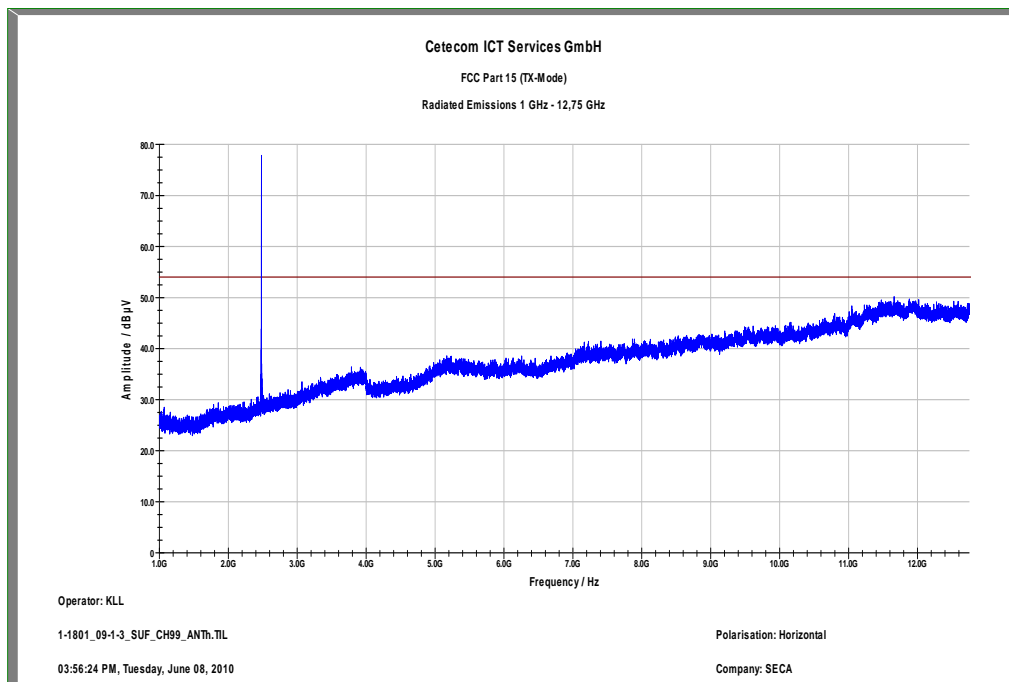
| | |
|------------------|--|
| Frequency Range: | 30 MHz - 2 GHz |
| Receiver: | Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32 |
| Signal Path: | without Notch FW 1.0 |
| Antenna: | VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113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

EMC 32 Version 8.10.00

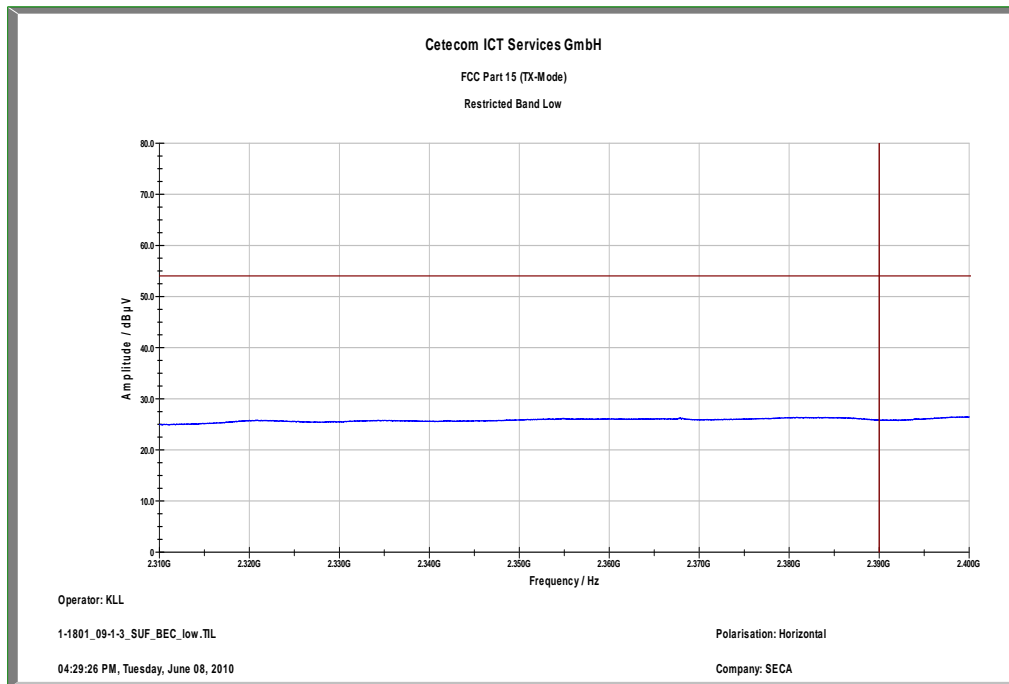
Plot:11 Highest channel, 1 – 12.75GHz, antenna vertical



