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CETECOM ICT Services
consulting - testing - certification >>>

TEST REPORT

Test report no.: 1-3701/11-01-09-A



DAkkS
Deutsche
Akkreditierungsstelle
D-PL-12076-01-01

Testing laboratory

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Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01
Area of Testing: Radio/Satellite Communications

Applicant

Cochlear Limited
1 University Avenue
Macquarie University NSW 2109 / AUSTRALIA
Phone: +61 2 94 28 65 15
Fax: -/-
Contact: Bronwyn Evans
e-mail: bevans@cochlear.com
Phone: +61 2 94 28 65 15

Manufacturer

Cochlear Limited
14 Mars Road, Lane Cove
NSW 2066 Sydney / AUSTRALIA

Test standard/s

| | |
|-------------------|--|
| 47 CFR Part 15 | Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices |
| RSS - 210 Issue 8 | Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment |

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

Test Item

Kind of test item: 2,4 GHz Hearing device with two Remote Controls
Model name: CR220,CR230, DR220, DR230
FCC ID: WTOR200FF
IC: 8039A-R200FF
Frequency: ISM band 2400 – 2483.5 MHz
lowest channel: 2402 MHz, highest channel: 2482 MHz
Technology tested: GFSK
Antenna: Integrated PCB antenna
Power Supply: 3.6 V DC by Li-Ion battery
Temperature Range: +5°C to +50 °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 report authorised:

Marco Bertolino
Testing Manager

Test performed:

Andreas Luckenbill

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2 General information

2.1 Notes and disclaimer

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 generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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

2.2 Application details

| | |
|------------------------------------|------------|
| Date of receipt of order: | 2012-02-07 |
| Date of receipt of test item: | 2012-02-07 |
| Start of test: | 2012-02-13 |
| End of test: | 2012-03-23 |
| Person(s) present during the test: | -/- |

3 Test standard/s

| Test standard | Date | Test standard description |
|-------------------|---------|---|
| 47 CFR Part 15 | 2010-10 | Title 47 of the Code of Federal Regulations; Chapter I Part 15 - Radio frequency devices |
| RSS - 210 Issue 8 | 2010-12 | Spectrum Management and Telecommunications - Radio Standards Specification Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment |

4 Test environment

| | | |
|----------------------------|------------------|---------------------------------------|
| Temperature: | T_{nom} | +22 °C during room temperature tests |
| | T_{max} | +50 °C during high temperature tests |
| | T_{min} | +5 °C during low temperature tests |
| Relative humidity content: | | 30 % |
| Barometric pressure: | | not relevant for this kind of testing |
| Power supply: | V_{nom} | 3.6 V DC by Li-Ion battery |
| | V_{max} | 4.2 V |
| | V_{min} | 3.0 V |

5 Test item

| | |
|------------------------|--|
| Kind of test item : | 2,4 GHz Hearing device with two Remote Controls |
| Type identification : | CR220, CR230, DR220, DR230 |
| S/N serial number : | Rad. 1040230004701x, 1040230005500x Cond. 1040230004695x |
| HW hardware status : | Build X |
| SW software status : | WTAv2 |
| Frequency band [MHz] : | ISM band: 2400 MHz – 2483.5 MHz lowest channel: 2402 MHz, highest channel: 2482 MHz |
| Type of modulation : | GFSK |
| Number of channels : | 41 |
| Antenna : | Integrated PCB antenna |
| Power supply : | 3.6 V DC by Li-Ion battery |
| Temperature range : | +5°C to +50 °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 | Passed | 2012-04-02 | -/- |

| Test specification clause | Test case | Temperature conditions | Power source voltages | Mode | Pass | Fail | NA | NP | Results (max.) |
|---|---------------------------------------|------------------------|-----------------------|---------|-------------------------------------|--------------------------|--------------------------|--------------------------|----------------|
| CFR 15.35(c) RSS Gen (Issue 3) / 4.5 | Timing of the transmitter | Nominal | Nominal | TX | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Not limited |
| RSS Gen (Issue 3) / 4.6.1 | 99% - Occupied Bandwidth | Nominal | Nominal | TX | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Not limited |
| §15.249(a)(e) RSS-210 / A2.9(a) | Maximum field strength | Nominal | Nominal | TX | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |
| §15.249(d) RSS-210 / A2.9(a)(b) | Band edge compliance radiated | Nominal | Nominal | TX | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |
| §15.249(d) RSS-210 / A2.9(a)(b) | TX spurious emissions radiated | Nominal | Nominal | TX | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |
| §15.109 RSS-Gen | RX spurious emissions radiated | Nominal | Nominal | Idle | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |
| §15.209(a) RSS-Gen | Spurious emissions radiated < 30 MHz | Nominal | Nominal | TX/Idle | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |
| §15.107(a) RSS-Gen | Spurious emissions conducted < 30 MHz | Nominal | Nominal | TX/Idle | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | complies |

Note: NA = Not Applicable; NP = Not Performed

8 RF measurements

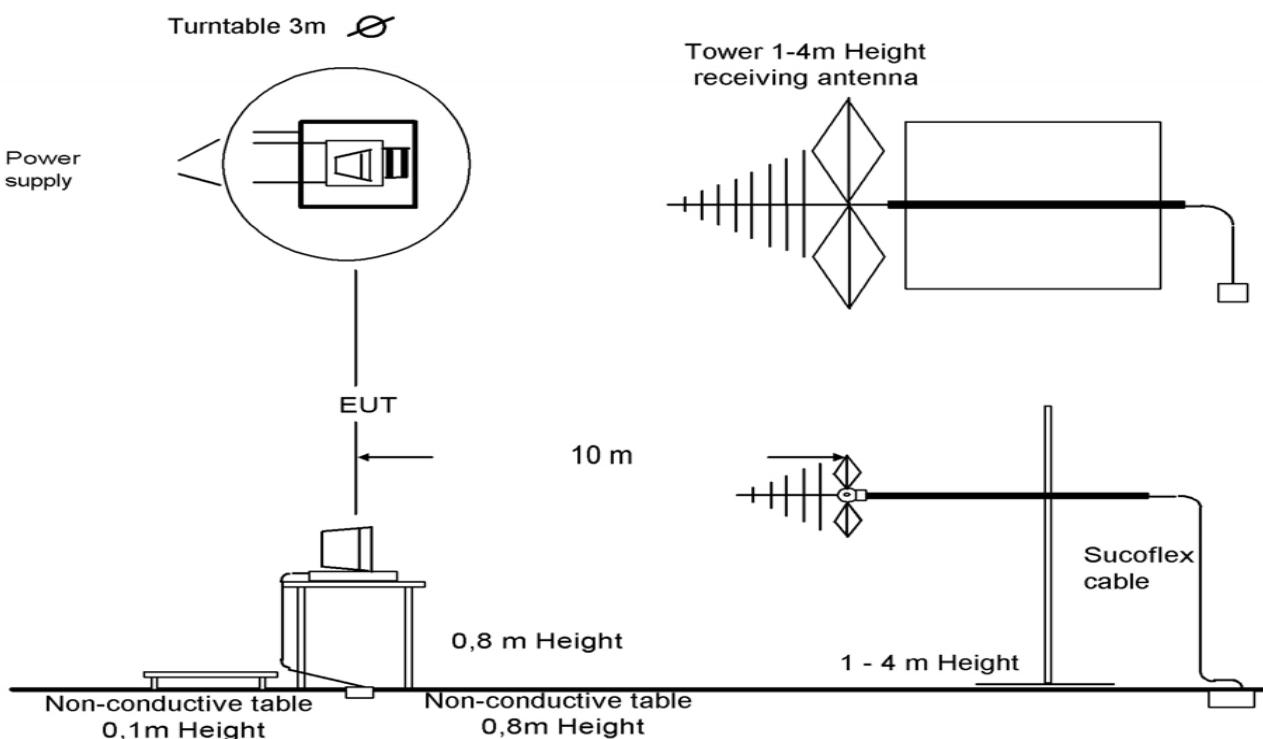
8.1 Description of test setup

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 C63.10-2009 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 C63.10-2009 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 |

The EUT is powered by an external power supply with nominal voltage or with battery.

8.2 Additional comments

Reference documents: None

Special test descriptions: None

Configuration descriptions: TX tests: were performed with the Pulsed 32b (901us) option in the Wireless TestApp 2.00 on the device.
RX/Standby tests: were performed with the Continuous RX option in the Wireless TestApp 2.00 on the device.

Test mode: Special software is used.
EUT is transmitting pseudo random data by itself

Delta test between Nordic1 chip incl. antenna and Nordic 2 chip incl. antenna in one device.

8.3 RSP100 test report cover sheet / performance test data

| | | |
|--|---|--|
| Test report number | : | 1-3701/11-01-09-A |
| Equipment model number | : | CR220, CR230, DR220, DR230 |
| Certification number | : | 8039A-R200FF |
| Manufacturer (complete address) | : | Cochlear Limited 14 Mars Road, Lane Cove NSW 2066 Sydney / AUSTRALIA |
| Tested to radio standards specification no. | : | RSS 210, Issue 8 |
| Open area test site IC No. | : | IC 3462C-1 |
| Frequency range | : | ISM band 2400 MHz to 2483.5 MHz (lowest channel 2402 MHz, highest channel 2482 MHz) |
| RF-field strength [dBμV/m @ 3 m] (max.) | : | Nordic 1: 78.71 (AVG) Nordic 2: 78.55 (AVG) |
| Occupied bandwidth (99%-BW) [kHz] | : | 1779 |
| Type of modulation | : | Digital Transmission System using GFSK modulation |
| Emission designator (TRC-43) | : | 1M78FXD |
| Antenna information | : | Integrated PCB antenna |
| Transmitter spurious (worst case) [dBμV/m @ 3m]: | | 49 @ 4804 MHz |
| Receiver spurious (worst case) [dBμV/m @ 3m] : | | 45 (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:

2012-04-02 Andreas Luckenbill
Date Name



Signature

9 Measurement results

9.1 Timing of the transmitter

Limits:

| FCC | IC |
|---|----|
| Timing of the transmitter | |
| <p>(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.</p> | |

Information by the vendor:

The protocol foresees in 901us pulse rate and the duration per emission is approx.

50us + [(1+4+8+2) *8bits / 2Mbps] = 110us.

Thus $20 * \log (111 * 0.110[\text{ms}]) / 100\text{ms} = 20 * \log (12.21\%) = -18.26 \text{ dB}$

Calculation:

Transmit time (Tx on) within 100 ms = $111 \times 0.110 \text{ ms} = 12.21 \text{ ms}$

Assumed Transmit time (Tx on) within 100 ms for further calculations: 12.21 ms

The peak-to-average correction factor [dB] is calculated with $20 \text{ Log } [\text{Tx on} / 100\text{ms}]$.

Result:

peak-to-average correction factor [dB]: -18.27

9.2 Spectrum bandwidth – 99% bandwidth

Description:

Measurement of the 99% bandwidth of the modulated signal.

Measurement:

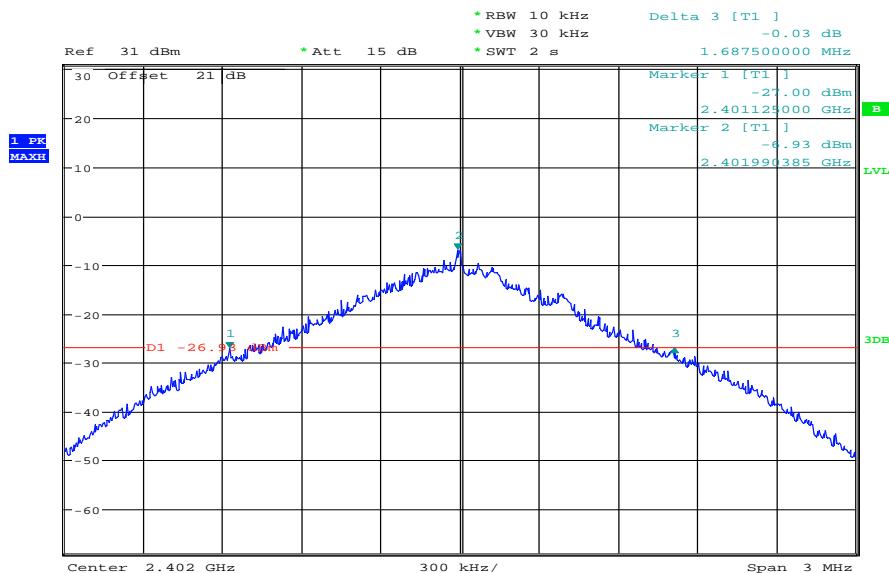
| Measurement parameter | |
|-----------------------|----------|
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 10 kHz |
| Video bandwidth: | 10 kHz |
| Span: | 3 MHz |
| Trace-Mode: | Max Hold |

Limits:

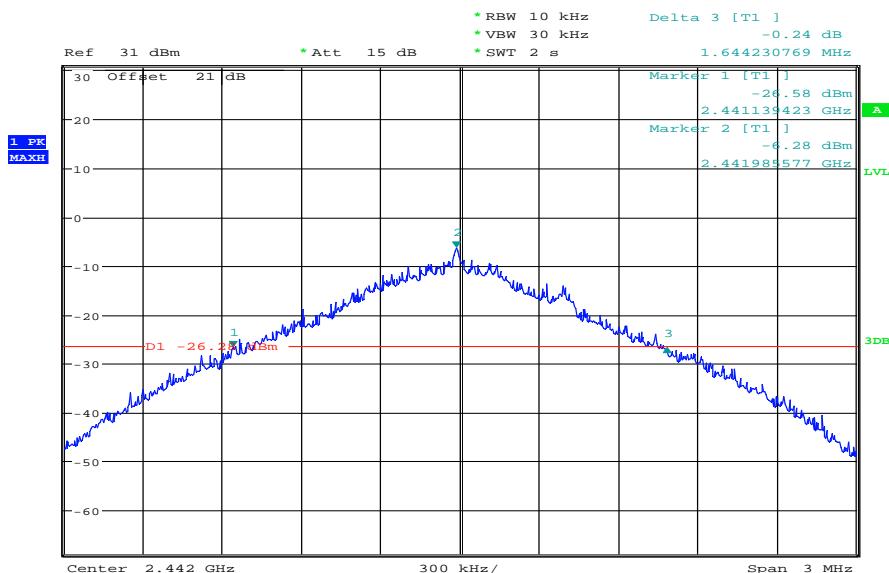
| FCC | IC |
|------------------------------------|----|
| Spectrum Bandwidth – 99% Bandwidth | |
| Required for emission designator | |

Results:

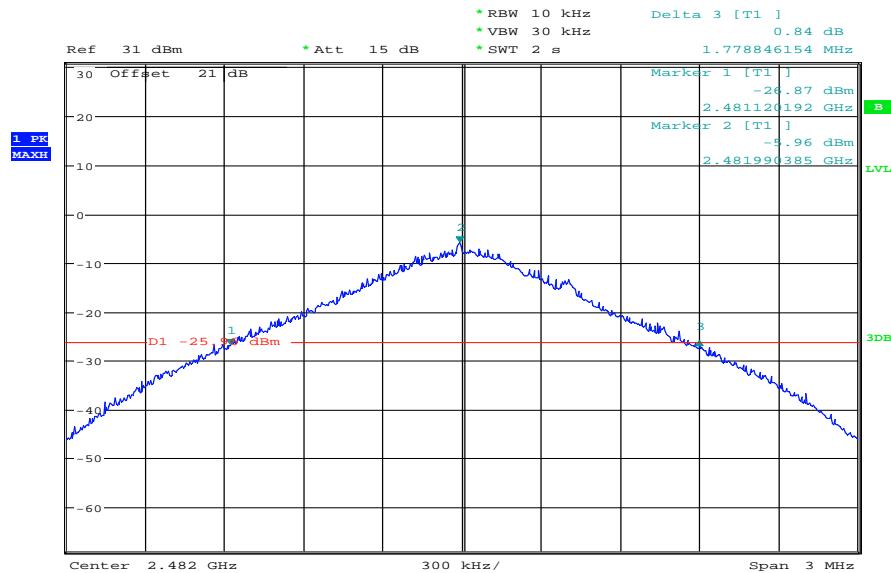
| Modulation | 99% BANDWIDTH [kHz] | | |
|-------------------------|---------------------|----------|----------|
| | 2402 MHz | 2442 MHz | 2482 MHz |
| GFSK | 1688 | 1644 | 1779 |
| Measurement uncertainty | ± 30 kHz | | |

Plots:**Plot 1: lowest channel – 2402 MHz, GFSK modulation**

Date: 16.FEB.2012 11:55:53

Plot 2: middle channel – 2442 MHz, GFSK modulation

Date: 16.FEB.2012 15:50:41

Plot 3: highest channel – 2482 MHz, GFSK modulation

Date: 16.FEB.2012 13:04:28

9.3 Maximum field strength

Description:

Measurement of the maximum field strength radiated.

Measurement:

| Measurement parameter | |
|-----------------------|----------|
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | 1 MHz |
| Span: | 3 MHz |
| Trace-Mode: | Max Hold |
| Measurement distance: | 3 m |

Limits:

| FCC | IC |
|--|----|
| Maximum field strength | |
| The field strength of emissions of intentional radiators shall comply with the following: Field strength of fundamental: 50 mV/m / (94 dB μ V/m) @ 3 m (AVG) 500 mV/m / (114 dB μ V/m) @ 3 m (Peak) | |

Result: Nordic 1

| Modulation | Maximum field strength [dB μ V/m] | | |
|-------------------------|---------------------------------------|----------|----------|
| | 2402 MHz | 2442 MHz | 2482 MHz |
| Frequency | | | |
| Peak | 95.55 | 96.18 | 96.98 |
| AVG*) | 77.28 | 77.91 | 78.71 |
| Measurement uncertainty | ± 3 dB | | |

*) Average value calculated with duty cycle correction factor. (see chapter 9.1)

Result: Nordic 2

| Modulation | Maximum field strength [dB μ V/m] | | |
|-------------------------|---------------------------------------|----------|----------|
| | 2402 MHz | 2442 MHz | 2482 MHz |
| Frequency | | | |
| Peak | 96.61 | 96.82 | 96.20 |
| AVG*) | 78.34 | 78.55 | 77.93 |
| Measurement uncertainty | ± 3 dB | | |

*) Average value calculated with duty cycle correction factor. (see chapter 9.1)

Result: The result of the measurement is passed.

9.4 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 lowest channel for the lower restricted band and to highest channel for the upper restricted band. Measurement distance is 3m.