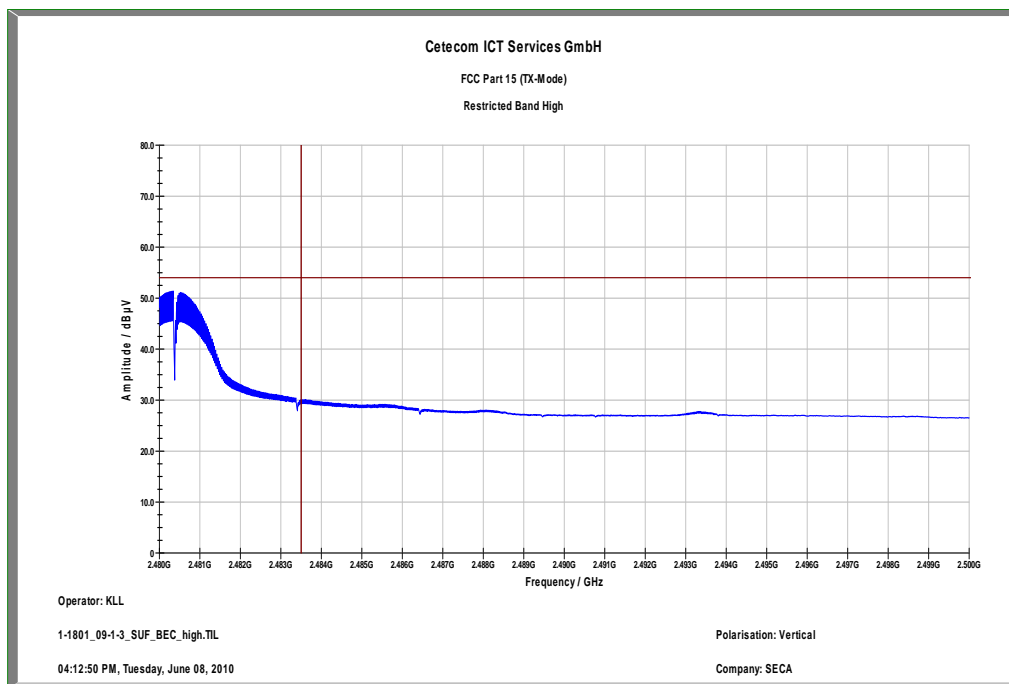
Plot:13 Highest channel, 1 – 12.75GHz, antenna horizontal



Plot: 14 Band edge low



Plot: 15 Band edge high



5.4 Receiver Spurious Emission (radiated)

Reference

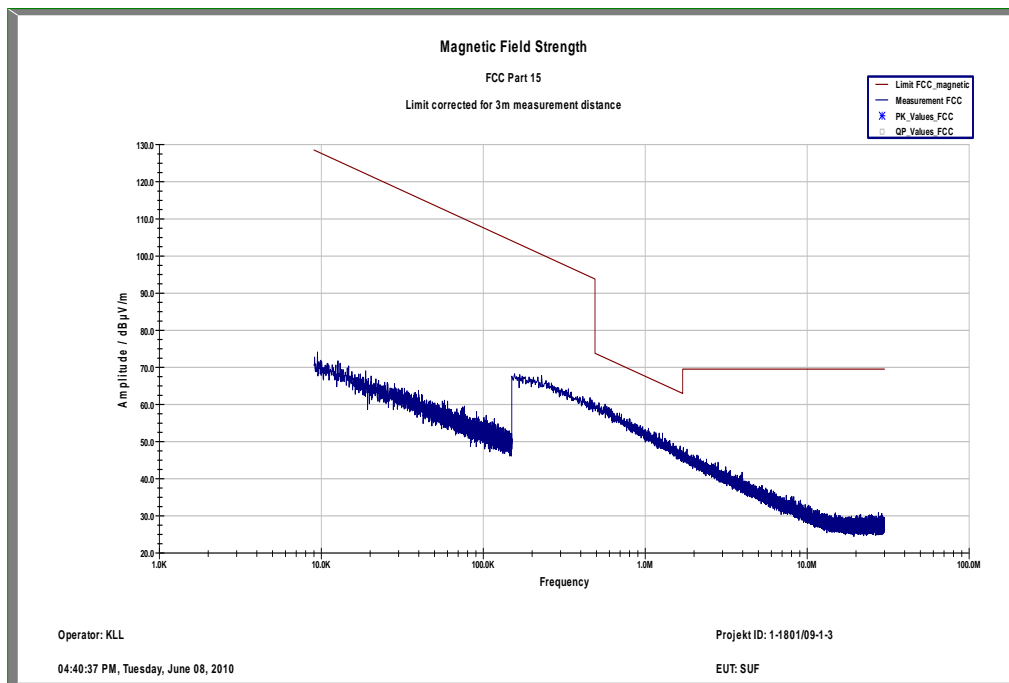
| | | |
|-----|---|--|
| FCC | : | CFR Part SUBCLAUSE § 15.109 |
| IC | : | RSS 210, Issue 7, Section 7.3 Receiver Spurious Emissions (Radiated) |

(to convert the measuring distance from 3m to 30m and 30 to 300m a correction factor from 40 dB/decade was used.)

Measurement distance 3m

This measurement was done in 3 polarisation's, the plot shows the worst case

Plot 1:

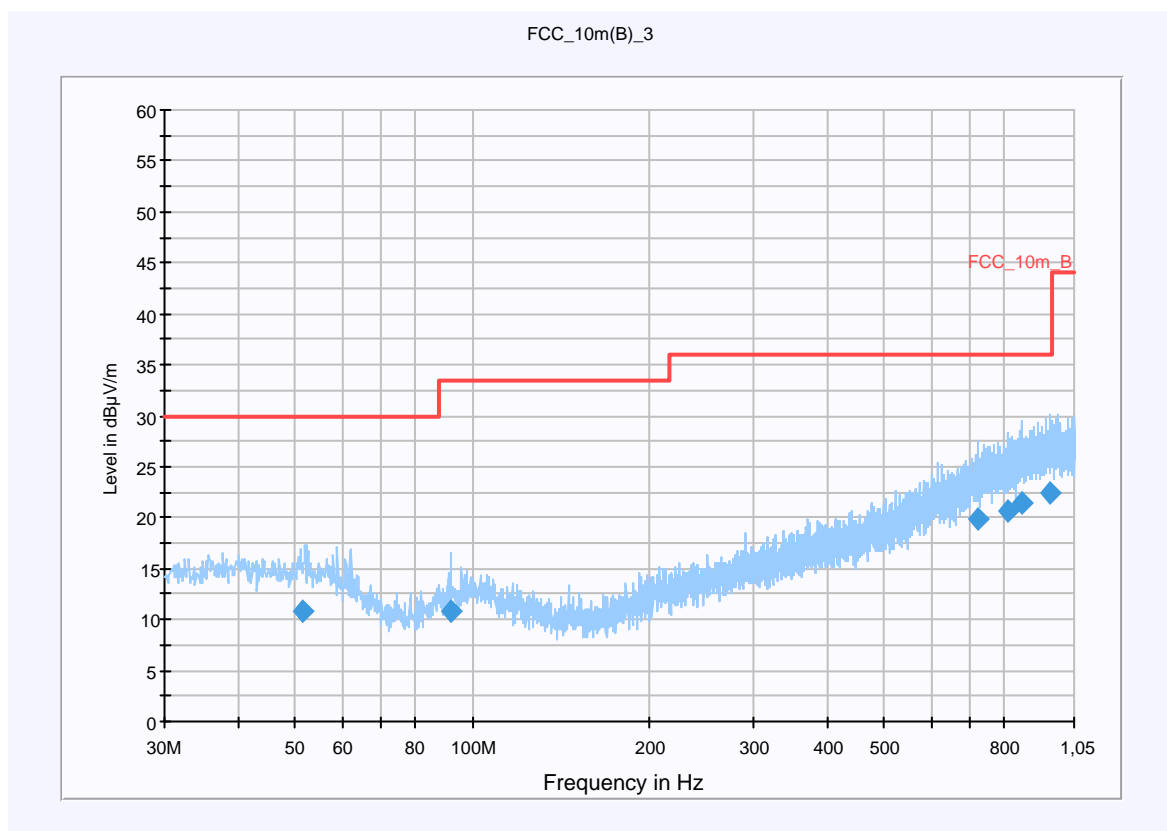


Plot 2: Idle, 0.03 – 1GHz

| | |
|-----------------------|-----------------------------|
| EUT: | SUF |
| Serial Number: | Prototype |
| Test Description: | FCC part 15 C Class B @ 10m |
| Operating Conditions: | idle |
| Operator Name: | LNG |
| Comment: | powerd via USB (5 V DC) |

Scan Setup: STAN_Fin [EMI radiated]

| | | | | |
|-------------------|----------------------|---------------------|-------------------|-----------------|
| Hardware Setup: | Electric Field (NOS) | | | |
| Level Unit: | dB μ V/m | | | |
| Subrange | Detectors | IF Bandwidth | Meas. Time | Receiver |
| 30 MHz - 1,05 GHz | QuasiPeak | 120 kHz | 15 s | Receiver |



Final Result 1

| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Antenna height (cm) | Polarity | Turntable position (deg) | Corr. (dB) | Margin (dB) | Limit (dB μ V/m) | Comment |
|-----------------|--------------------------|-----------------|-----------------|---------------------|----------|--------------------------|------------|-------------|----------------------|---------|
| 51.508800 | 10.8 | 15000.000 | 120.000 | 142.0 | V | 16.0 | 13.2 | 19.2 | 30.0 | |
| 91.971300 | 10.8 | 15000.000 | 120.000 | 167.0 | V | 260.0 | 10.8 | 22.7 | 33.5 | |
| 719.893200 | 19.9 | 15000.000 | 120.000 | 98.0 | H | 260.0 | 23.0 | 16.1 | 36.0 | |
| 809.355600 | 20.7 | 15000.000 | 120.000 | 220.0 | H | 185.0 | 23.9 | 15.3 | 36.0 | |
| 853.776600 | 21.4 | 15000.000 | 120.000 | 220.0 | H | 256.0 | 24.6 | 14.6 | 36.0 | |
| 957.736350 | 22.5 | 15000.000 | 120.000 | 220.0 | H | 288.0 | 25.4 | 13.5 | 36.0 | |

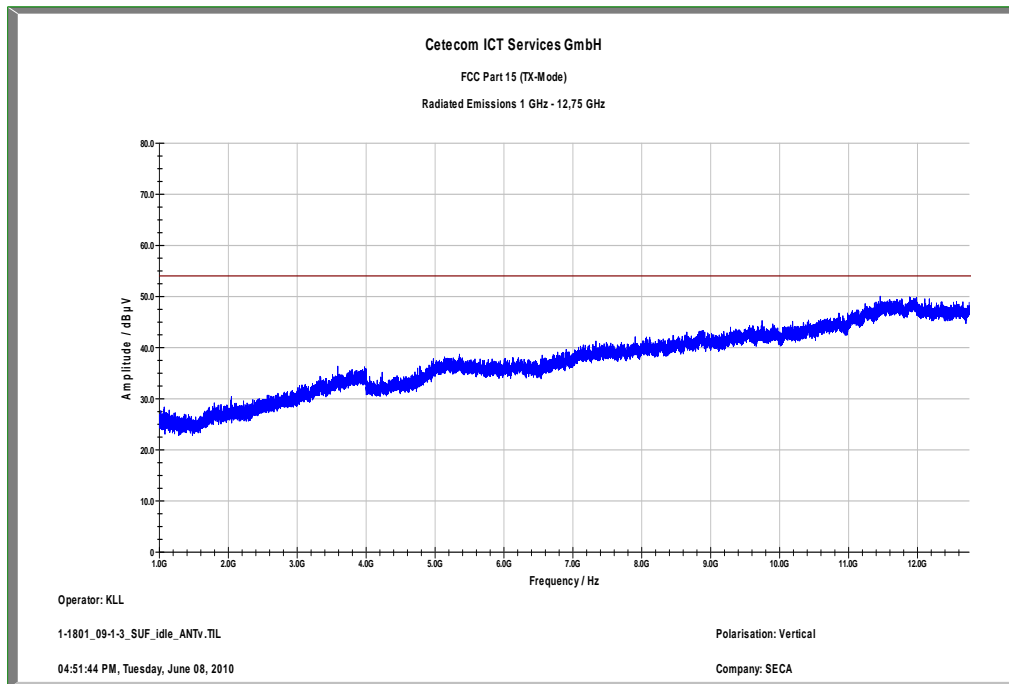
Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1