Measurement:

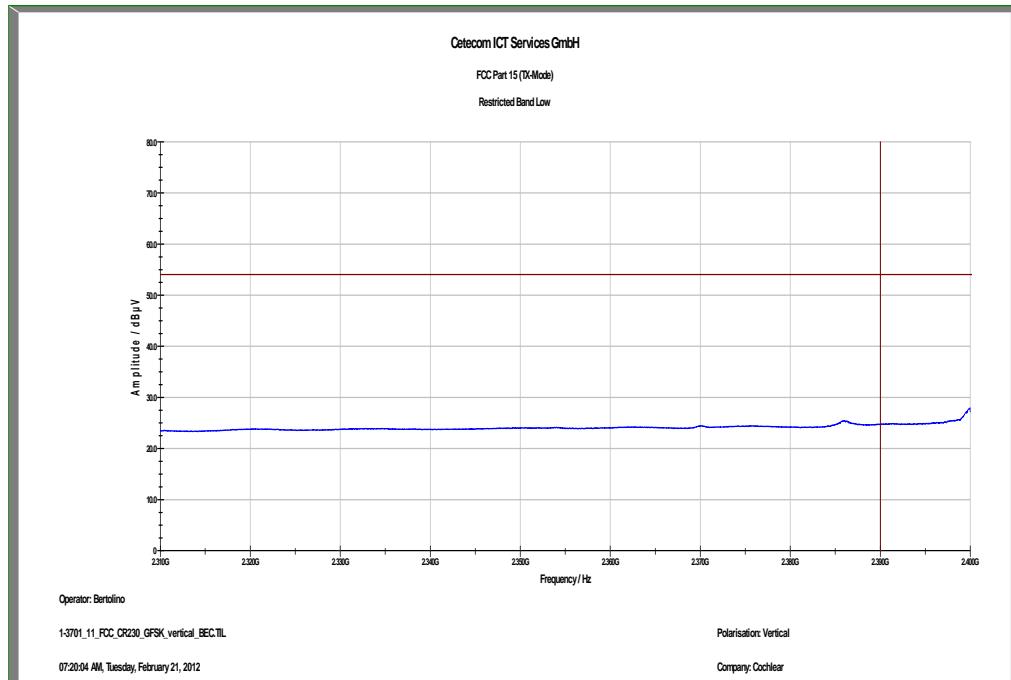
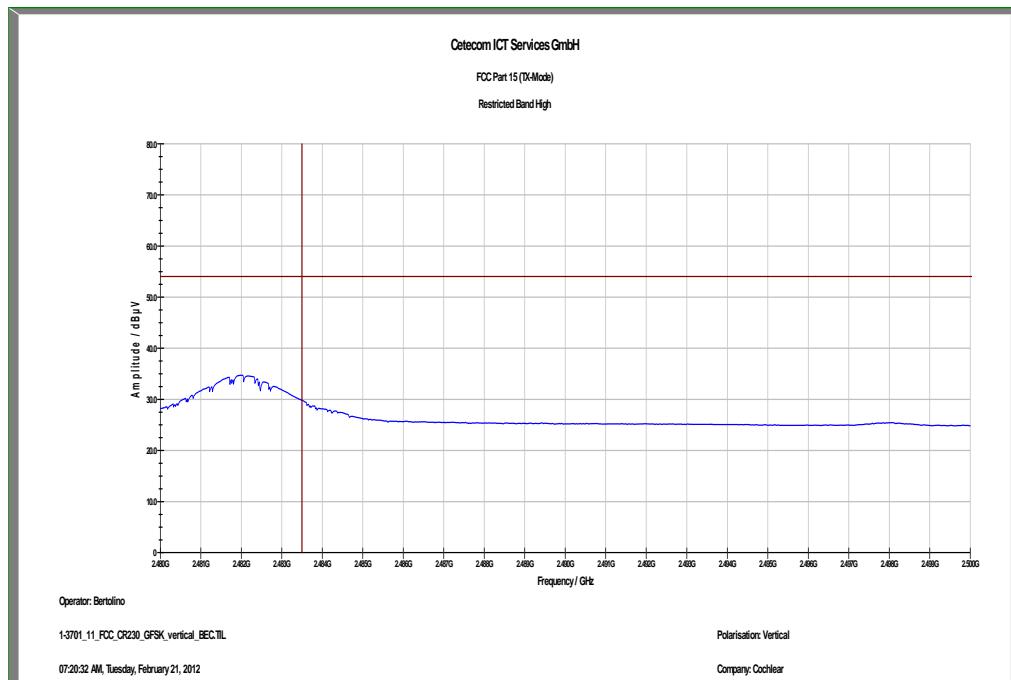
| Measurement parameter | |
|-----------------------|---|
| Detector: | Peak |
| Sweep time: | Auto |
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | 10 Hz |
| Span: | Lower Band: 2300 – 2400 MHz Higher Band: 2480 – 2500 MHz |
| Trace-Mode: | Max Hold |

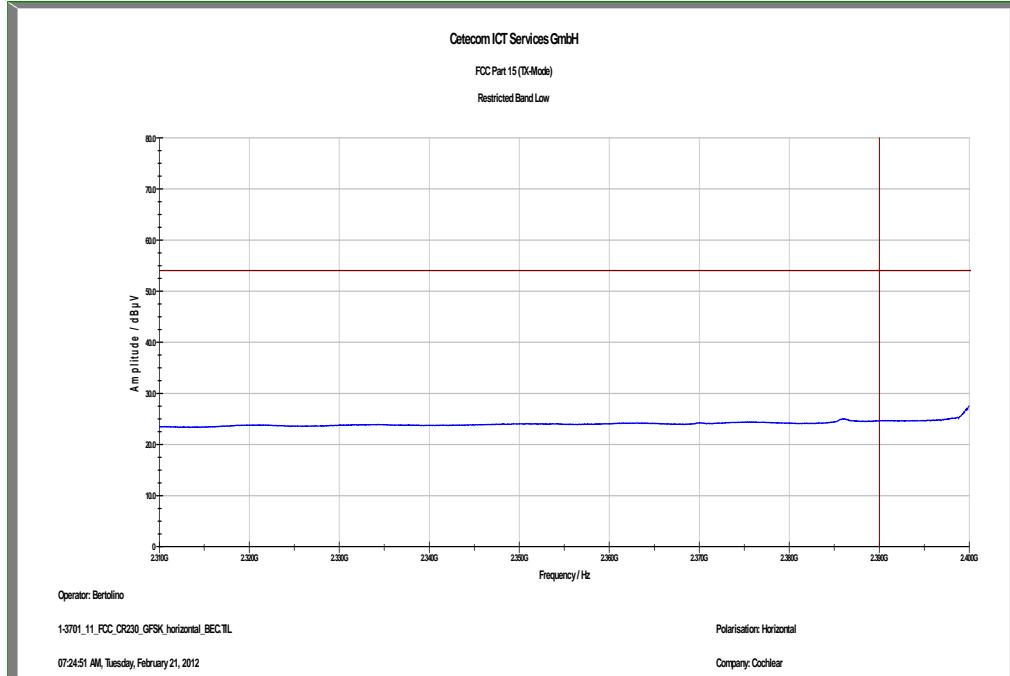
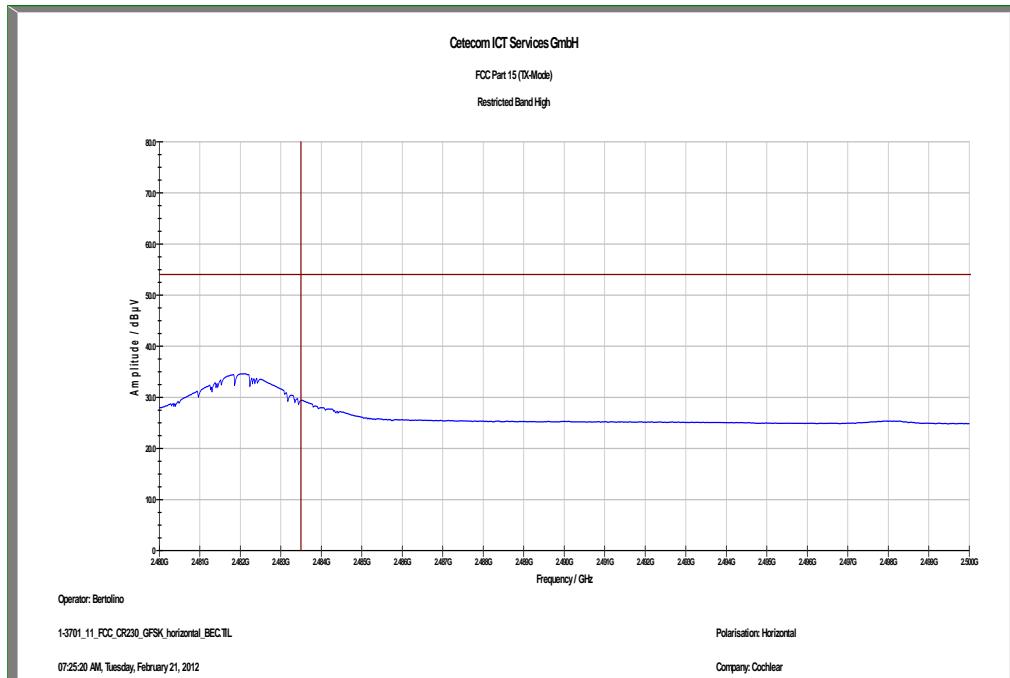
Limits:

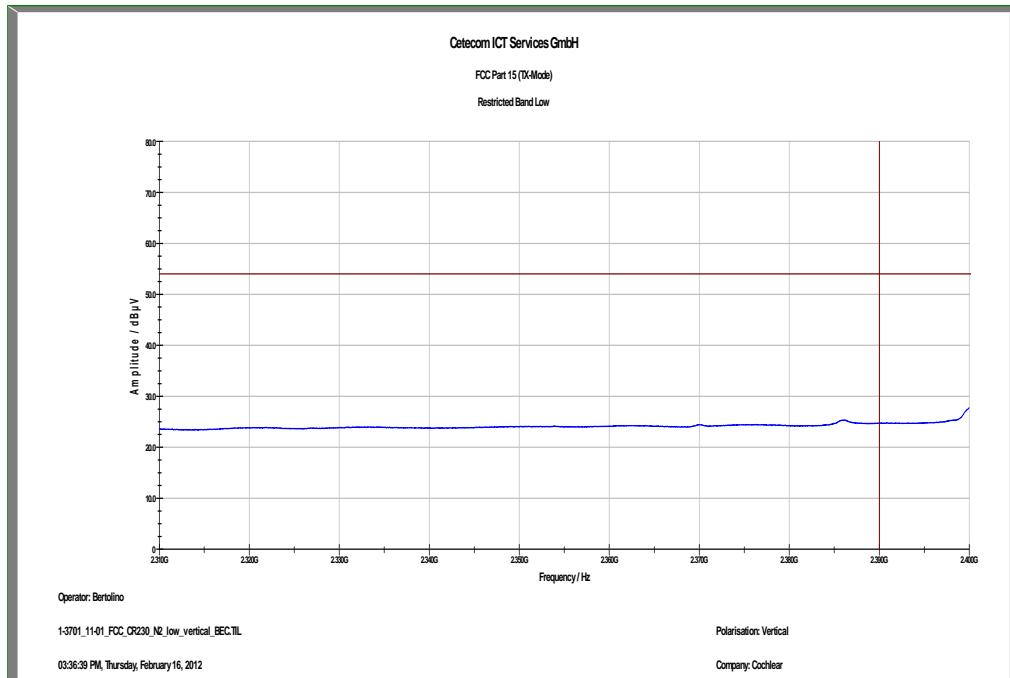
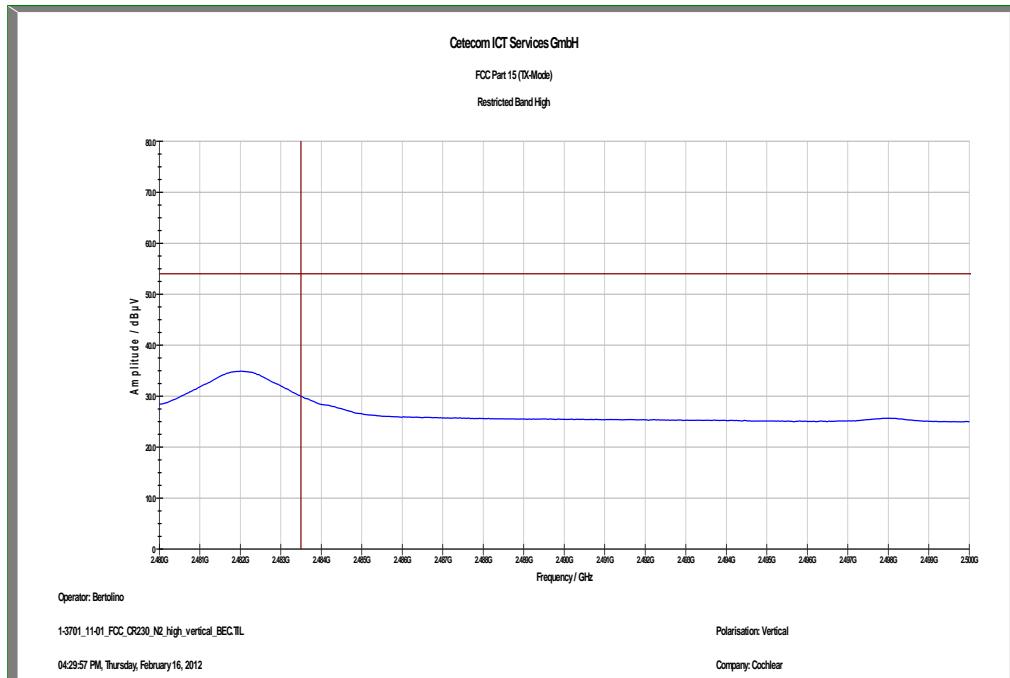
| FCC | IC |
|---|----|
| Band Edge Compliance Radiated | |
| Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209 / RSS GEN, whichever is the lesser attenuation. | |
| 54 dB μ V/m (AVG) / 74 dB μ V/m (PP) | |

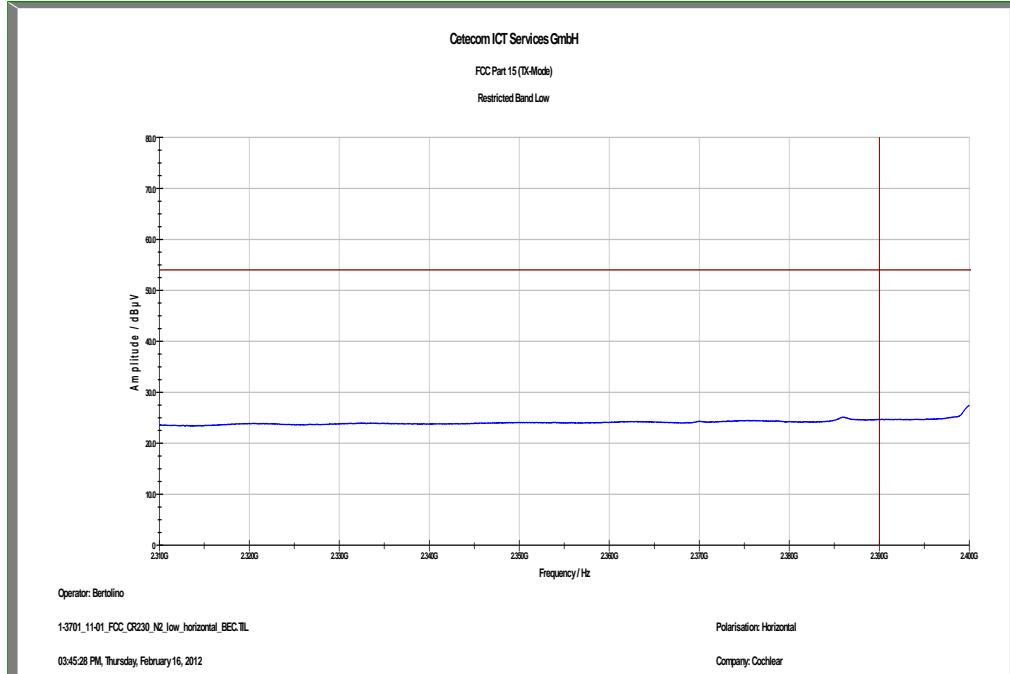
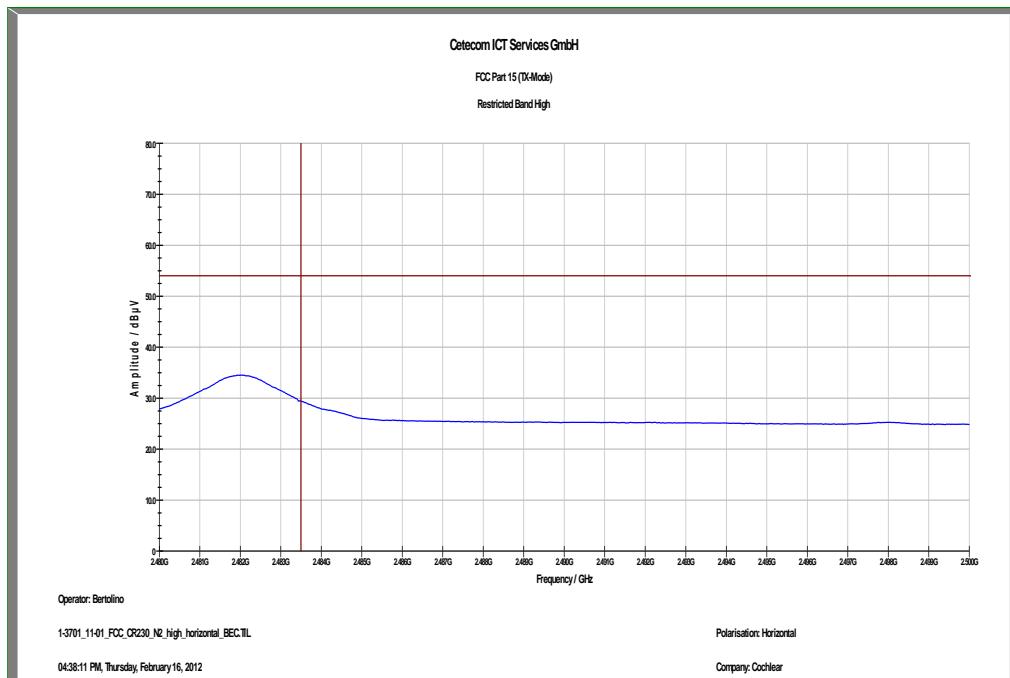
Result:

| Modulation | Band Edge Compliance Radiated [dB μ V/m] |
|-----------------------------------|--|
| | GFSK |
| Lower Band Edge – Lowest Channel | < 54 dB μ V/m (see plots 1/3) |
| Upper Band Edge – Highest Channel | < 54 dB μ V/m (see plot 2/4) |
| Measurement uncertainty | ± 3 dB |

Plots: Nordic 1**Plot 1:** Lower band edge, GFSK modulation, vertical polarization**Plot 2:** Upper band edge, GFSK modulation, vertical polarization

Plot 3: Lower band edge, GFSK modulation, horizontal polarization**Plot 4:** Upper band edge, GFSK modulation, horizontal polarization

Plots: Nordic 2**Plot 1:** Lower band edge, GFSK modulation, vertical polarization**Plot 2:** Upper band edge, GFSK modulation, vertical polarization

Plot 3: Lower band edge, GFSK modulation, horizontal polarization**Plot 4:** Upper band edge, GFSK modulation, horizontal polarization

Result: The result of the measurement is passed.

9.5 TX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in transmit mode. The measurement is performed at lowest, middle and highest channel.

Measurement:

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

Limits:

| FCC | IC | |
|---|-------------------------------|----------------------|
| TX spurious emissions radiated | | |
| 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 §15.209 / RSS GEN, whichever is the lesser attenuation. | | |
| §15.209 | | |
| 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 |

Results:

| TX Spurious Emissions Radiated [dB μ V/m] | | | | | | | | |
|---|----------|-------------------------|-----------------------------|----------|-------------------------|-----------------------------|----------|-------------------------|
| 2402 MHz | | | 2442 MHz | | | 2482 MHz | | |
| F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] |
| No critical peaks detected! | | | No critical peaks detected! | | | No critical peaks detected! | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

Result: The result of the measurement is passed.