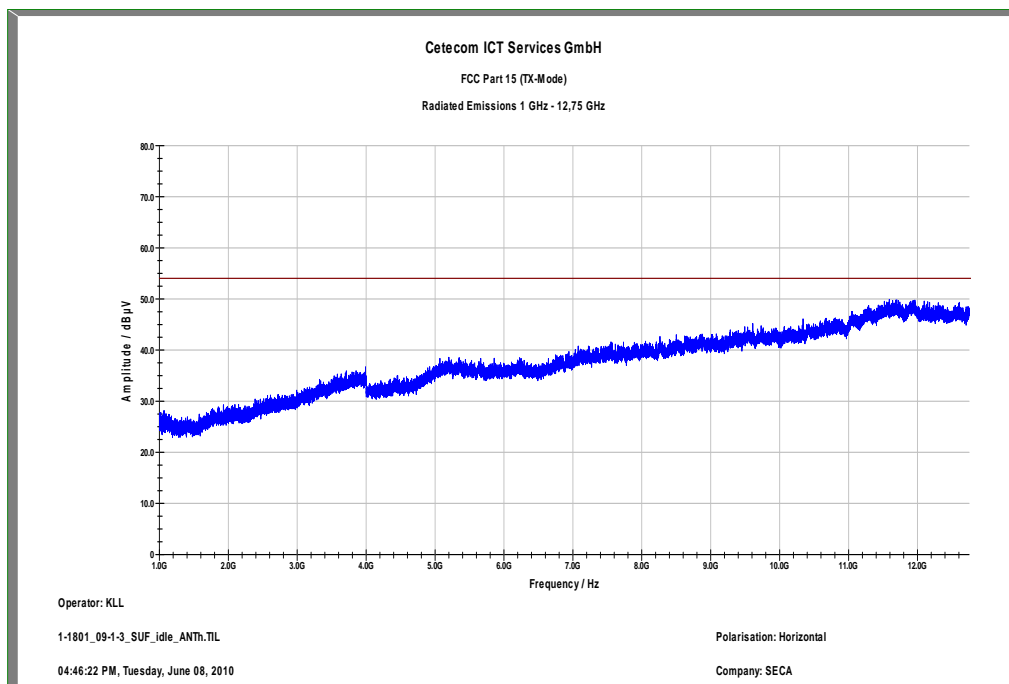
| | |
|------------------|--|
| Frequency Range: | 30 MHz - 2 GHz |
| Receiver: | Receiver [ESCI 3] @ GPIB0 (ADR 20), SN 100083/003, FW 4.32 |
| Signal Path: | without Notch FW 1.0 |
| Antenna: | VULB 9163 SN 9163-295, FW --- Correction Table (vertical): VULP6113 Correction Table (horizontal): VULP6113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

EMC 32 Version 8.10.00

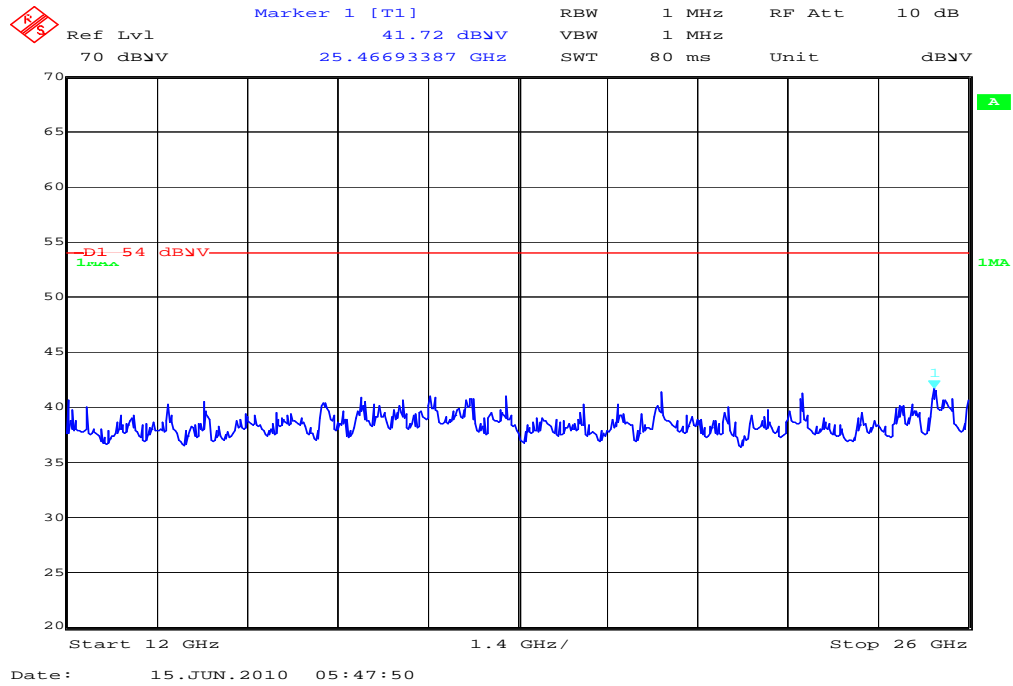
Plot 3: Idle, 1 – 12.75GHz, antenna vertical



Plot 4: Idle, 1 – 12.75GHz, antenna horizontal



Plot 5: Idle, 12 – 26GHz, vertical/horizontal max.hold



Limits

SUBCLAUSE § 15.109

| Frequency (MHz) | Field strength ($\mu\text{V/m}$) | Measurement distance (m) |
|-----------------|------------------------------------|--------------------------|
| 30 - 88 | 100 | 3 |
| 88 - 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| above 960 | 500 | 3 |