Plots: Nordic 1**Plot 1:** 30 MHz to 1 GHz, TX mode, 2402 MHz, vertical polarization**Common Information**

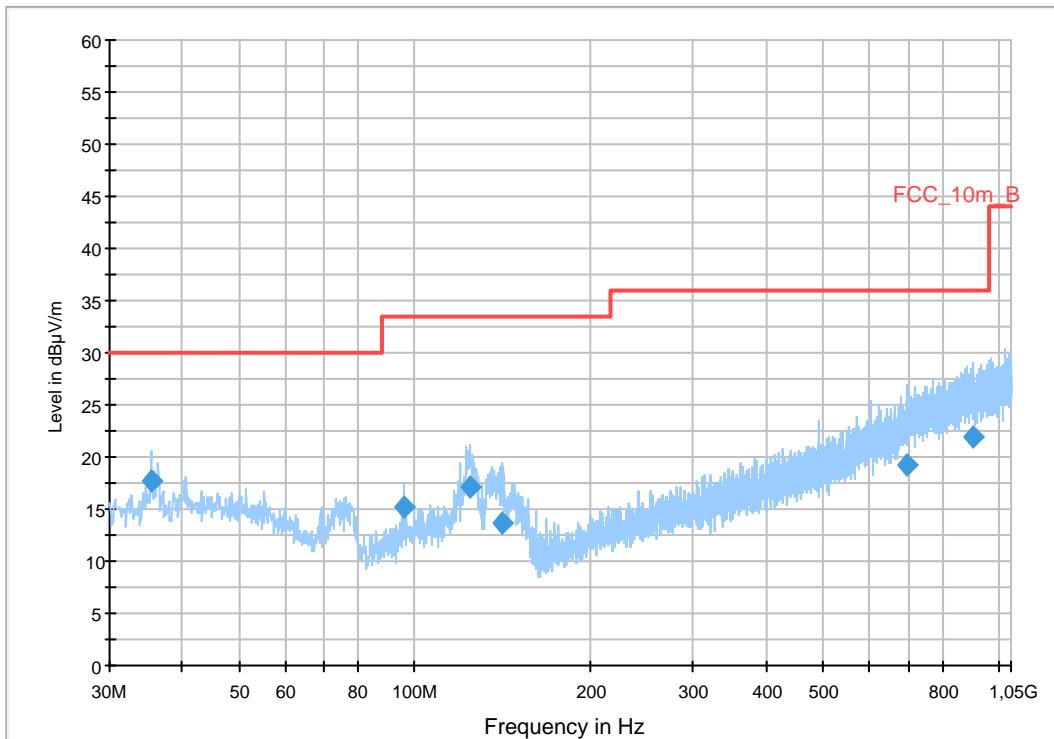
EUT: CR220 + USB charger SE EP310
 Serial Number: 1040230005500X
 Test Description: FCC part 15C class B
 Operating Conditions: TX pulsed 32b (1536µS); 2402MHz; nordic 1
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

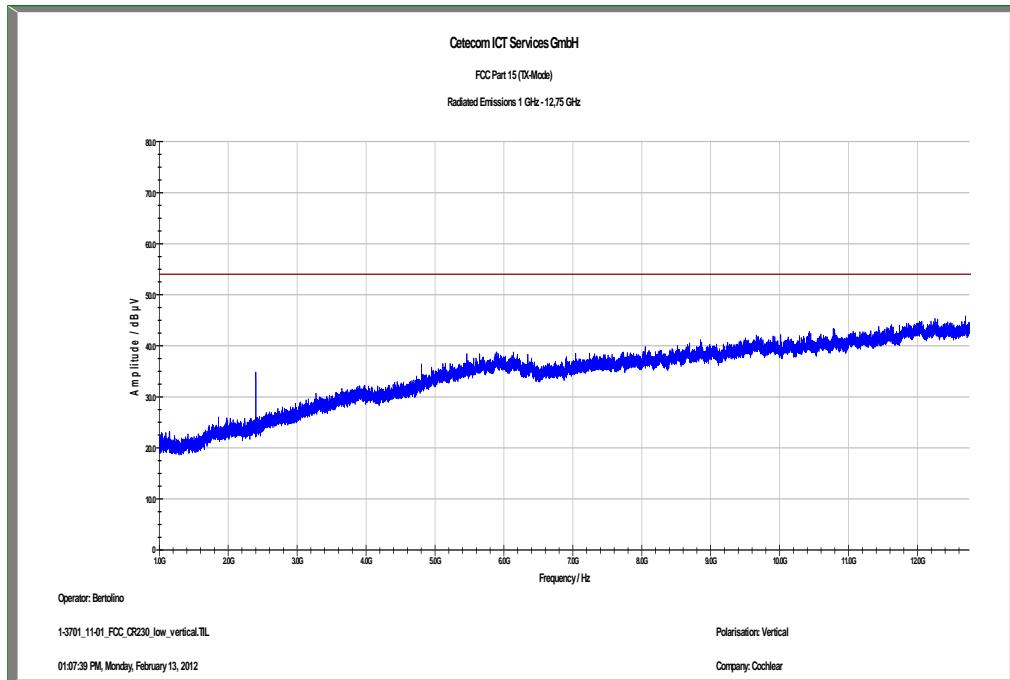
Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |

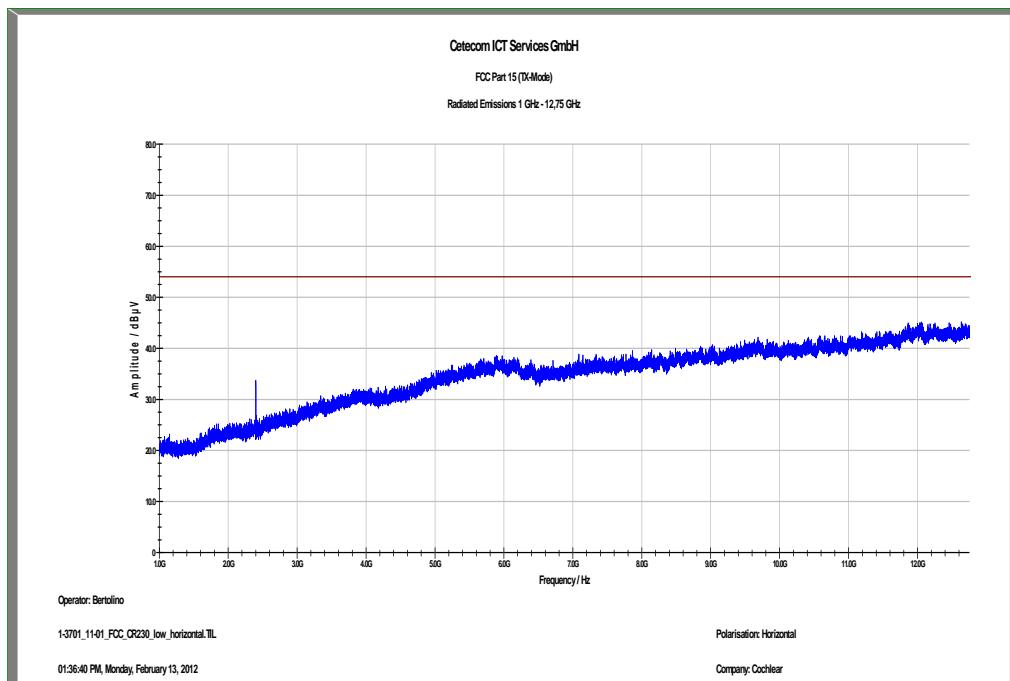
FCC_10m(B)_3

**Final Result 1**

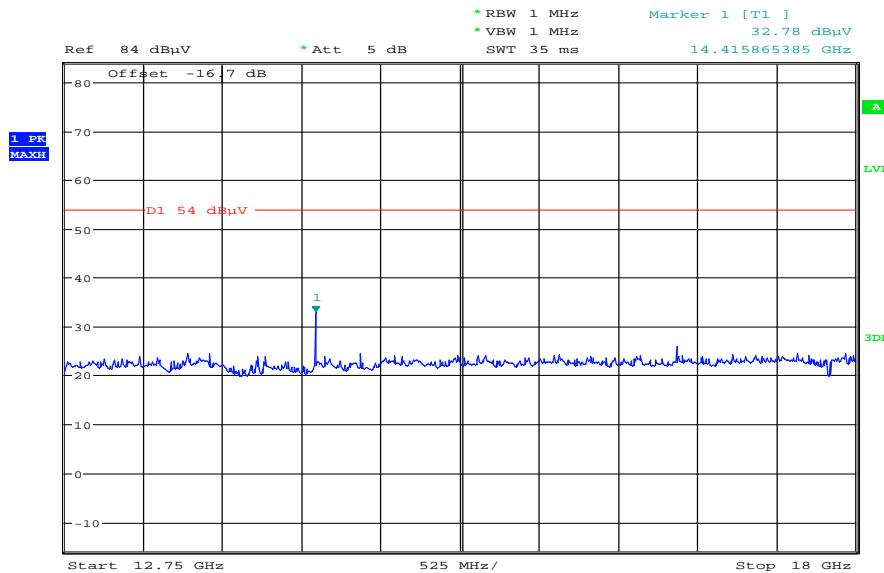
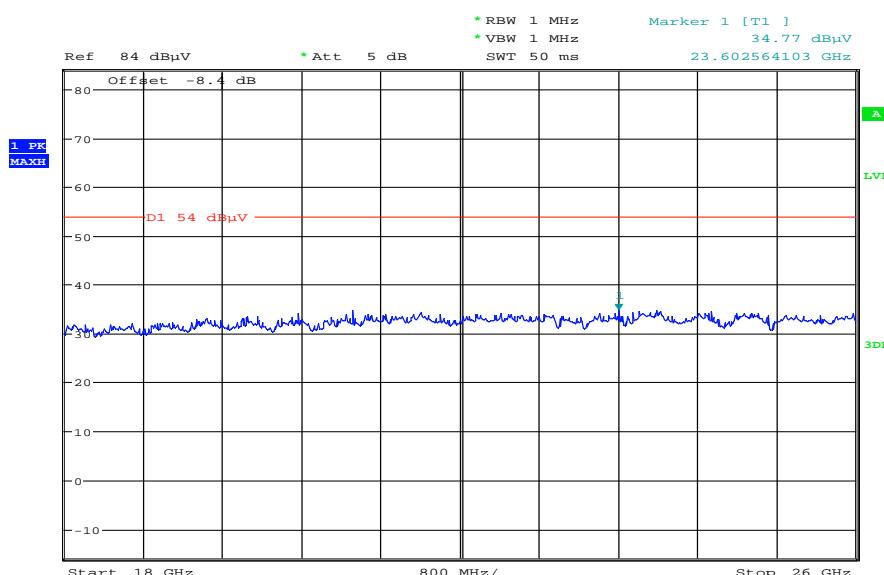
| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dB μ V/m) | Comment |
|-----------------|--------------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------------|---------|
| 35.444250 | 17.7 | 1000.0 | 120.000 | 98.0 | V | 196.0 | 13.1 | 12.3 | 30.0 | |
| 95.994300 | 15.1 | 1000.0 | 120.000 | 106.0 | V | 196.0 | 11.4 | 18.4 | 33.5 | |
| 124.589100 | 17.1 | 1000.0 | 120.000 | 170.0 | V | 260.0 | 9.8 | 16.4 | 33.5 | |
| 141.325950 | 13.7 | 1000.0 | 120.000 | 106.0 | V | -7.0 | 8.7 | 19.8 | 33.5 | |
| 694.008000 | 19.2 | 1000.0 | 120.000 | 106.0 | H | 283.0 | 22.3 | 16.8 | 36.0 | |
| 905.376000 | 21.8 | 1000.0 | 120.000 | 98.0 | V | 94.0 | 25.2 | 14.2 | 36.0 | |

Plot 2: 1 GHz to 12.75 GHz, TX mode, 2402 MHz, vertical polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: 1 GHz to 12.75 GHz, TX mode, 2402 MHz, horizontal polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 4: 12.75 GHz to 18 GHz, TX mode, 2402 MHz, vertical & horizontal polarization**Plot 5:** 18 GHz to 26 GHz, TX mode, 2402 MHz, vertical & horizontal polarization

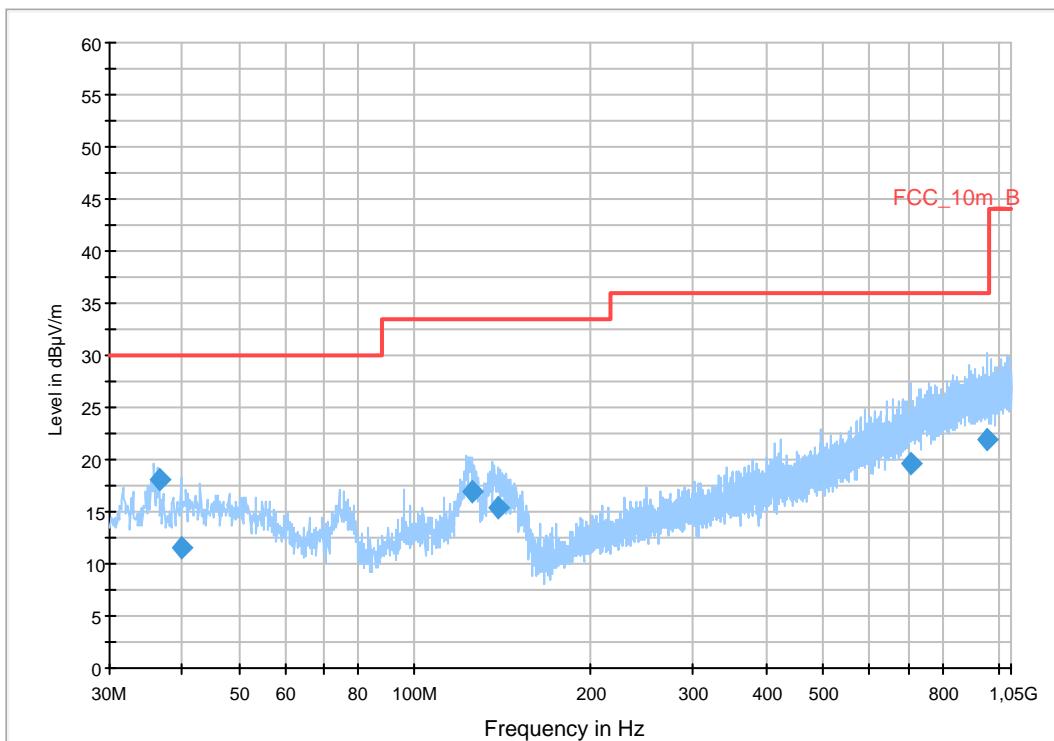
Plot 6: 30 MHz to 1 GHz, TX mode, 2442 MHz, vertical polarization**Common Information**

EUT: CR220 + USB charger SE EP310
 Serial Number: 1040230005500X
 Test Description: FCC part 15C class B
 Operating Conditions: TX pulsed 32b (1536µS); 2442MHz; nordic 1
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

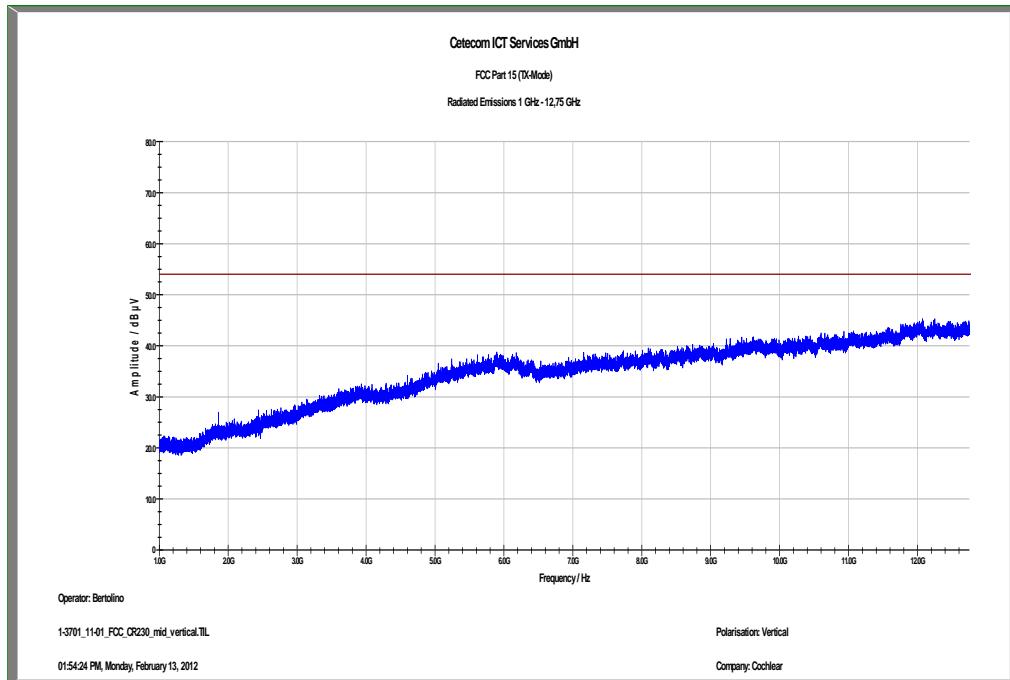
Scan Setup: STAN_Fin [EMI radiated]

| | | | | | |
|-----------------|----------------------|------------------|--------------|-------------------|---------------|
| Hardware Setup: | Electric Field (NOS) | | | | |
| Receiver: | [ESCI 3] | | | | |
| Level Unit: | dB μ V/m | | | | |
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |

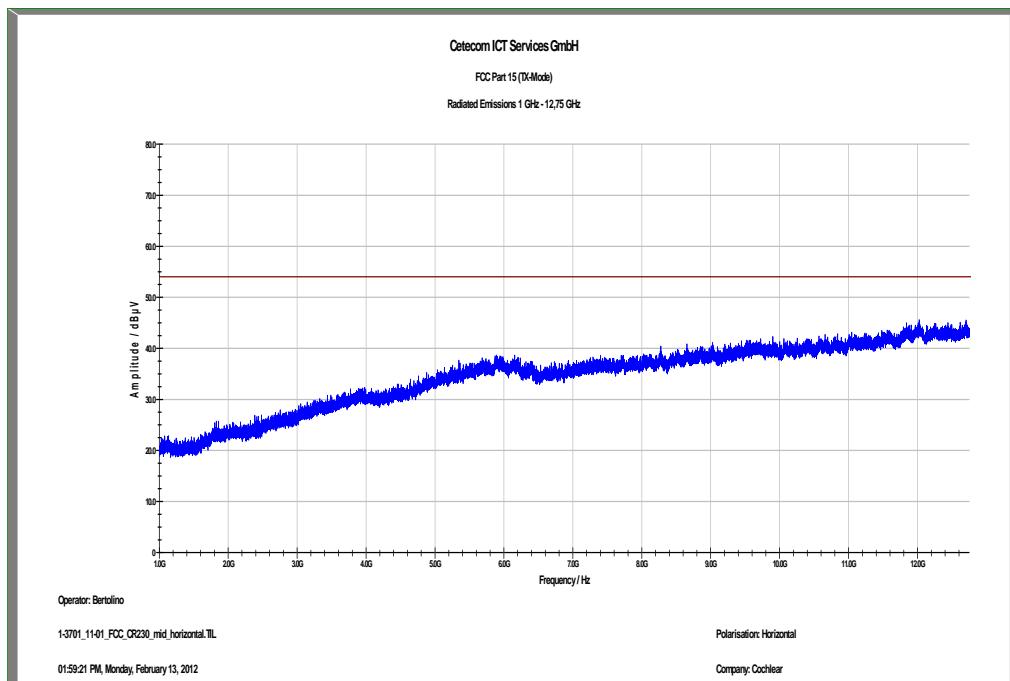
FCC_10m(B)_3

**Final Result 1**

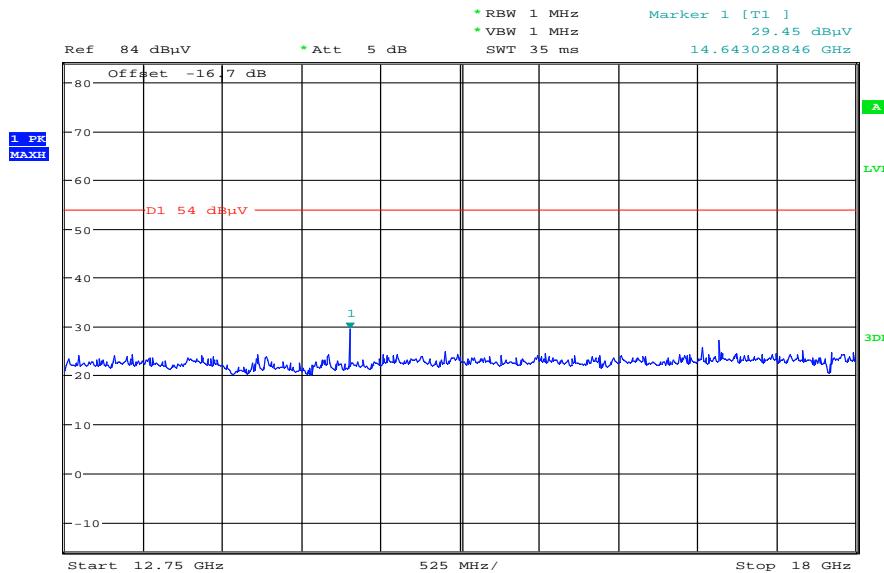
| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dB μ V/m) | Comment |
|-----------------|--------------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------------|---------|
| 36.440550 | 18.1 | 1000.0 | 120.000 | 98.0 | V | 106.0 | 13.1 | 11.9 | 30.0 | |
| 39.993600 | 11.6 | 1000.0 | 120.000 | 124.0 | V | 8.0 | 13.4 | 18.4 | 30.0 | |
| 125.199300 | 16.9 | 1000.0 | 120.000 | 120.0 | V | 283.0 | 9.8 | 16.6 | 33.5 | |
| 138.500250 | 15.5 | 1000.0 | 120.000 | 106.0 | V | 283.0 | 8.8 | 18.0 | 33.5 | |
| 709.373550 | 19.6 | 1000.0 | 120.000 | 114.0 | V | 196.0 | 22.7 | 16.4 | 36.0 | |
| 956.405400 | 22.0 | 1000.0 | 120.000 | 170.0 | H | 8.0 | 25.4 | 14.0 | 36.0 | |

Plot 7: 1 GHz to 12.75 GHz, TX mode, 2442 MHz, vertical polarization

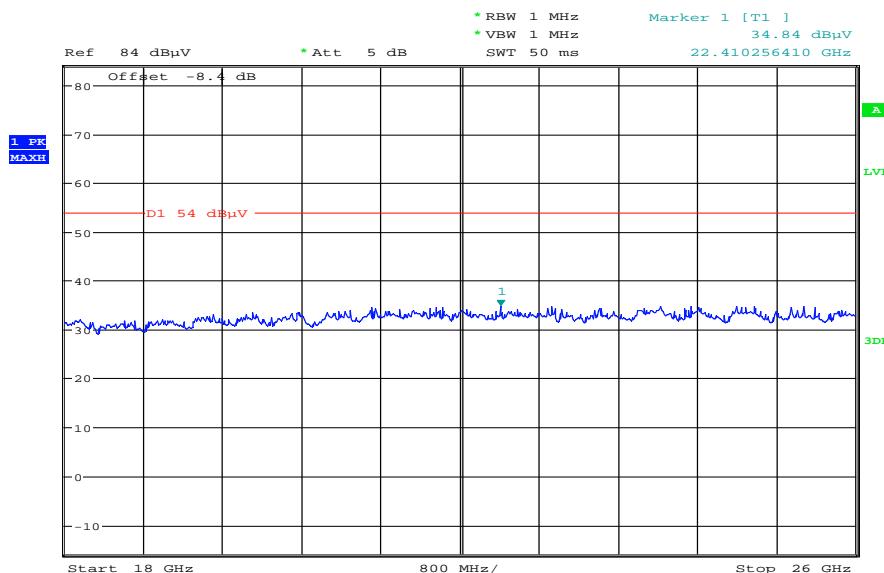
The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 8: 1 GHz to 12.75 GHz, TX mode, 2442 MHz, horizontal polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 9: 12.75 GHz to 18 GHz, TX mode, 2442 MHz, vertical & horizontal polarization

Date: 14.FEB.2012 15:49:54

Plot 10: 18 GHz to 26 GHz, TX mode, 2442 MHz, vertical & horizontal polarization

Date: 14.FEB.2012 15:58:02

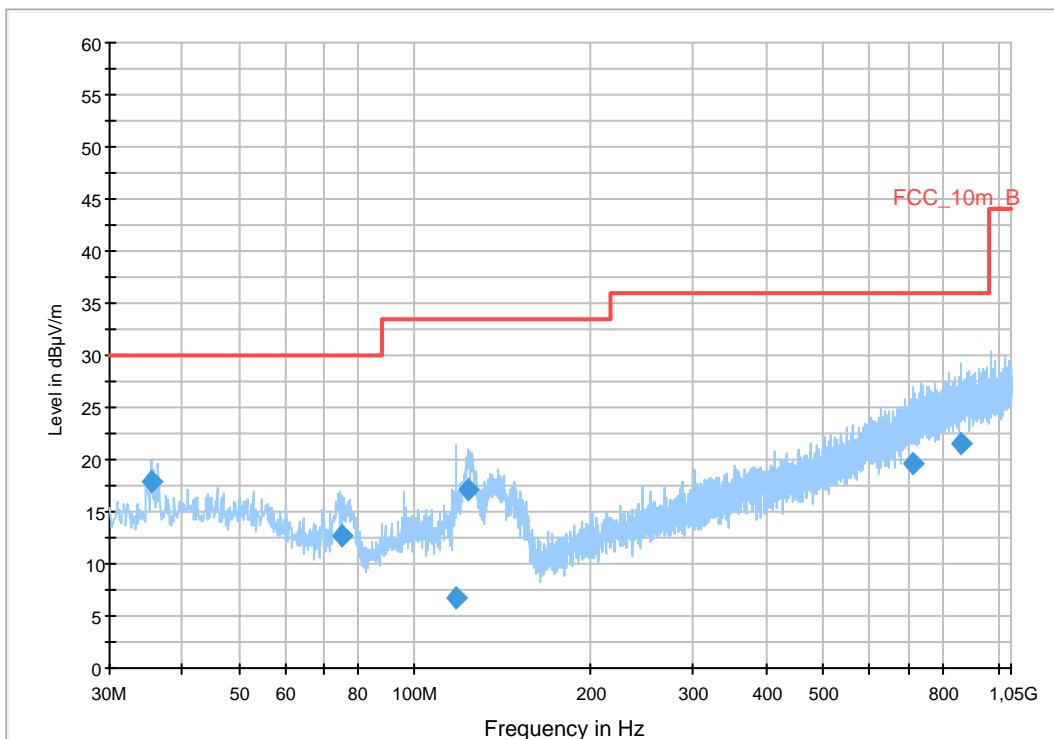
Plot 11: 30 MHz to 1 GHz, TX mode, 2482 MHz, vertical polarization**Common Information**

EUT: CR220 + USB charger SE EP310
 Serial Number: 1040230005500X
 Test Description: FCC part 15C class B
 Operating Conditions: TX pulsed 32b (1536µS); 2482MHz; nordic 1
 Operator Name: Sciglano
 Comment: AC: 115 V / 60 Hz

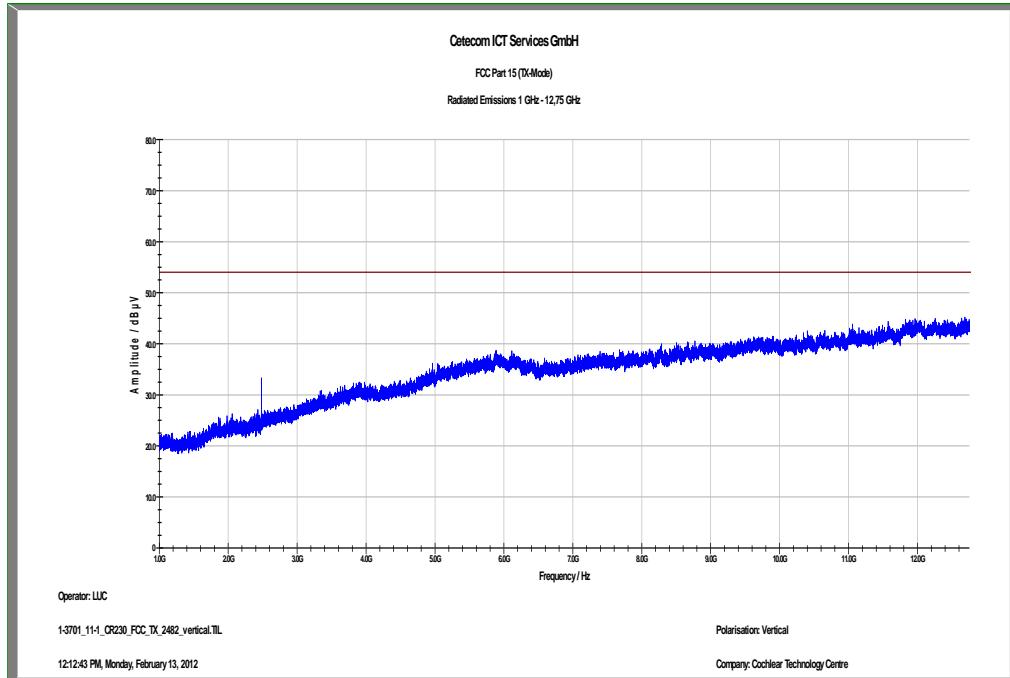
Scan Setup: STAN_Fin [EMI radiated]

| | | | | | |
|-----------------|----------------------|------------------|--------------|-------------------|---------------|
| Hardware Setup: | Electric Field (NOS) | | | | |
| Receiver: | [ESCI 3] | | | | |
| Level Unit: | dB μ V/m | | | | |
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |

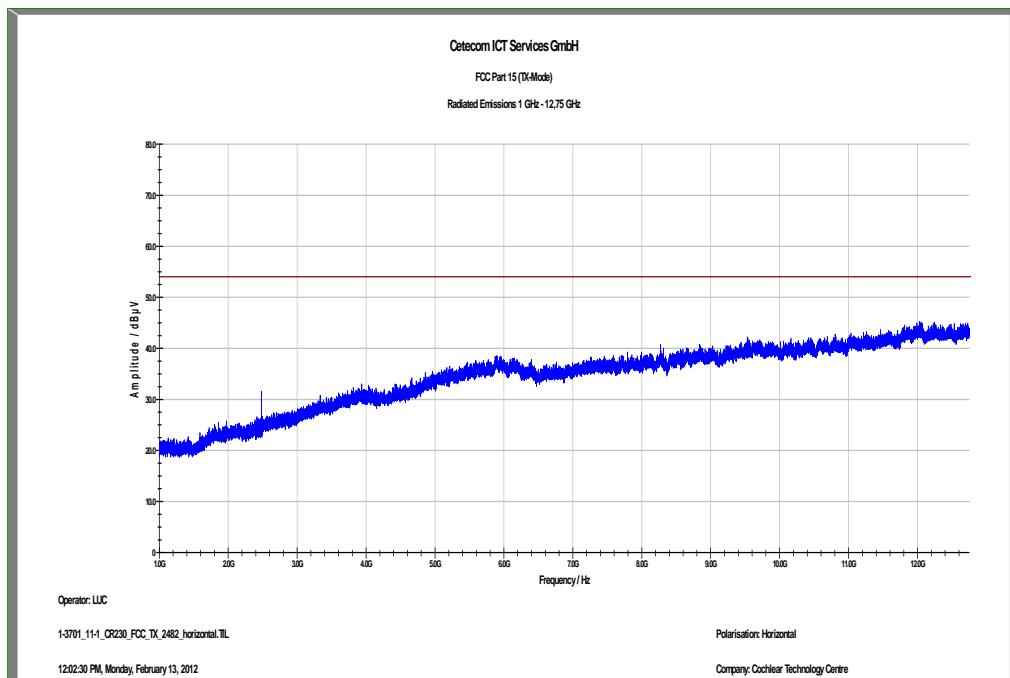
FCC_10m(B)_3

**Final Result 1**

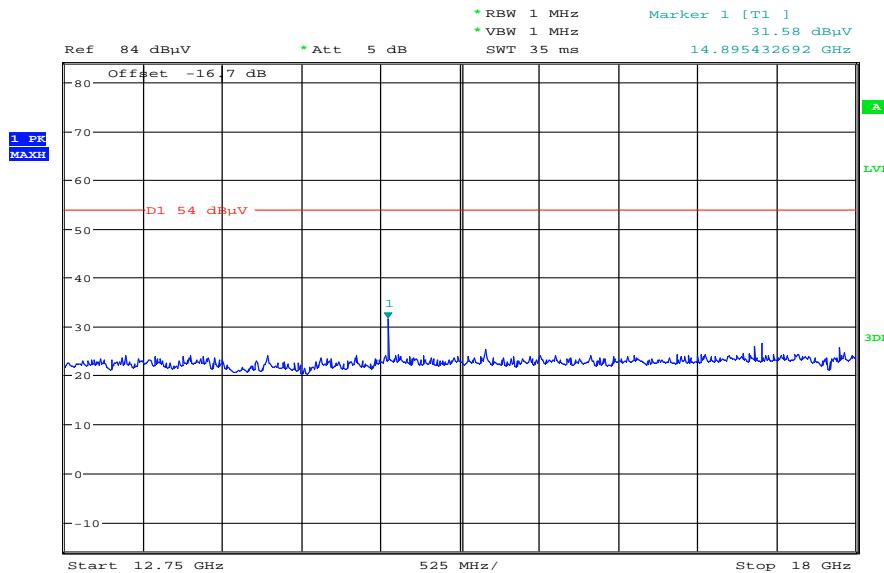
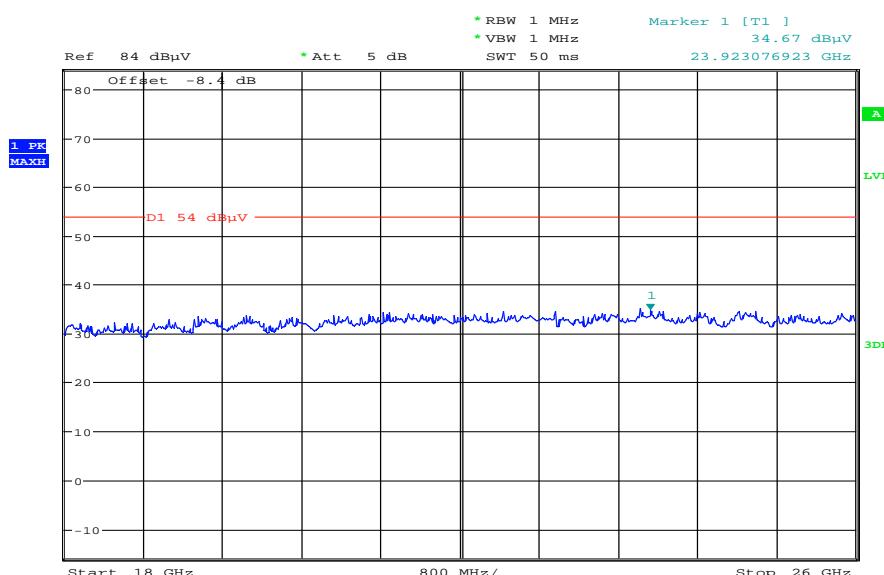
| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dB μ V/m) | Comment |
|-----------------|--------------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------------|---------|
| 35.400900 | 17.8 | 1000.0 | 120.000 | 98.0 | V | 196.0 | 13.1 | 12.2 | 30.0 | |
| 74.883000 | 12.8 | 1000.0 | 120.000 | 170.0 | V | -7.0 | 9.2 | 17.2 | 30.0 | |
| 117.937950 | 6.8 | 1000.0 | 120.000 | 143.0 | H | -7.0 | 10.4 | 26.7 | 33.5 | |
| 123.618450 | 17.2 | 1000.0 | 120.000 | 125.0 | V | 269.0 | 9.9 | 16.3 | 33.5 | |
| 711.864900 | 19.6 | 1000.0 | 120.000 | 170.0 | V | 283.0 | 22.8 | 16.4 | 36.0 | |
| 862.580550 | 21.5 | 1000.0 | 120.000 | 170.0 | H | 273.0 | 24.7 | 14.5 | 36.0 | |

Plot 12: 1 GHz to 12.75 GHz, TX mode, 2482 MHz, vertical polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 13: 1 GHz to 12.75 GHz, TX mode, 2482 MHz, horizontal polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 14: 12.75 GHz to 18 GHz, TX mode, 2482 MHz, vertical & horizontal polarization**Plot 15:** 18 GHz to 26 GHz, TX mode, 2482 MHz, vertical & horizontal polarization

Plots: Nordic 2

Plot 1: 30 MHz to 1 GHz, TX mode, 2402 MHz, vertical polarization

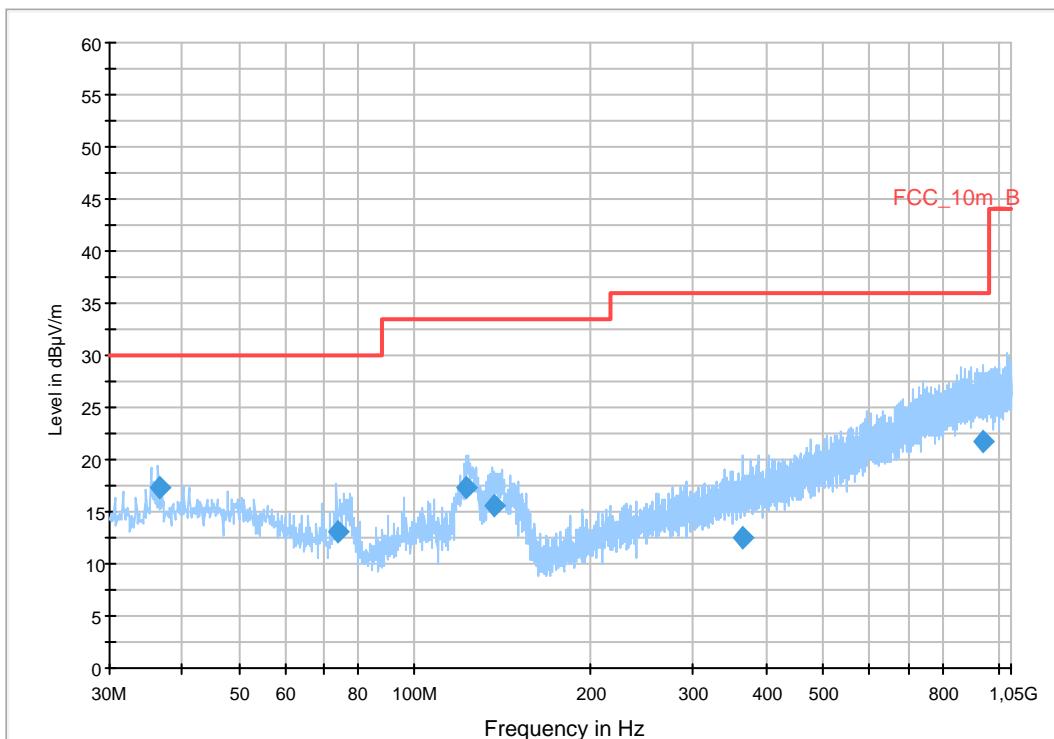
Common Information

EUT: CR220 + USB charger SE EP310
 Serial Number: 1040230005500X
 Test Description: FCC part 15C class B
 Operating Conditions: TX pulsed 32b (1536µS); 2402MHz; nordic 2
 Operator Name: Sciglano
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

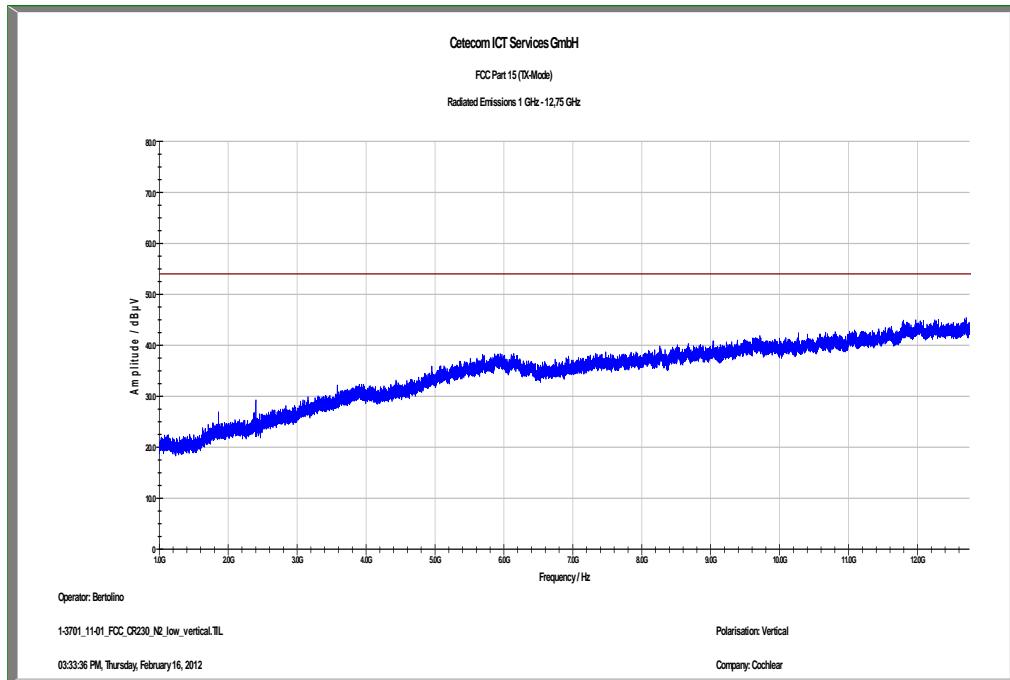
| | | | | | |
|-----------------|----------------------|------------------|--------------|-------------------|---------------|
| Hardware Setup: | Electric Field (NOS) | | | | |
| Receiver: | [ESCI 3] | | | | |
| Level Unit: | dB μ V/m | | | | |
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |

FCC_10m(B)_3

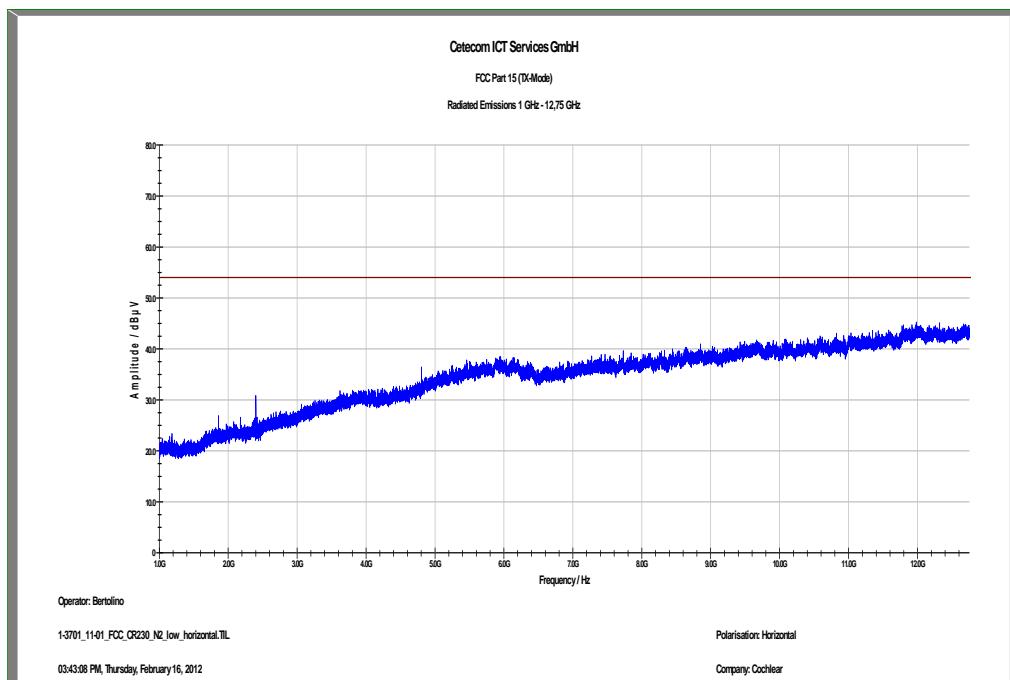


Final Result 1

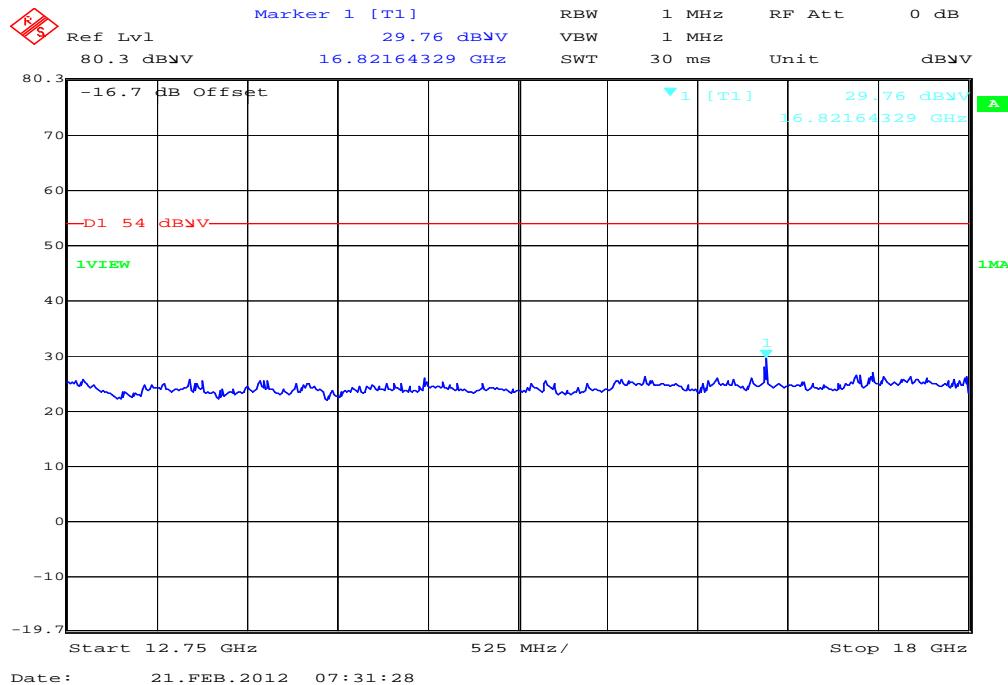
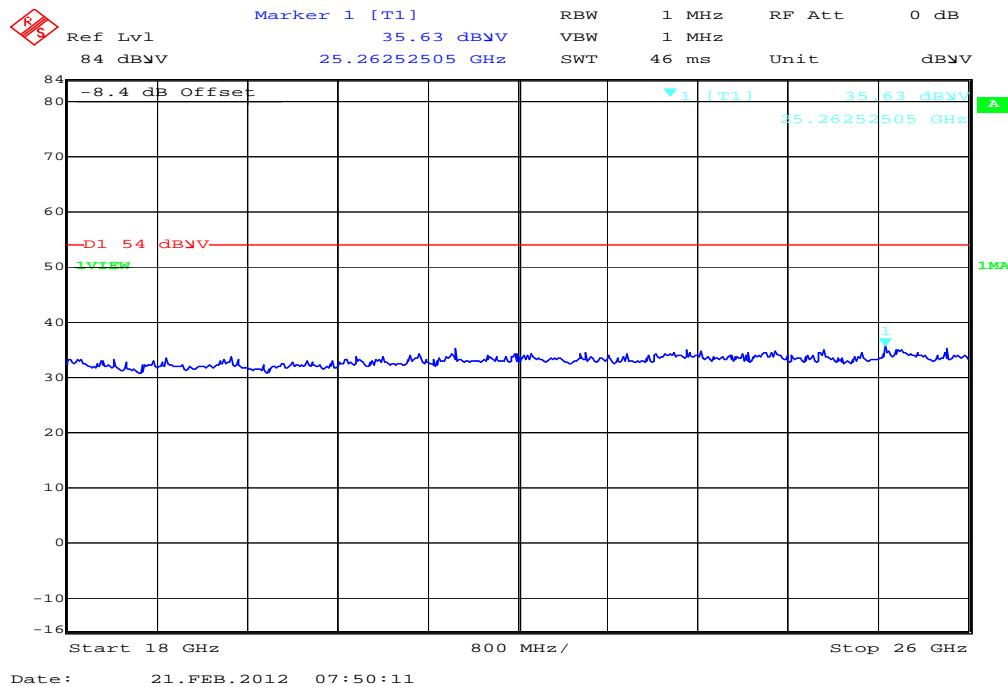
| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dB μ V/m) | Comment |
|-----------------|--------------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------------|---------|
| 36.409200 | 17.3 | 1000.0 | 120.000 | 98.0 | V | 80.0 | 13.1 | 12.7 | 30.0 | |
| 73.999950 | 13.0 | 1000.0 | 120.000 | 170.0 | V | 106.0 | 9.2 | 17.0 | 30.0 | |
| 122.875500 | 17.3 | 1000.0 | 120.000 | 98.0 | V | 260.0 | 10.0 | 16.2 | 33.5 | |
| 136.567050 | 15.6 | 1000.0 | 120.000 | 134.0 | V | 283.0 | 8.9 | 17.9 | 33.5 | |
| 364.761450 | 12.4 | 1000.0 | 120.000 | 170.0 | V | 182.0 | 16.3 | 23.6 | 36.0 | |
| 937.840200 | 21.8 | 1000.0 | 120.000 | 146.0 | H | -3.0 | 25.3 | 14.2 | 36.0 | |

Plot 2: 1 GHz to 12.75 GHz, TX mode, 2402 MHz, vertical polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 3: 1 GHz to 12.75 GHz, TX mode, 2402 MHz, horizontal polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 4: 12.75 GHz to 18 GHz, TX mode, 2402 MHz, vertical & horizontal polarization**Plot 5:** 18 GHz to 26 GHz, TX mode, 2402 MHz, vertical & horizontal polarization

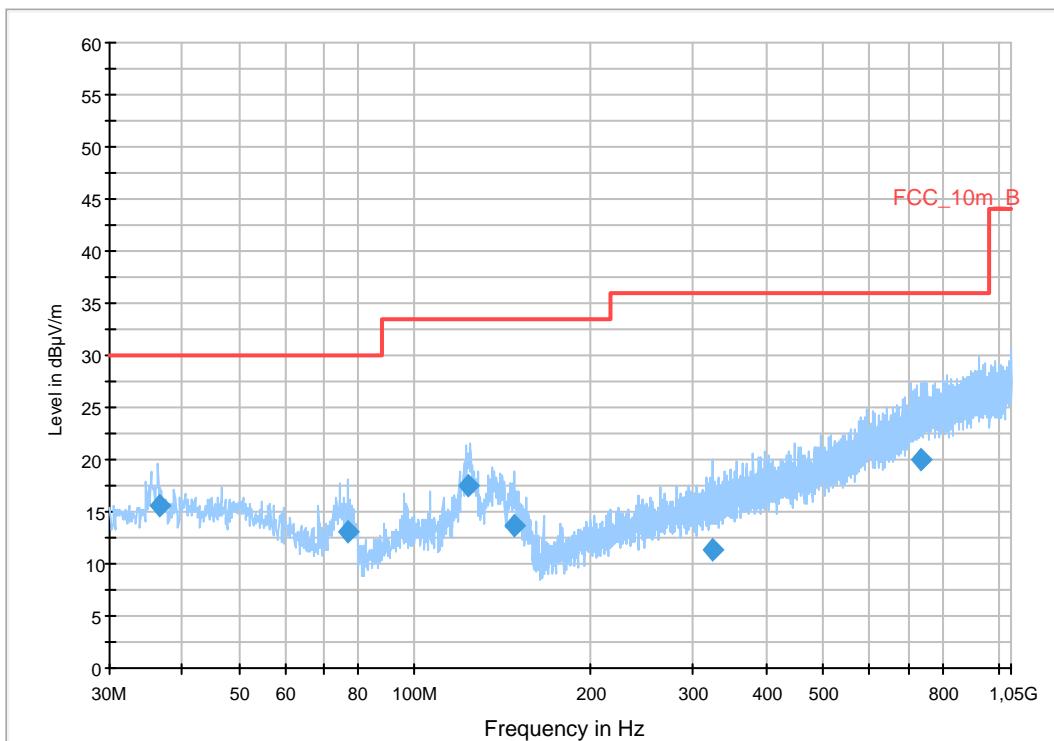
Plot 6: 30 MHz to 1 GHz, TX mode, 2442 MHz, vertical polarization**Common Information**

EUT: CR220 + USB charger SE EP310
 Serial Number: 1040230005500X
 Test Description: FCC part 15C class B
 Operating Conditions: TX pulsed 32b (1536µS); 2442MHz; nordic 2
 Operator Name: Sciglano
 Comment: AC: 115 V / 60 Hz

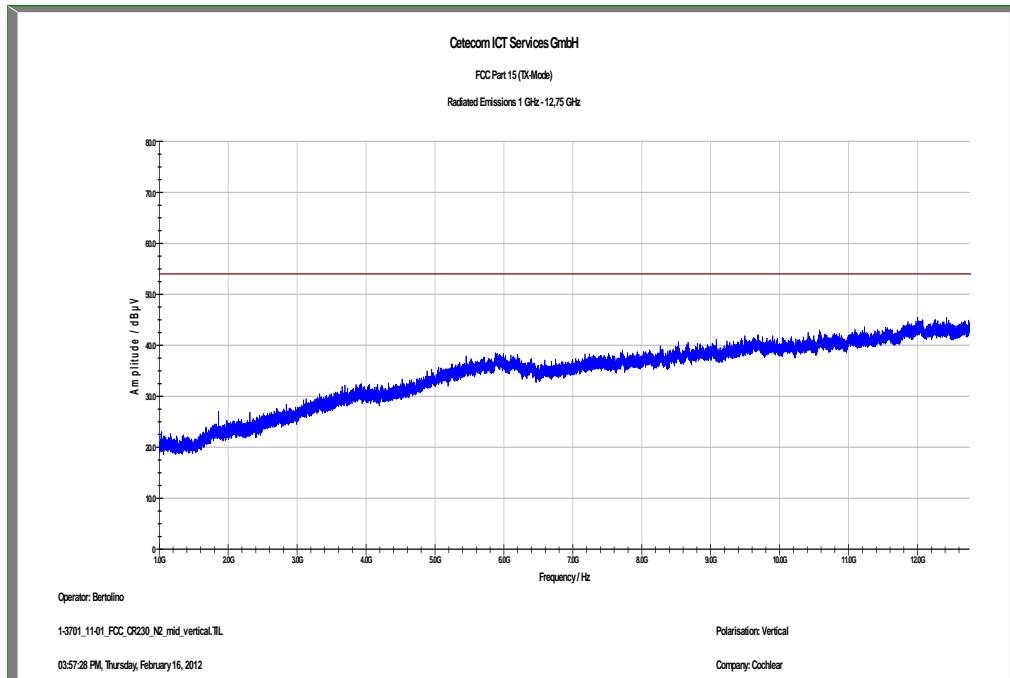
Scan Setup: STAN_Fin [EMI radiated]

| | | | | | |
|-----------------|----------------------|------------------|--------------|-------------------|---------------|
| Hardware Setup: | Electric Field (NOS) | | | | |
| Receiver: | [ESCI 3] | | | | |
| Level Unit: | dB μ V/m | | | | |
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |

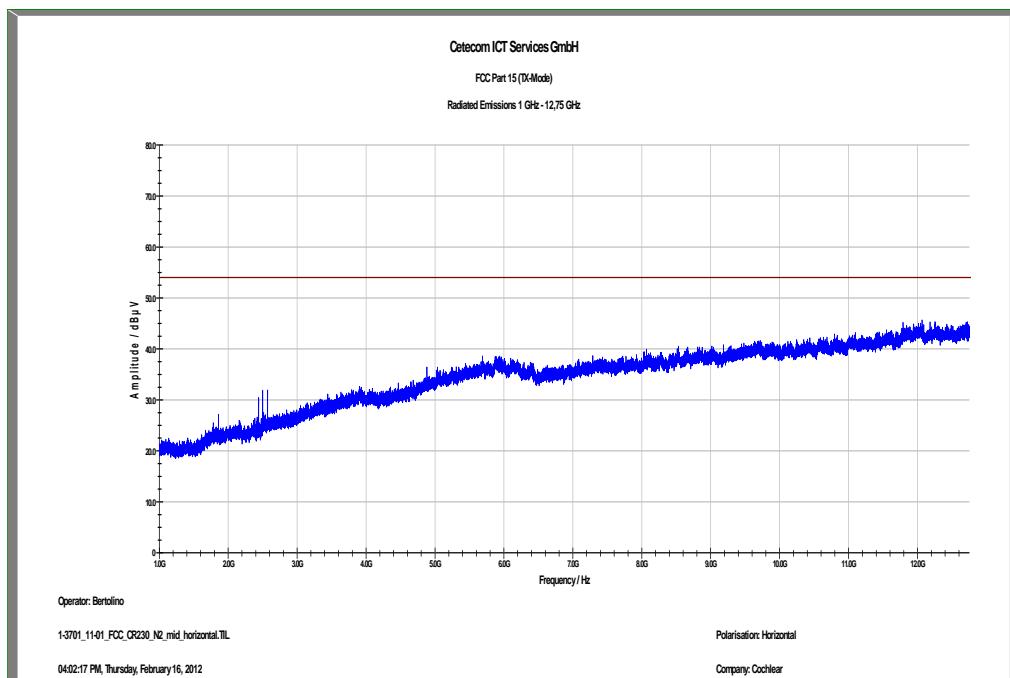
FCC_10m(B)_3

**Final Result 1**

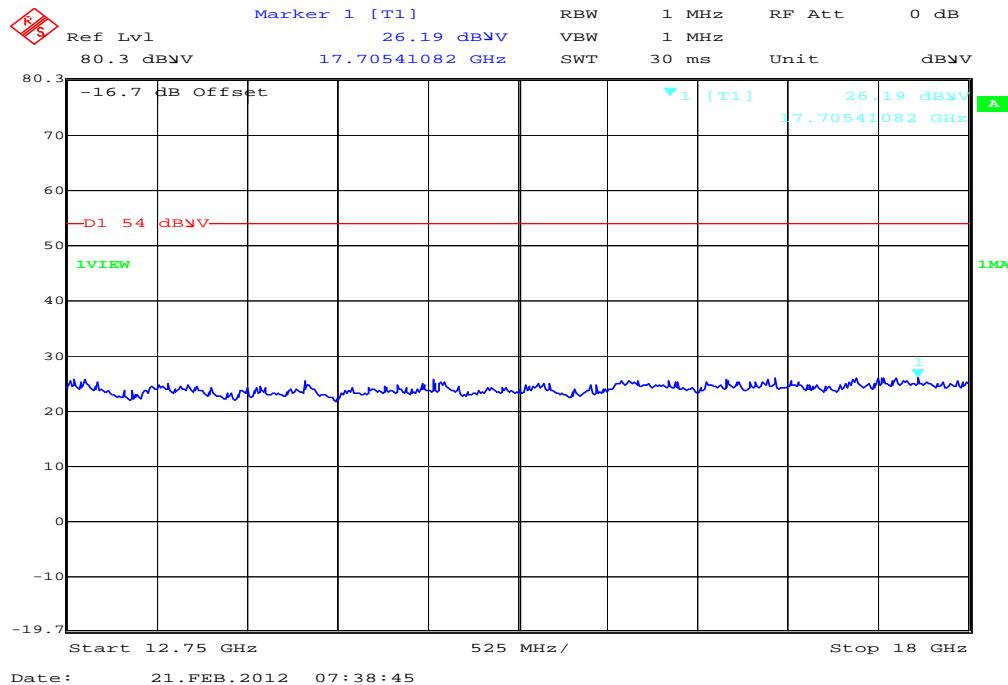
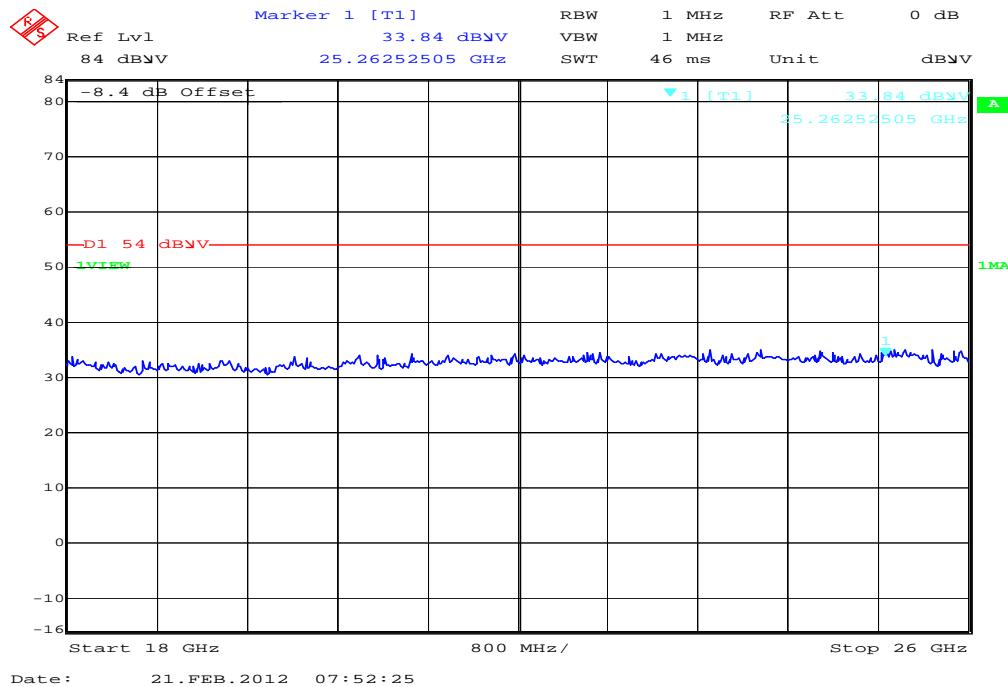
| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dB μ V/m) | Comment |
|-----------------|--------------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------------|---------|
| 36.473700 | 15.7 | 1000.0 | 120.000 | 170.0 | V | 102.0 | 13.2 | 14.4 | 30.0 | |
| 76.827300 | 13.1 | 1000.0 | 120.000 | 170.0 | V | 102.0 | 9.1 | 16.9 | 30.0 | |
| 123.698100 | 17.5 | 1000.0 | 120.000 | 156.0 | V | 269.0 | 9.9 | 16.0 | 33.5 | |
| 148.233750 | 13.7 | 1000.0 | 120.000 | 98.0 | V | 273.0 | 8.9 | 19.8 | 33.5 | |
| 322.665600 | 11.4 | 1000.0 | 120.000 | 155.0 | H | 260.0 | 15.2 | 24.6 | 36.0 | |
| 735.038700 | 20.1 | 1000.0 | 120.000 | 98.0 | V | 264.0 | 23.3 | 15.9 | 36.0 | |