5.5 Conducted Limits

Reference

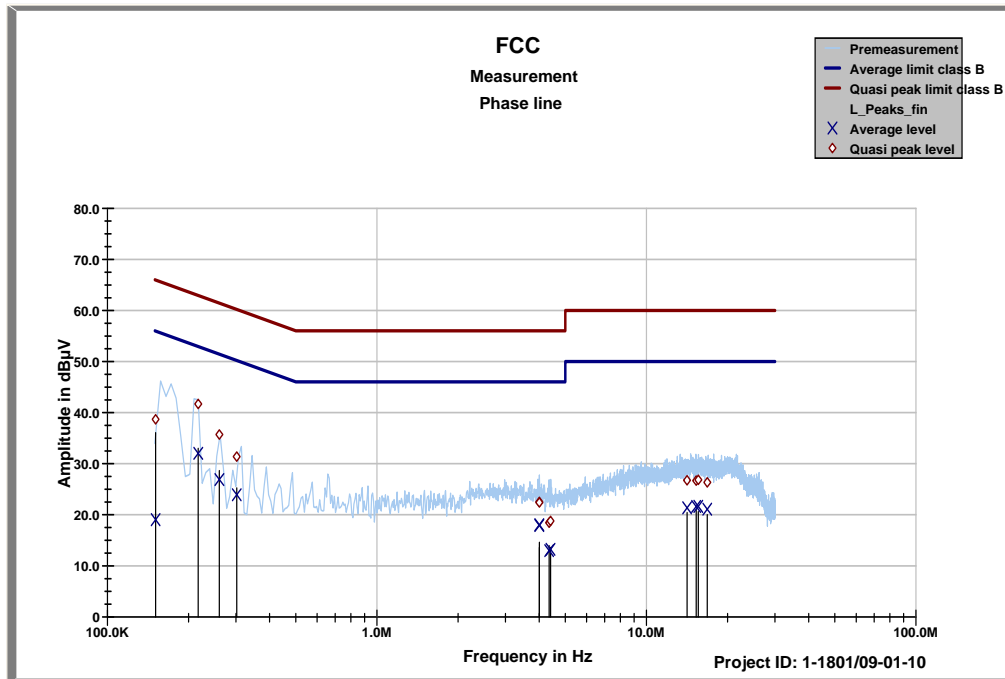
| | | |
|-----|---|-------------------------------------|
| FCC | : | CFR Part 15.207, 15.107 |
| IC | : | RSS 210, Issue 7, Section 6.6 , 7.4 |

Limits: § 15.107 / 15.207

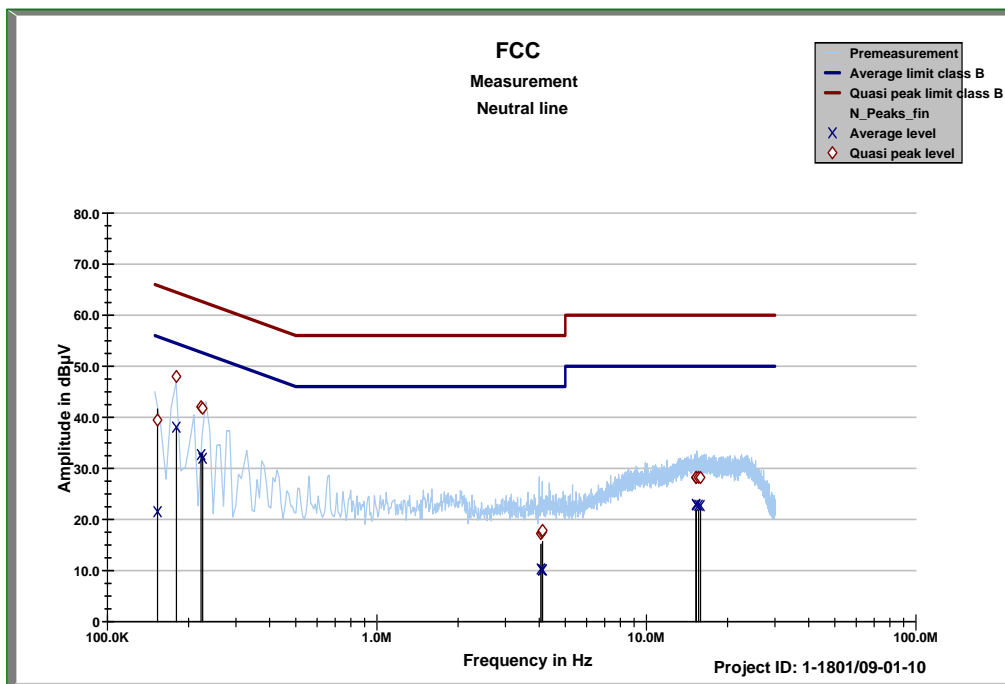
| Frequency of Emission (MHz) | Conducted Limit (dB μ V) | |
|-----------------------------|------------------------------|------------|
| | Quasi-peak | Average |
| 0.15 – 0.5 | 66 to 56 * | 56 to 46 * |
| 0.5 – 5 | 56 | 46 |
| 5 - 30 | 60 | 50 |