Plot 7: 1 GHz to 12.75 GHz, TX mode, 2442 MHz, vertical polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 8: 1 GHz to 12.75 GHz, TX mode, 2442 MHz, horizontal polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 9: 12.75 GHz to 18 GHz, TX mode, 2442 MHz, vertical & horizontal polarization**Plot 10:** 18 GHz to 26 GHz, TX mode, 2442 MHz, vertical & horizontal polarization

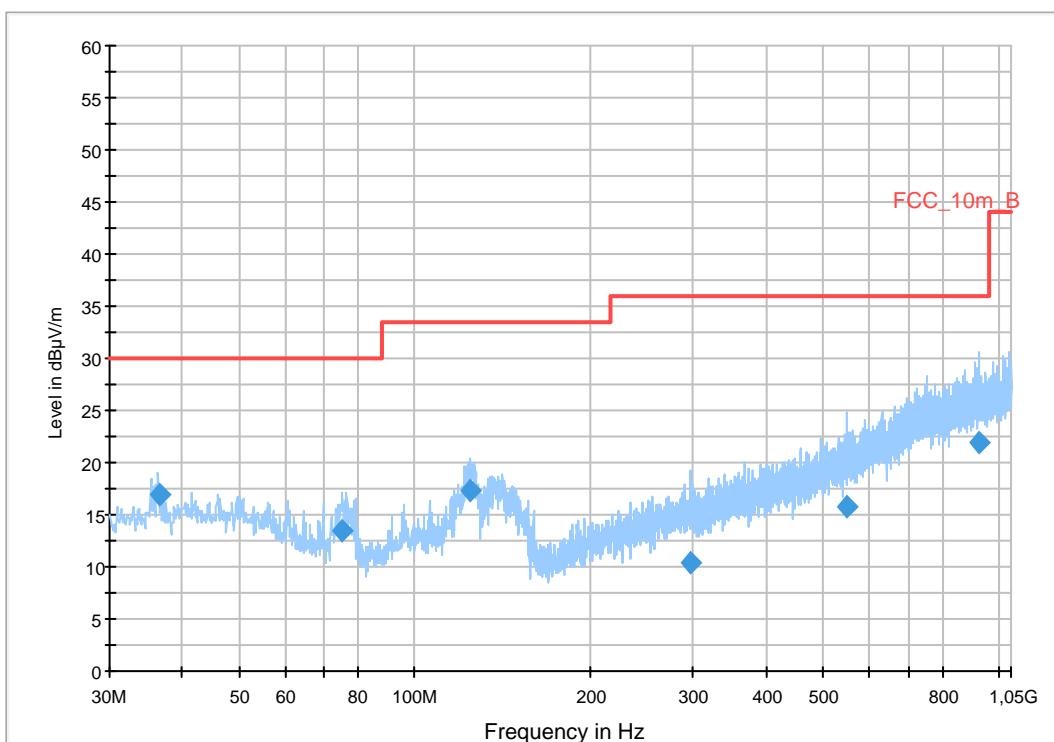
Plot 11: 30 MHz to 1 GHz, TX mode, 2482 MHz, vertical polarization
Common Information

EUT: CR220 + USB charger SE EP310
 Serial Number: 1040230005500X
 Test Description: FCC part 15C class B
 Operating Conditions: TX pulsed 32b (1536 μ S); 2482MHz; nordic 2
 Operator Name: Scigliano
 Comment: AC: 115 V / 60 Hz

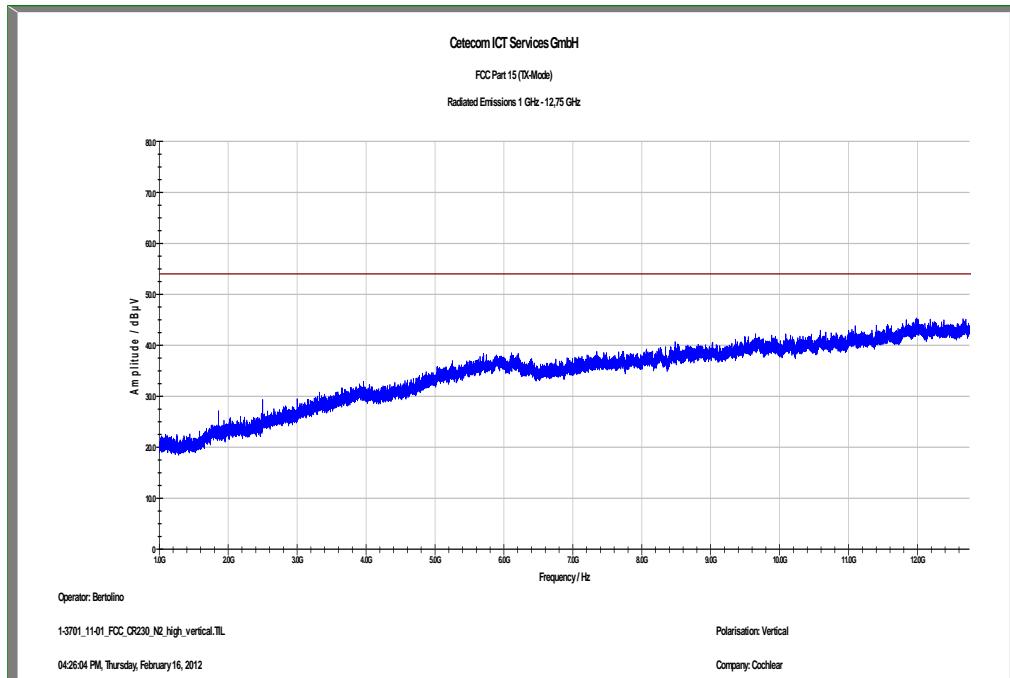
Scan Setup: STAN_Fin [EMI radiated]

| | | | | | |
|-----------------|----------------------|------------------|--------------|-------------------|---------------|
| Hardware Setup: | Electric Field (NOS) | | | | |
| Receiver: | [ESCI 3] | | | | |
| Level Unit: | dB μ V/m | | | | |
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |

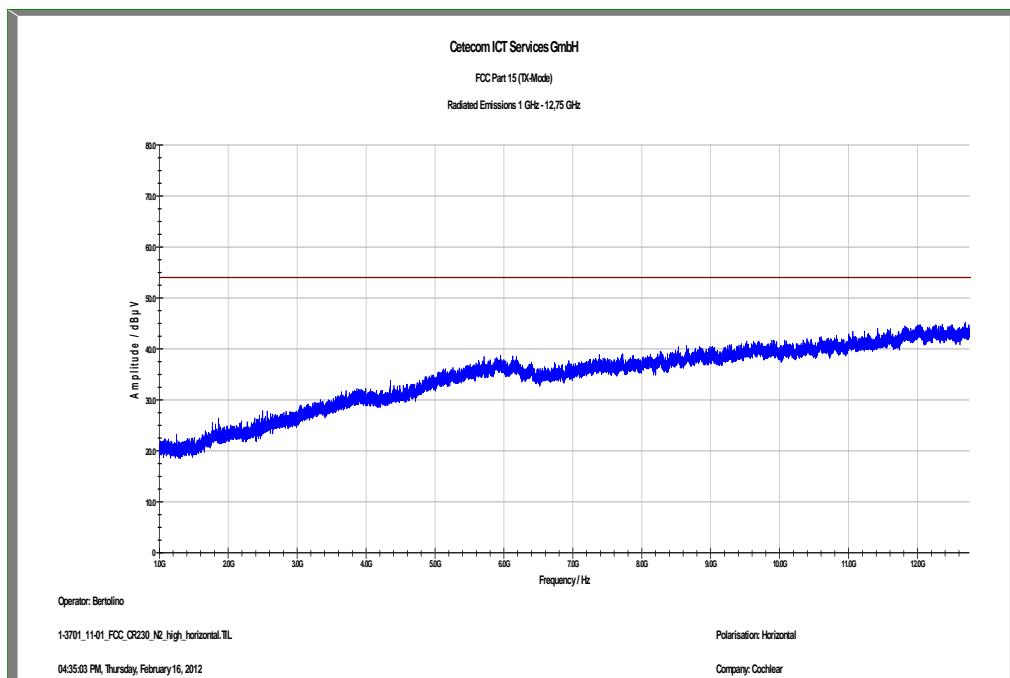
FCC_10m(B)_3


Final Result 1

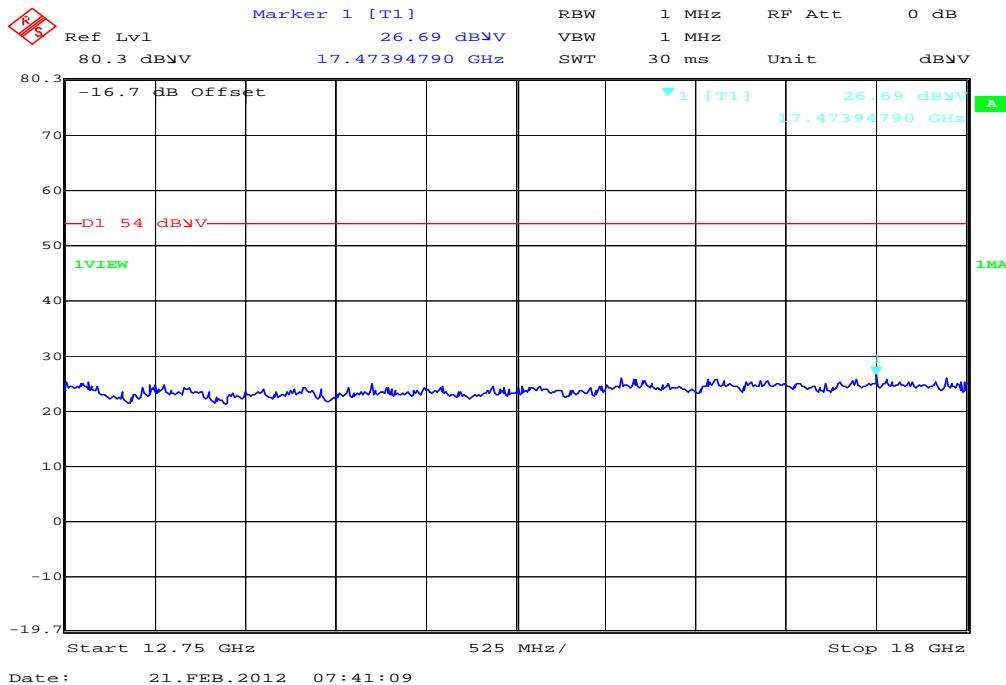
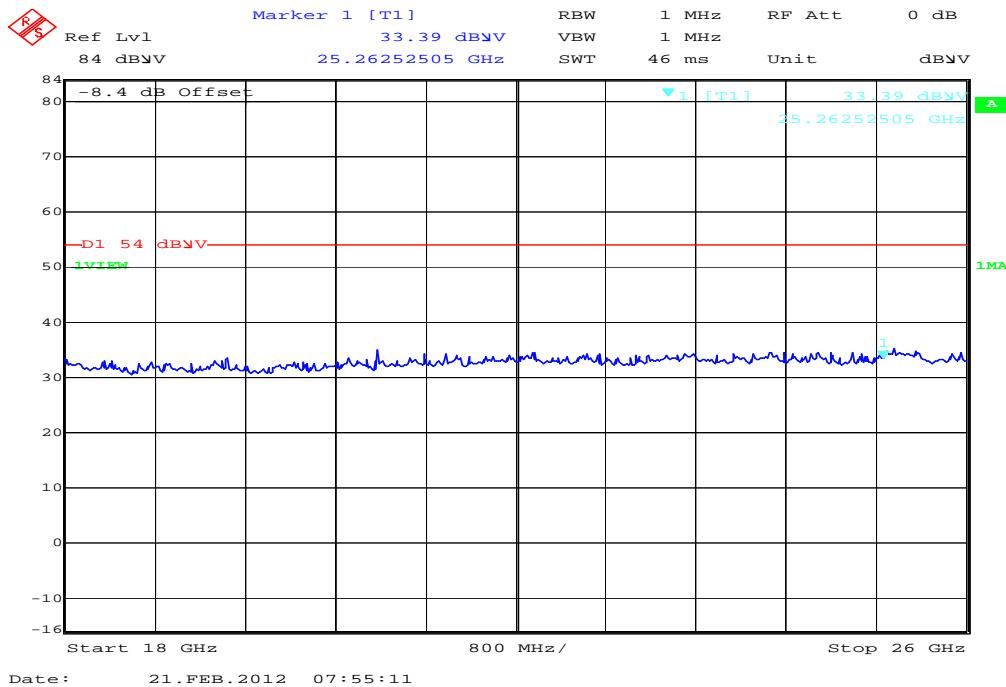
| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dB μ V/m) | Comment |
|-----------------|--------------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------------|---------|
| 36.415500 | 17.0 | 1000.0 | 120.000 | 114.0 | V | 195.0 | 13.1 | 13.0 | 30.0 | |
| 75.082800 | 13.5 | 1000.0 | 120.000 | 170.0 | V | 82.0 | 9.2 | 16.5 | 30.0 | |
| 124.704450 | 17.2 | 1000.0 | 120.000 | 170.0 | V | 270.0 | 9.8 | 16.3 | 33.5 | |
| 297.176700 | 10.5 | 1000.0 | 120.000 | 170.0 | V | 106.0 | 14.4 | 25.5 | 36.0 | |
| 550.161600 | 15.9 | 1000.0 | 120.000 | 170.0 | V | 106.0 | 19.4 | 20.1 | 36.0 | |
| 927.081300 | 21.8 | 1000.0 | 120.000 | 170.0 | H | 0.0 | 25.3 | 14.2 | 36.0 | |

Plot 12: 1 GHz to 12.75 GHz, TX mode, 2482 MHz, vertical polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 13: 1 GHz to 12.75 GHz, TX mode, 2482 MHz, horizontal polarization

The carrier signal is notched with a 2.4 GHz band rejection filter.

Plot 14: 12.75 GHz to 18 GHz, TX mode, 2482 MHz, vertical & horizontal polarization**Plot 15:** 18 GHz to 26 GHz, TX mode, 2482 MHz, vertical & horizontal polarization

9.6 RX spurious emissions radiated

Description:

Measurement of the radiated spurious emissions in idle/receive mode.

Measurement:

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

Limits:

| FCC | IC | |
|--------------------------------|-------------------------------|----------------------|
| 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 |

Results:

| RX Spurious Emissions Radiated [dB μ V/m] | | |
|---|----------|----------------------|
| F [MHz] | Detector | Level [dB μ V/m] |
| No critical peaks detected! | | |
| | | |
| | | |
| Measurement uncertainty | | ± 3 dB |

Result: The result of the measurement is passed.

Plots: Nordic 1

Plot 1: 30 MHz to 1 GHz, RX mode, vertical polarization

Common Information

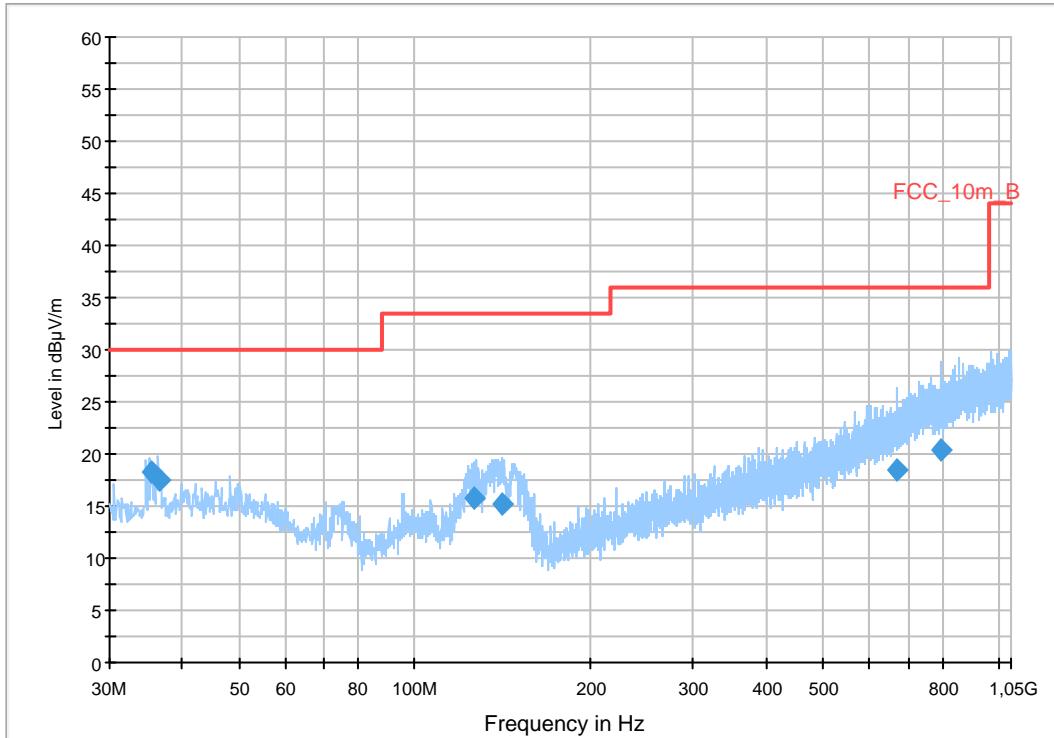
EUT: CR220 + USB charger SE EP310
 Serial Number: 1040230005500X
 Test Description: FCC part 15C class B
 Operating Conditions: RX mode, nordic 1
 Operator Name: Wolsdorfer
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Receiver: [ESCI 3]
 Level Unit: dB μ V/m