* Decreases with the logarithm of the frequency

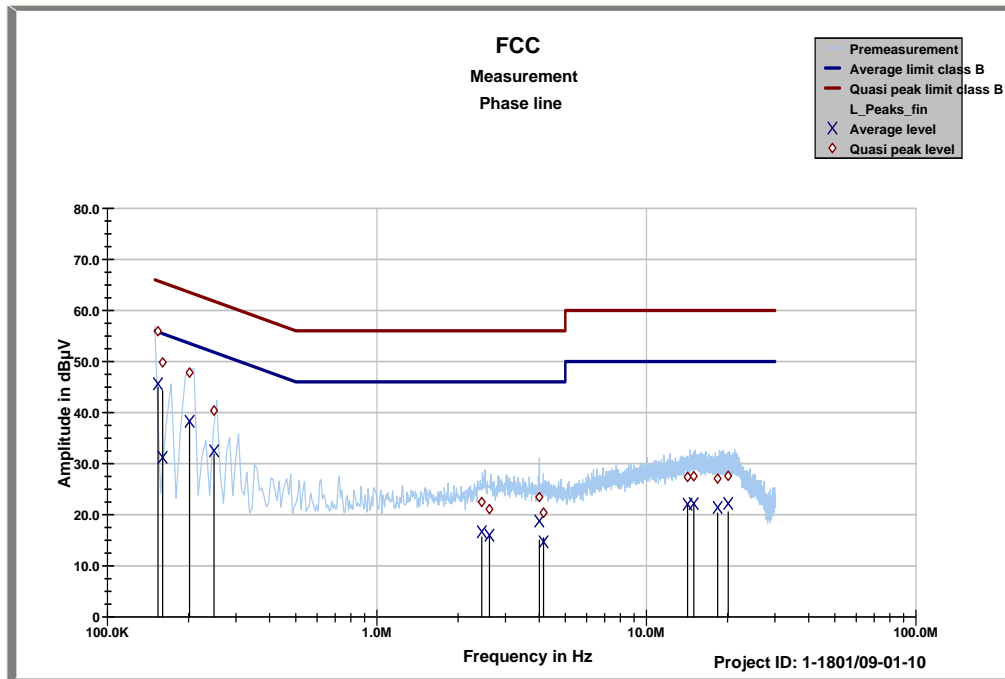
Plot 1: TX CH00, phase line



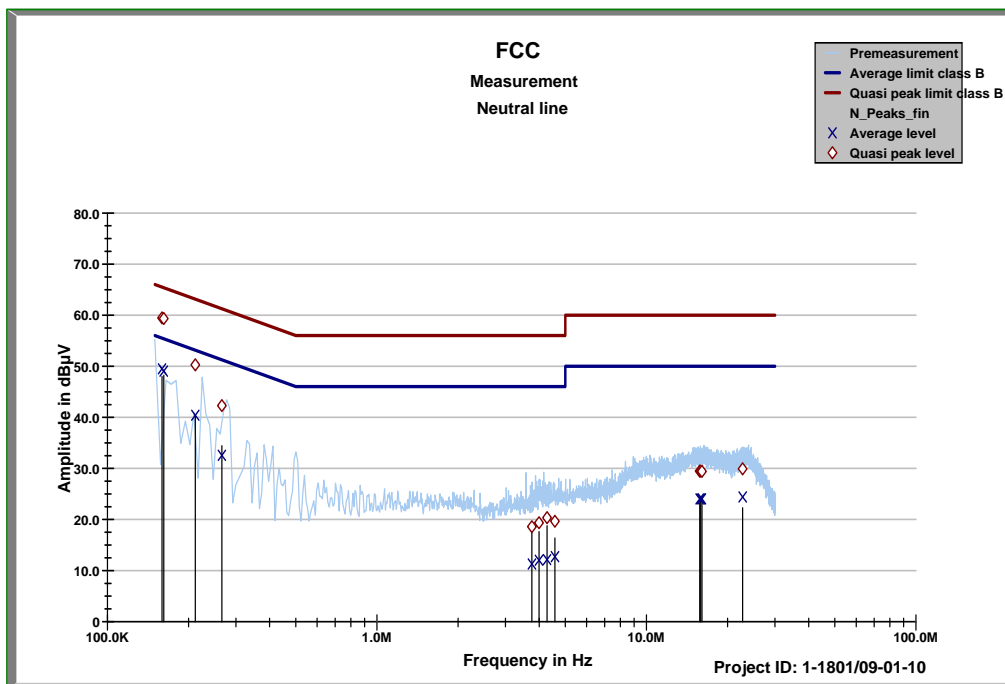
Plot 2: TX CH00, neutral line



Plot 3: Idle, phase line

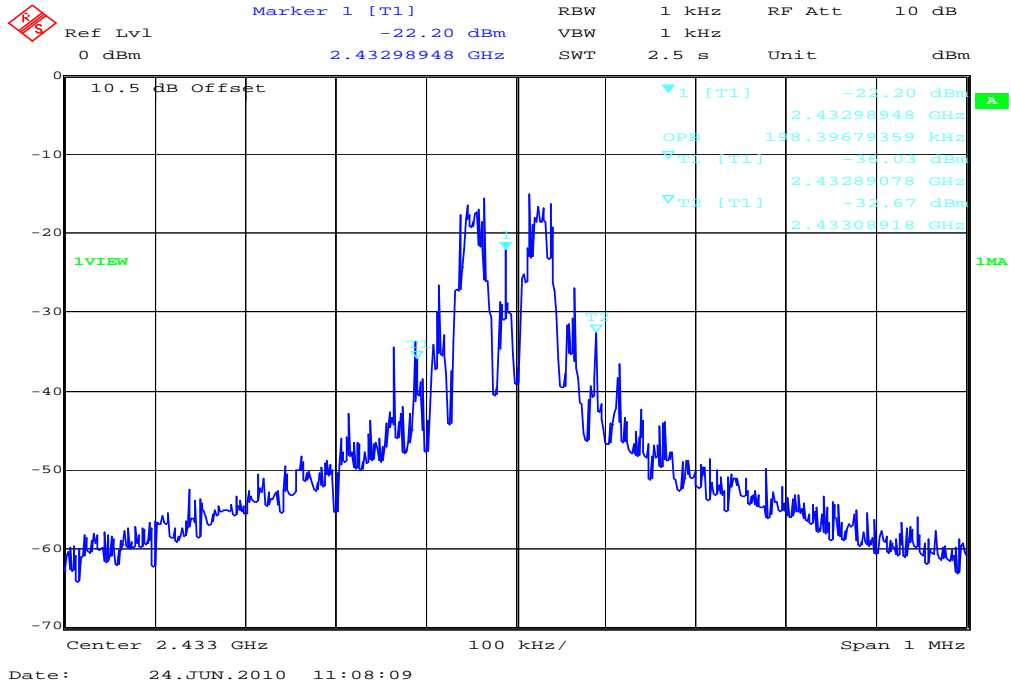


Plot 4: Idle, neutral line

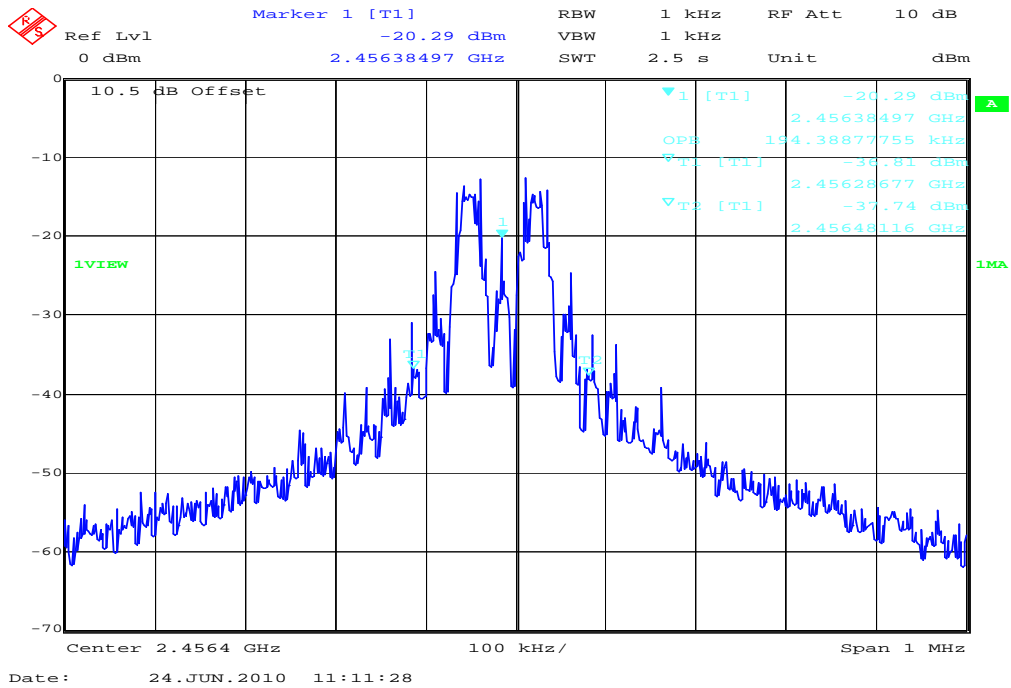


5.6 Occupied bandwidth 20dB (conducted)

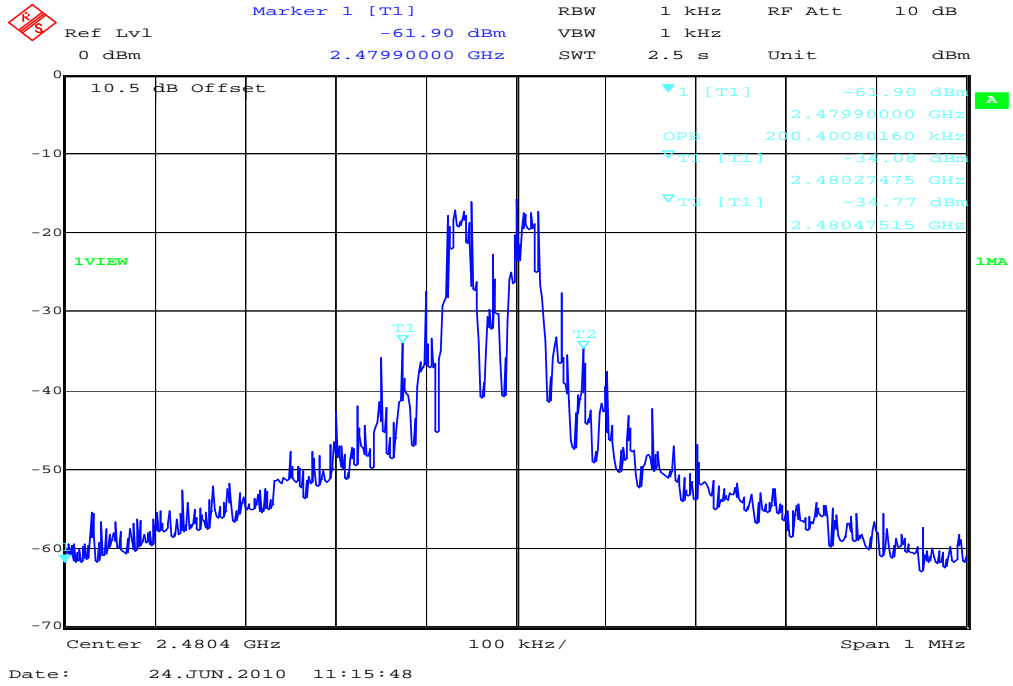
Plot 1: Lowest channel



Plot 2: Middle channel



Plot 3: Highest channel



Results:

| Test conditions | | 20 dB BANDWIDTH [MHz] | | |
|-------------------------|-----------|-----------------------|--------|--------|
| | | 2433 | 2456.4 | 2480.4 |
| Frequency [MHz] | | 2433 | 2456.4 | 2480.4 |
| T_{nom} | V_{nom} | 0.198 | 0.194 | 0.200 |
| Measurement uncertainty | | ±3kHz | | |

6 Test equipment and ancillaries used for tests

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

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

| No. | Labor / Item | Equipment | Type | Manufact. | Serial No. | INV. No Cetecom | Kal. Art | Last Calibration | Next Calibration |
|-----|--------------|---|---|--------------------|------------|-----------------|---------------|------------------|------------------|
| 1 | n. a. | DC power supply, 60Vdc, 50A, 1200 W | 6032A | HP Meßtechnik | 2818A03450 | 300001040 | Ve | 08.01.2009 | 08.01.2012 |
| 2 | n. a. | PowerAttenuator | 8325 | Byrd | 1530 | 300001595 | | | |
| 3 | n. a. | Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115 | EMCO | 8812-3088 | 300001032 | vl KI ! | 05.03.2009 | 05.03.2011 |
| 4 | n. a. | Active Loop Antenna | 6502 | EMCO | 2210 | 300001015 | ne | | |
| 5 | n. a. | Anechoic chamber | | MWB | 87400/02 | 300000996 | | | |
| 6 | Spec.A. 2_2e | System rack for EMI measurement solution | 85900 | HP I.V. | * | 300000222 | ne | | |
| 7 | 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 |
| 8 | n. a. | Relais Matrix | 3488A | HP Meßtechnik | 2719A15013 | 300001156 | ne | | |
| 9 | n. a. | Relais Matrix | PSU | R&S | 890167/024 | 300001168 | ne | | |
| 10 | n. a. | Isolating Transformer | RT5A | Grundig | 9242 | 300001263 | ne | | |
| 11 | n. a. | Three-Way Power Splitter, 50 Ohm | 11850C | HP Meßtechnik | | 300000997 | ne | | |
| 12 | n. a. | Switch / Control Unit | 3488A | HP | 2605e08770 | 300001443 | ne | | |
| 13 | n. a. | Band Reject filter | WRCG1 855/1910 - 1835/192 5-40/8SS | Wainwright | 7 | 300003350 | ev | | |
| 14 | n. a. | Band Reject filter | WRCG2 400/2483 - 2375/250 5- 50/10SS | Wainwright | 11 | 300003351 | ev | | |
| 15 | n. a. | TILE-Software Emission | Quantum Change, Modell TILE-ICS/FULL | EMCO | none | 300003451 | ne | | |
| 16 | n. a. | Highpass Filter | WHKX2. 9/18G- 12SS | Wainwright | 1 | 300003492 | ev | | |
| 17 | n. a. | Highpass Filter | WHK1.1/ 15G- 10SS | Wainwright | 3 | 300003255 | ev | | |
| 18 | n. a. | Highpass Filter | WHKX7. 0/18G- 8SS | Wainwright | 18 | 300003789 | ne | | |
| 19 | n. a. | PSA Spectrum Analyzer 3 Hz - 26.5 | E4440A | Agilent Technologi | MY48250080 | 300003812 | k | 05.08.2008 | 05.08.2010 |

| | | | | | | | | | |
|----|-------|--|---------------------|----------------------|---------------------|----------------|---------------|------------|------------|
| | | GHz | | es | | | | | |
| 20 | n. a. | MXG Microwave Analog Signal Generator | N5183A | Agilent Technologies | MY47420220 | 300003813 | k | 06.08.2008 | 06.08.2010 |
| 21 | n. a. | RF Filter Section 9kHz - 1GHz | N9039A | Agilent Technologies | MY48260003 | 300003825 | vl KI ! | 19.08.2008 | 19.08.2010 |
| 22 | n. a. | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck | 371 | 300003854 | vl KI ! | 17.12.2008 | 17.12.2010 |
| 23 | n. a. | Signal Analyzer 20Hz-26,5GHz-150 to + 30 DBM | FSIQ26 | R&S | 835540/018 | 300002681-0005 | k | 07.01.2010 | 07.01.2012 |
| 24 | n. a. | DC Power Supply 0 – 32V | 1108-32 | Heiden | 001802 | 300001383 | Ve | | |
| 25 | 45 | Switch-Unit | 3488A | HP Meßtechnik | 2719A14505 | 300000368 | g | | |
| 26 | 50 | DC power supply, 60Vdc, 50A, 1200 W | 6032A | HP Meßtechnik | 2920A04466 | 300000580 | k | 06.01.2009 | 06.01.2011 |
| 27 | n. a. | software | SPS_PHE 1.4f | Spitzberger & Spieß | B5981; 5D1081;B5979 | 300000210 | ne | | |
| 28 | n. a. | EMI Test Receiver | ESCI 1166.5950.03 | R&S | 100083 | 300003312 | k | 08.01.2010 | 08.01.2012 |
| 29 | n. a. | Analyzerr-Reference-System (Harmonics and Flicker) | ARS 16/1 | SPS | A3509 07/00205 | 300003314 | k | | |
| 30 | n. a. | Amplifier | JS42-00502650-28-5A | MITEQ | 1084532 | 300003379 | ev | | |
| 31 | n. a. | Antenna Tower | Model 2175 | ETS-LINDGREN | 64762 | 300003745 | iz w | | |
| 32 | n. a. | Positioning Controller | Model 2090 | ETS-LINDGREN | 64672 | 300003746 | iz w | | |
| 33 | n. a. | Turntable Interface-Box | Model 105637 | ETS-LINDGREN | 44583 | 300003747 | iz w | | |
| 34 | n. a. | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck | 295 | 300003787 | k | | |
| 35 | n. a. | Spectrum-Analyzer | FSU26 | R&S | 200809 | 300003874 | k | 08.01.2010 | 08.01.2012 |