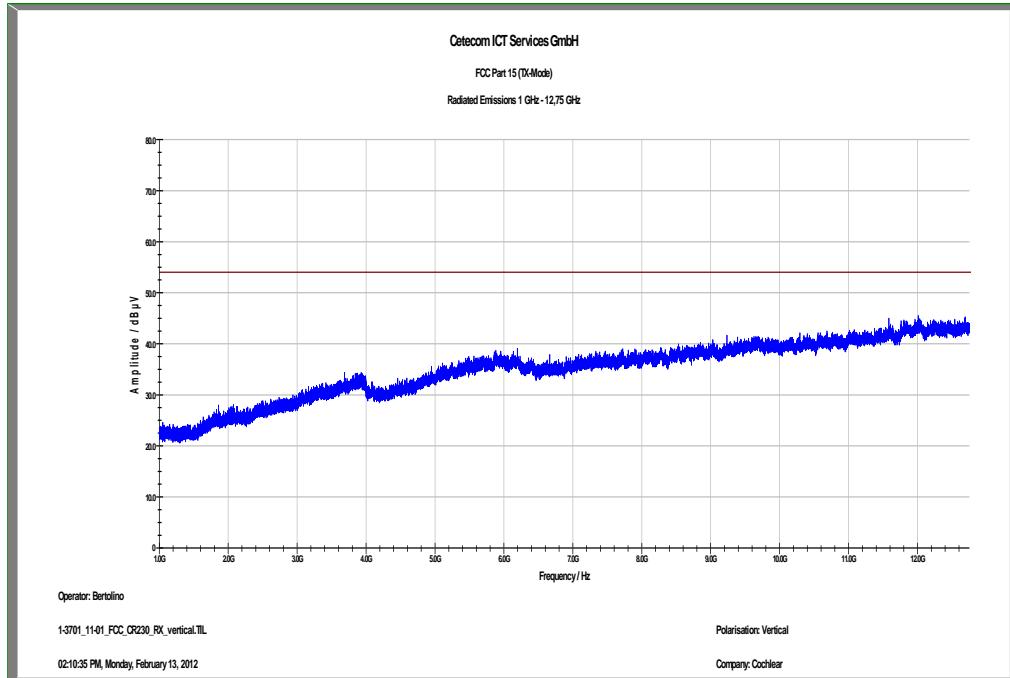
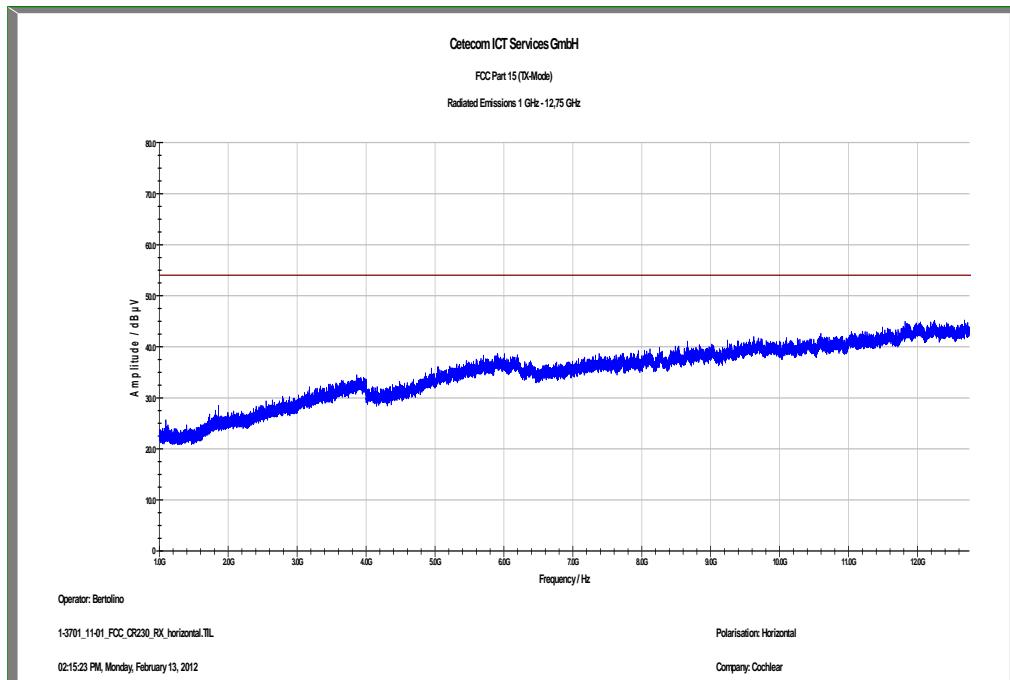
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
|----------------|-----------|-----------|---------|------------|--------|
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |

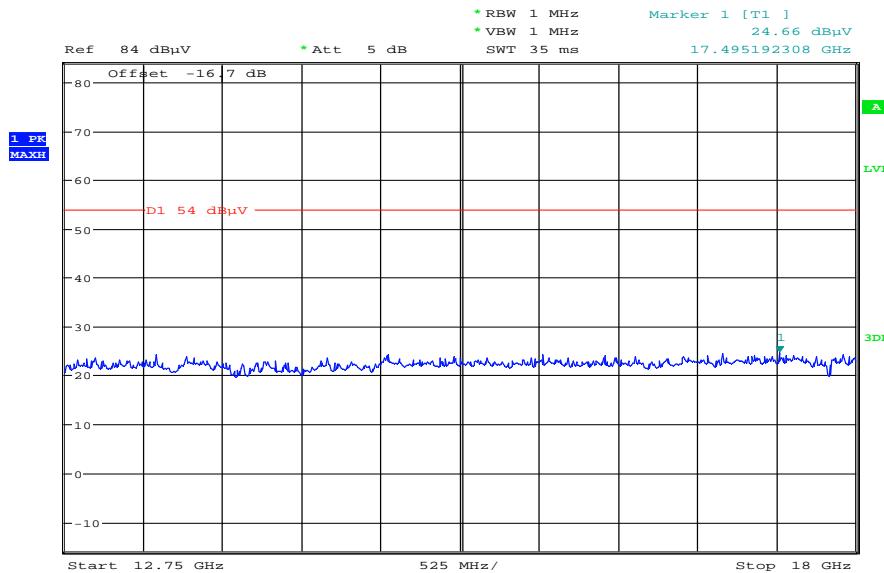
FCC_10m(B)_3



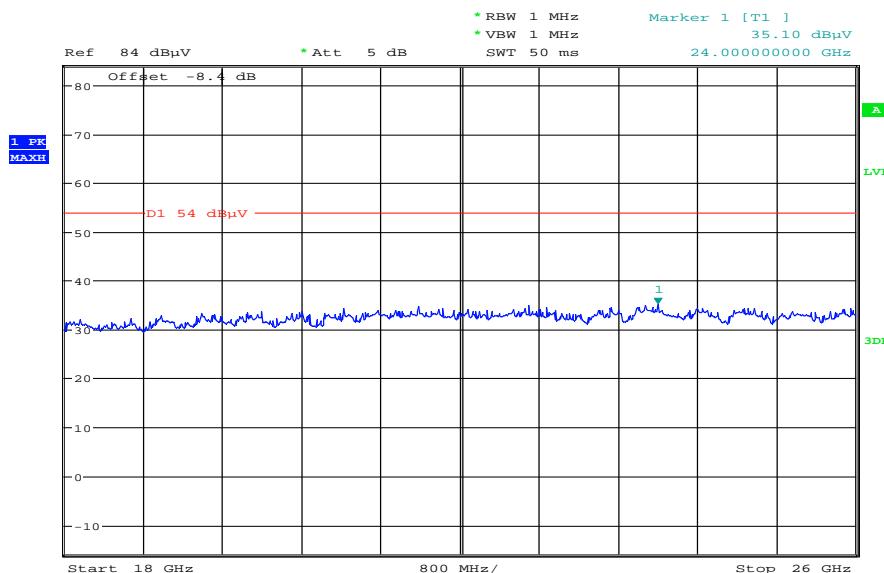
Final Result 1

| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dB μ V/m) | Comment |
|-----------------|--------------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------------|---------|
| 35.416650 | 18.2 | 1000.0 | 120.000 | 113.0 | V | 196.0 | 13.1 | 11.8 | 30.0 | |
| 36.420450 | 17.4 | 1000.0 | 120.000 | 98.0 | V | 260.0 | 13.1 | 12.6 | 30.0 | |
| 125.889150 | 15.8 | 1000.0 | 120.000 | 98.0 | V | 258.0 | 9.7 | 17.7 | 33.5 | |
| 141.350850 | 15.3 | 1000.0 | 120.000 | 105.0 | V | -7.0 | 8.7 | 18.2 | 33.5 | |
| 668.118600 | 18.4 | 1000.0 | 120.000 | 170.0 | H | 283.0 | 21.6 | 17.6 | 36.0 | |
| 795.836100 | 20.4 | 1000.0 | 120.000 | 106.0 | V | 271.0 | 23.8 | 15.6 | 36.0 | |

Plot 2: 1 GHz to 12.75 GHz, RX mode, vertical polarization**Plot 3:** 1 GHz to 12.75 GHz, RX mode, horizontal polarization

Plot 5: 12.75 GHz to 18 GHz, RX mode, vertical & horizontal polarization

Date: 14.FEB.2012 15:52:08

Plot 6: 18 GHz to 26 GHz, RX mode, vertical & horizontal polarization

Date: 14.FEB.2012 15:55:20

Plots: Nordic 2

Plot 1: 30 MHz to 1 GHz, RX mode, vertical polarization

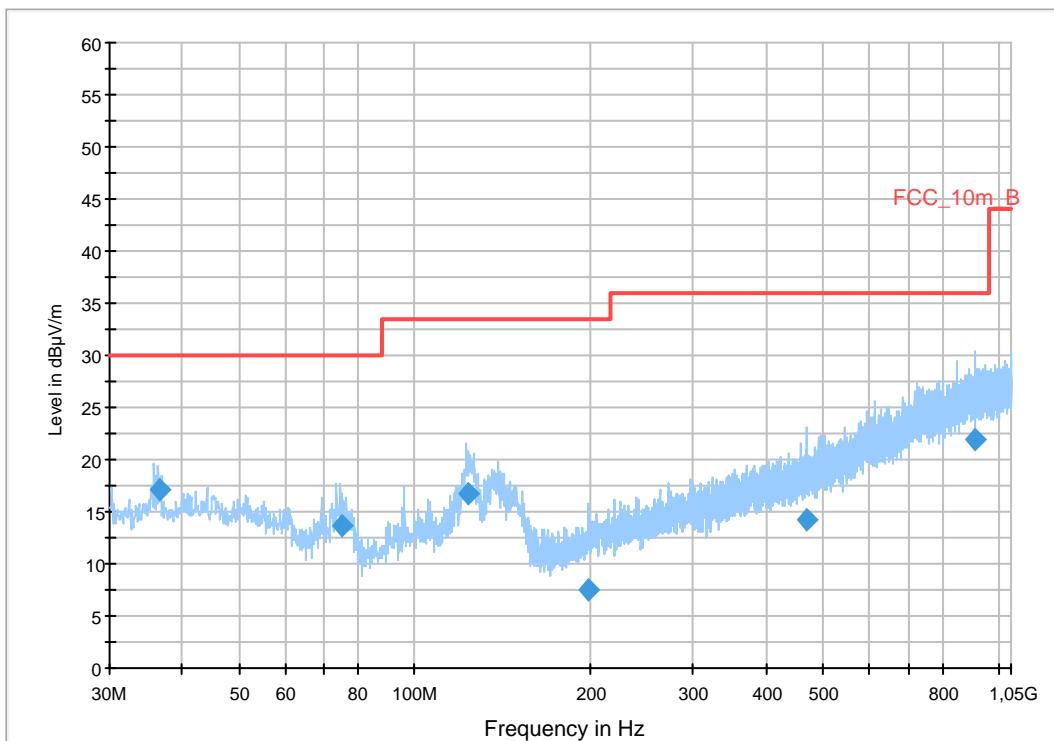
Common Information

EUT: CR220 + USB charger SE EP310
 Serial Number: 1040230005500X
 Test Description: FCC part 15C class B
 Operating Conditions: RX mode, nordic 2
 Operator Name: Scigliano
 Comment: AC: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

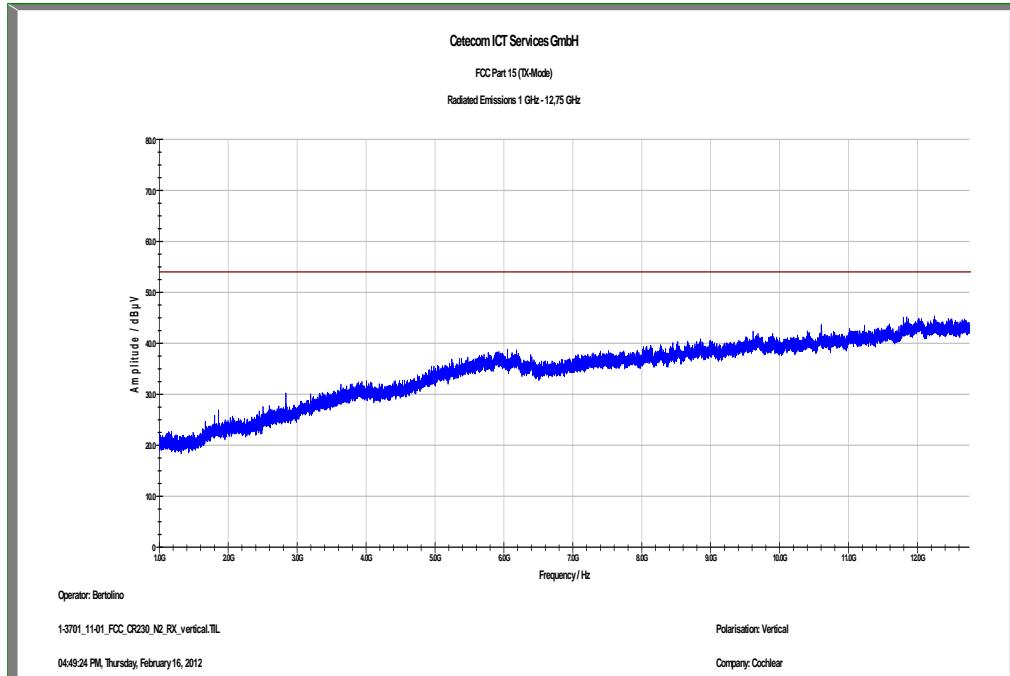
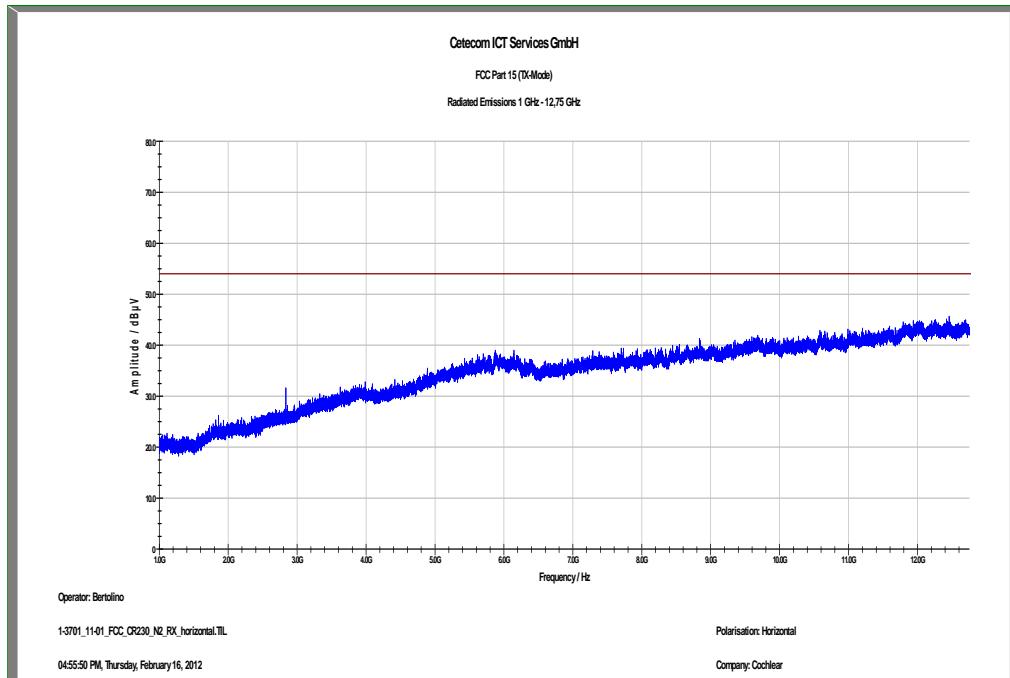
| | | | | | |
|-----------------|----------------------|------------------|--------------|-------------------|---------------|
| Hardware Setup: | Electric Field (NOS) | | | | |
| Receiver: | [ESCI 3] | | | | |
| Level Unit: | dB μ V/m | | | | |
| Subrange | Step Size | Detectors | IF BW | Meas. Time | Preamp |
| 30 MHz - 2 GHz | 60 kHz | QPK | 120 kHz | 1 s | 20 dB |

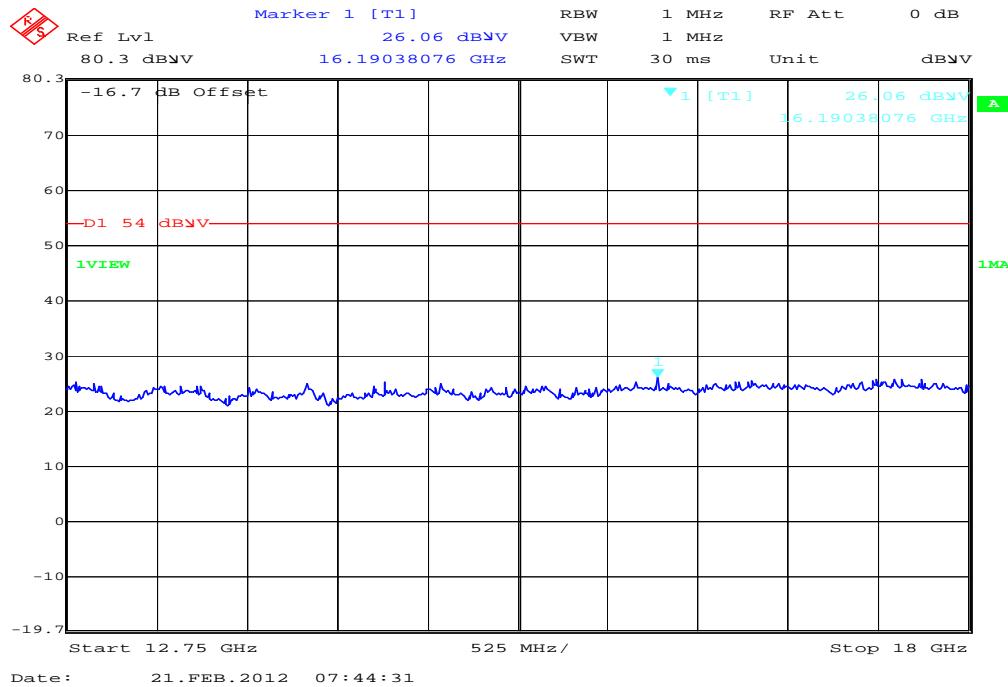
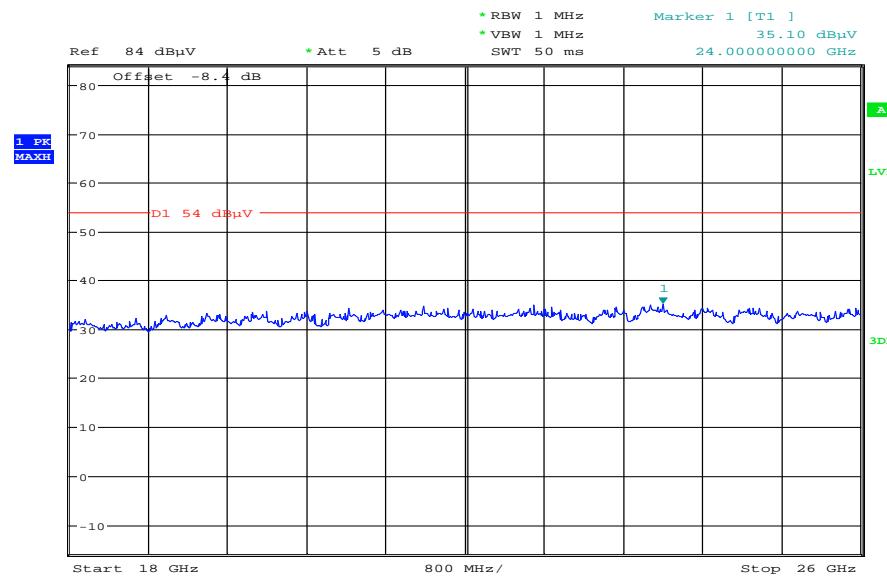
FCC_10m(B)_3



Final Result 1

| Frequency (MHz) | QuasiPeak (dB μ V/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dB μ V/m) | Comment |
|-----------------|--------------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------------|---------|
| 36.453600 | 17.2 | 1000.0 | 120.000 | 164.0 | V | 106.0 | 13.2 | 12.8 | 30.0 | |
| 74.789550 | 13.6 | 1000.0 | 120.000 | 170.0 | V | 95.0 | 9.2 | 16.4 | 30.0 | |
| 123.426300 | 16.7 | 1000.0 | 120.000 | 144.0 | V | 195.0 | 9.9 | 16.8 | 33.5 | |
| 198.692550 | 7.5 | 1000.0 | 120.000 | 98.0 | V | 12.0 | 11.6 | 26.0 | 33.5 | |
| 468.475650 | 14.2 | 1000.0 | 120.000 | 170.0 | V | 195.0 | 18.1 | 21.8 | 36.0 | |
| 911.187150 | 21.9 | 1000.0 | 120.000 | 170.0 | H | 172.0 | 25.2 | 14.1 | 36.0 | |

Plot 2: 1 GHz to 12.75 GHz, RX mode, vertical polarization**Plot 3:** 1 GHz to 12.75 GHz, RX mode, horizontal polarization

Plot 5: 12.75 GHz to 18 GHz, RX mode, vertical & horizontal polarization**Plot 6:** 18 GHz to 26 GHz, RX mode, vertical & horizontal polarization

9.7 Spurious emissions radiated < 30 MHz

Description:

Measurement of the radiated spurious emissions in transmit mode below 30 MHz. The EUT is set to lowest, middle and highest channel. 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 |
| Resolution bandwidth: | F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz |
| Video bandwidth: | F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz |
| Span: | 9 kHz to 30 MHz |
| Trace-Mode: | Max Hold |

Limits:

| FCC | IC | |
|--------------------------------------|-------------------------------|----------------------|
| Spurious Emissions Radiated < 30 MHz | | |
| Frequency (MHz) | Field Strength (dB μ V/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 |

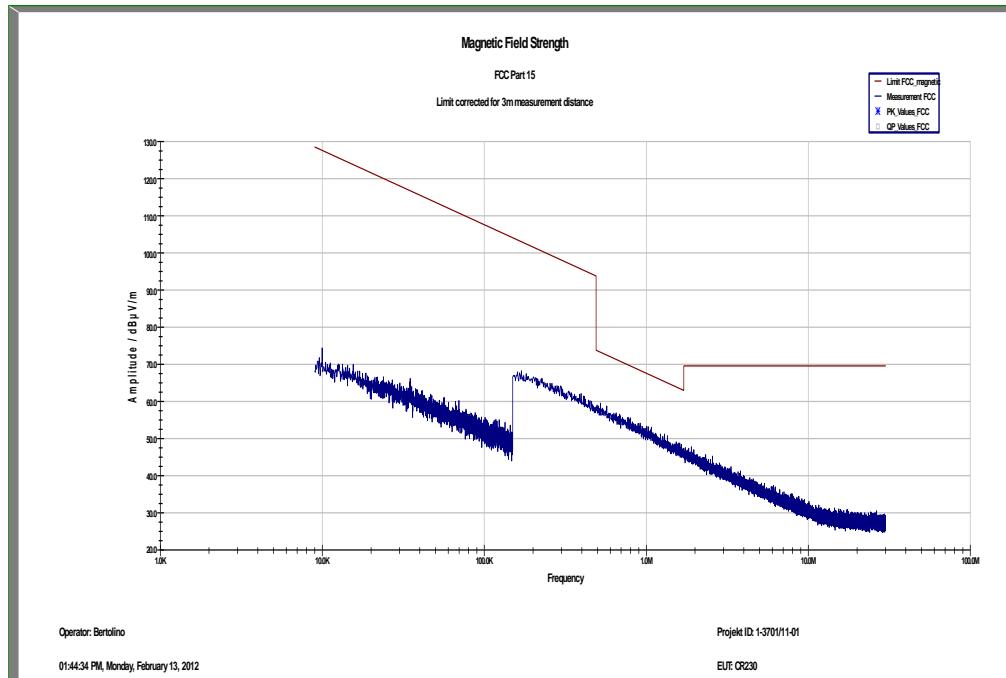
Results:

| Spurious Emissions Radiated < 30 MHz [dB μ V/m] | | | | | | | | |
|---|----------|----------------------|-----------------------------|----------|----------------------|-----------------------------|----------|----------------------|
| 2402 MHz | | | 2442 MHz | | | 2482 MHz | | |
| F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] | F [MHz] | Detector | Level [dB μ V/m] |
| No critical peaks detected! | | | No critical peaks detected! | | | No critical peaks detected! | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| Measurement uncertainty | | | ± 3 dB | | | | | |

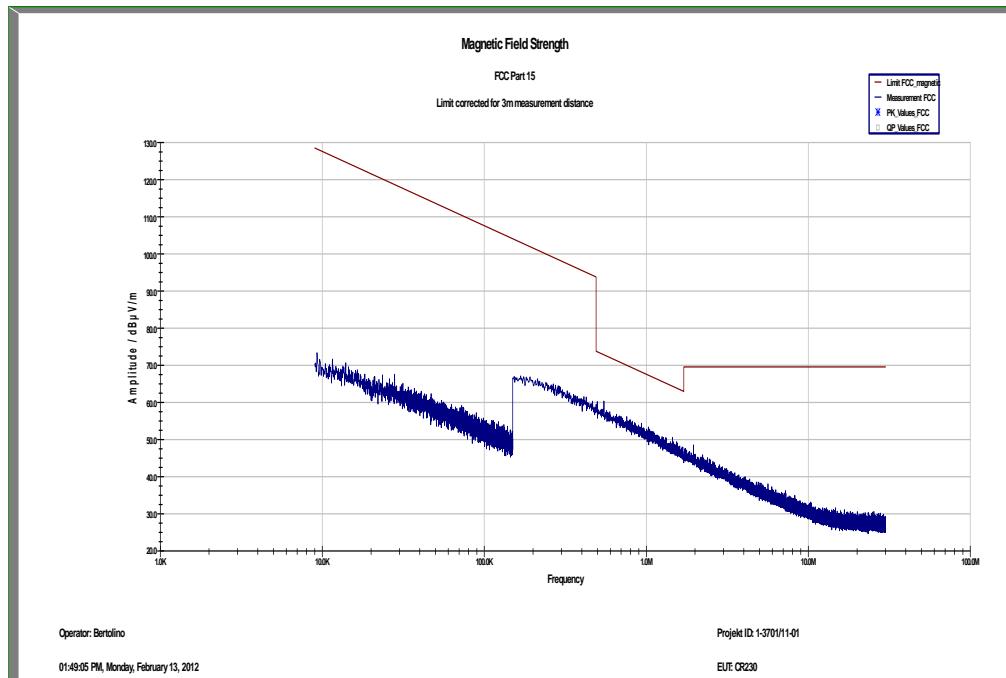
Result: The result of the measurement is passed.

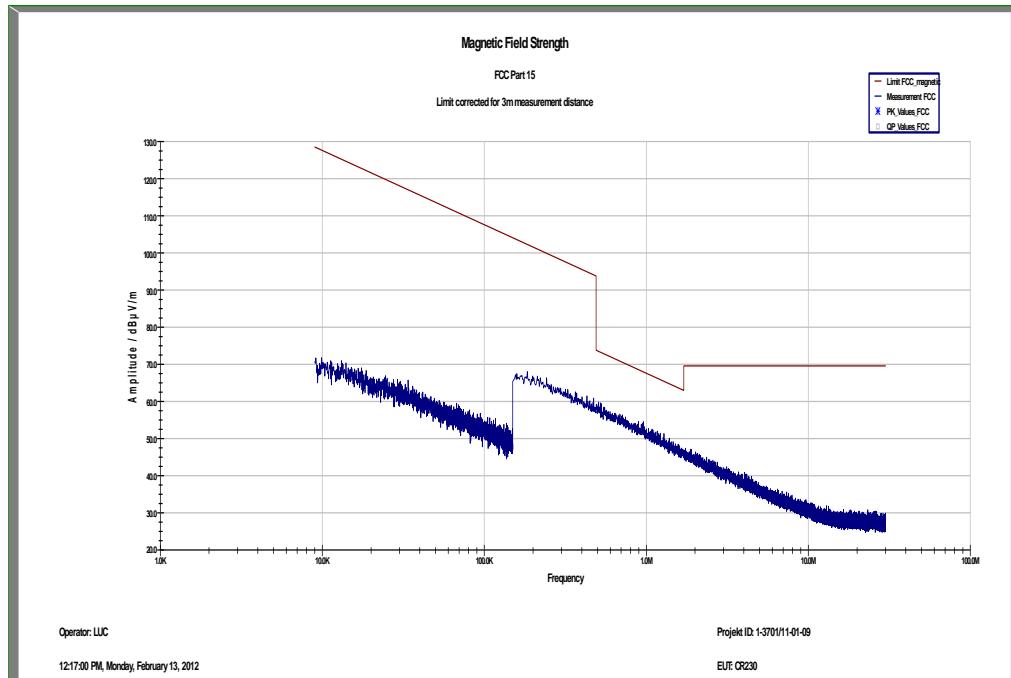
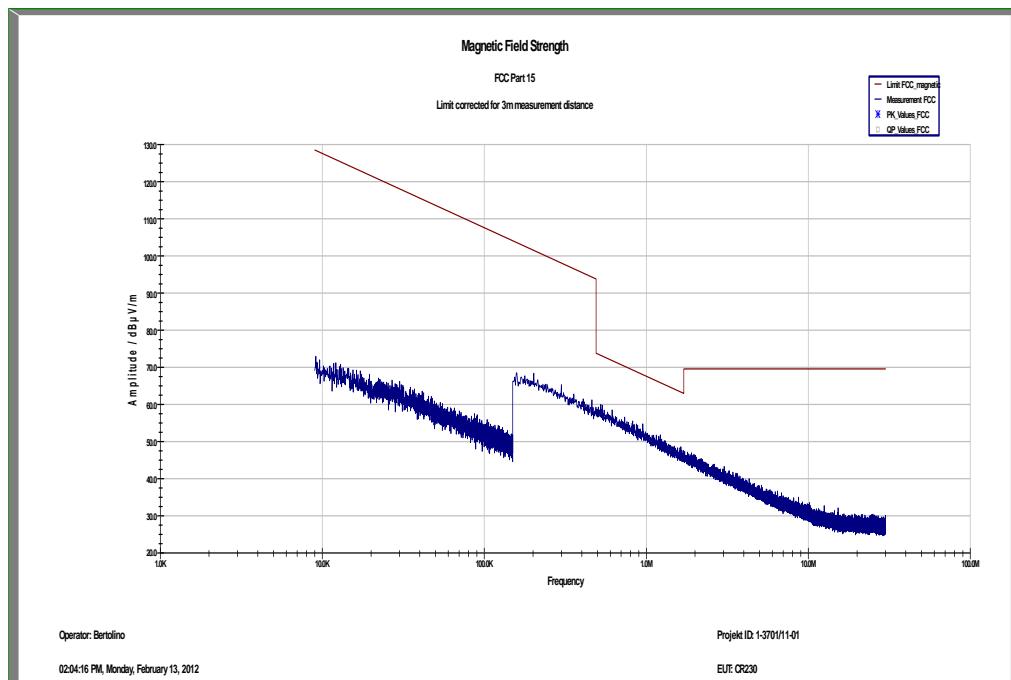
Plots: Nordic 1

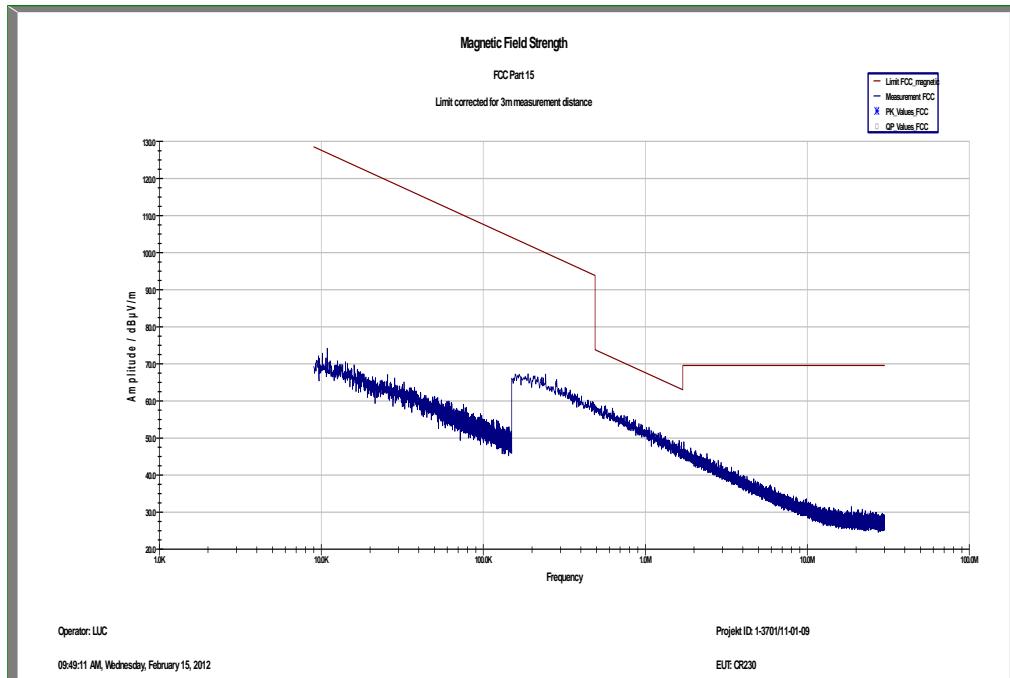
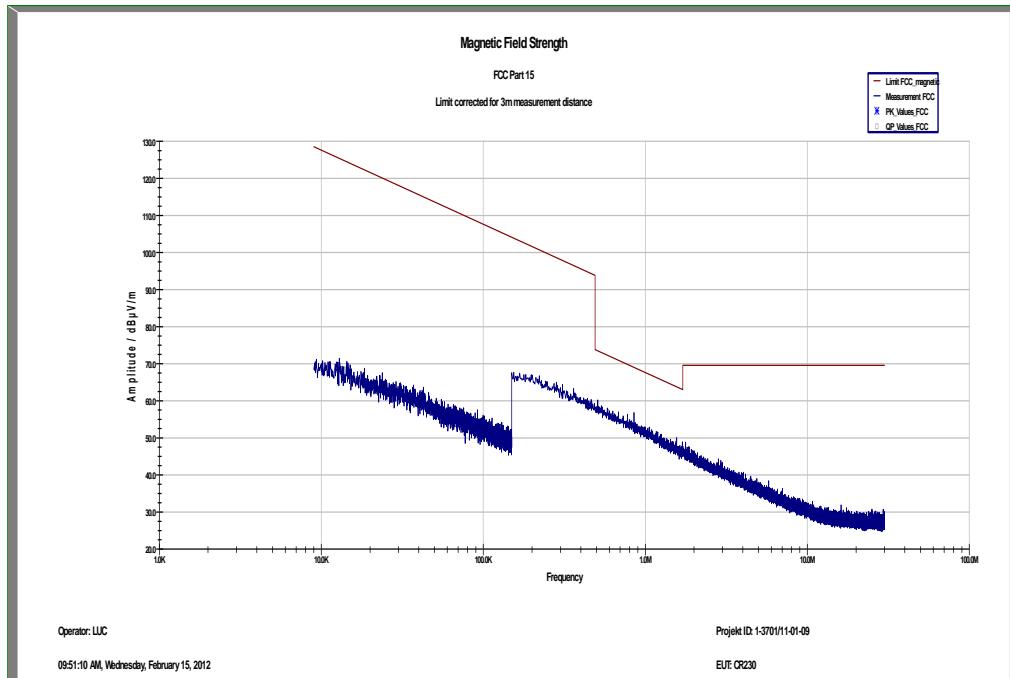
Plot 1: 9 kHz to 30 MHz, TX mode, 2402 MHz

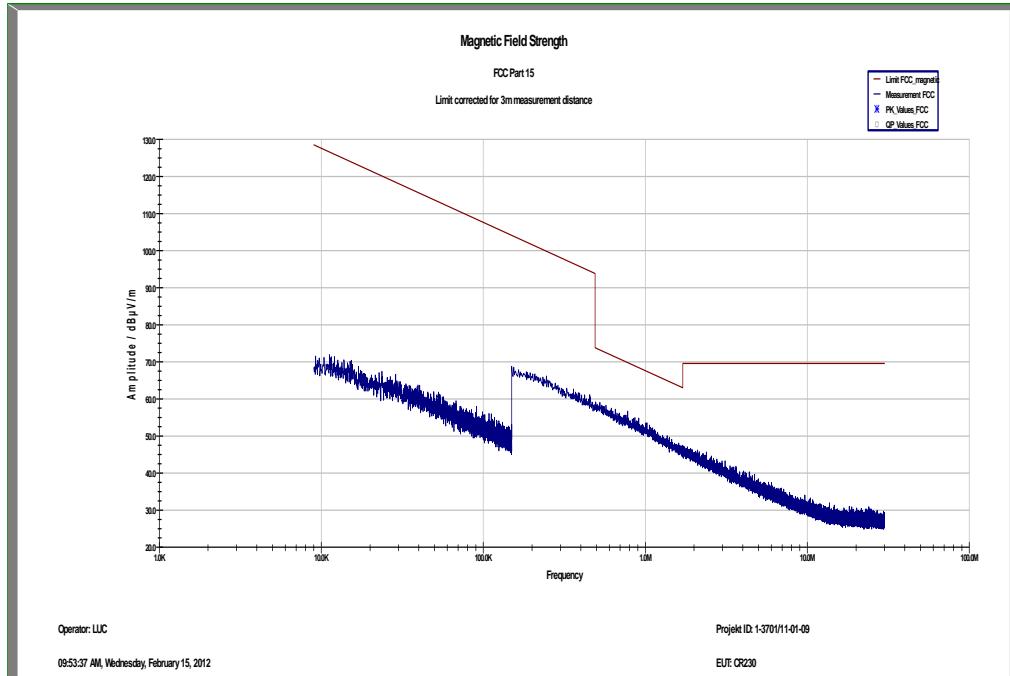
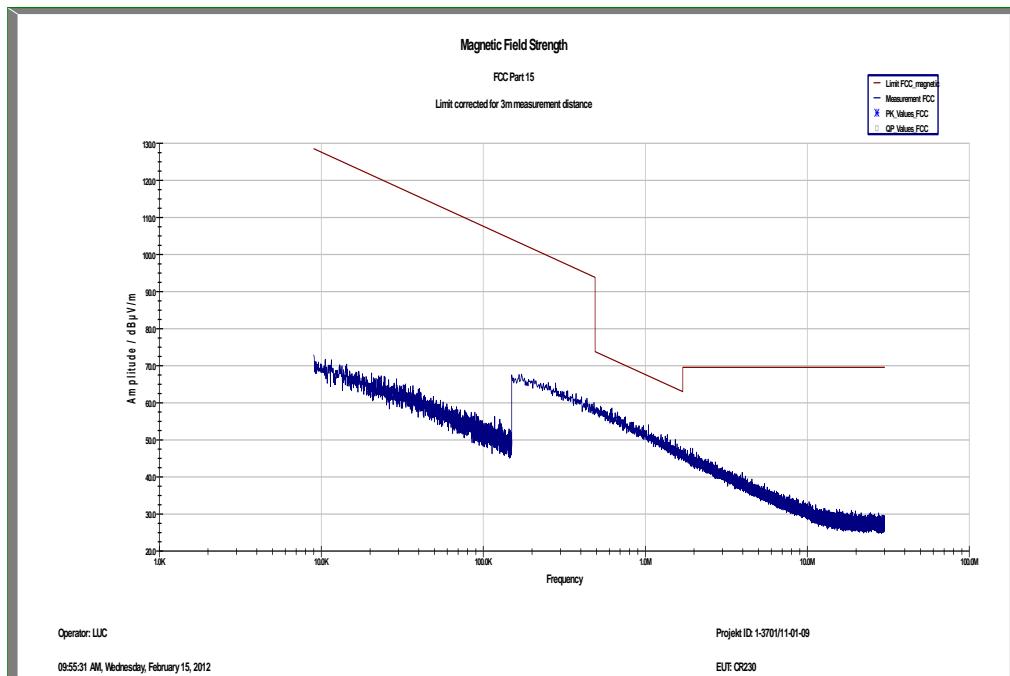


Plot 2: 9 kHz to 30 MHz, TX mode, 2442 MHz



Plot 3: 9 kHz to 30 MHz, TX mode, 2482 MHz**Plot 4:** 9 kHz to 30 MHz, RX mode

Plots: Nordic 2**Plot 1:** 9 kHz to 30 MHz, TX mode, 2402 MHz**Plot 2:** 9 kHz to 30 MHz, TX mode, 2442 MHz

Plot 3: 9 kHz to 30 MHz, TX mode, 2482 MHz**Plot 4:** 9 kHz to 30 MHz, RX mode

9.8 Spurious emissions conducted < 30 MHz

Description:

Measurement of the conducted spurious emissions in transmit mode below 30 MHz. The EUT is set to middle channel and Idle mode. If critical peaks are found the lowest and highest channel will be measured too. 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 |
| Resolution bandwidth: | F < 150 kHz: 1 kHz F > 150 kHz: 100 kHz |
| Video bandwidth: | F < 150 kHz: 200 Hz F > 150 kHz: 9 kHz |
| Span: | 9 kHz to 30 MHz |
| Trace-Mode: | Max Hold |

Limits:

| FCC | IC | |
|--|---------------------------|------------------------|
| TX Spurious Emissions Conducted < 30 MHz | | |
| Frequency (MHz) | Quasi-Peak (dB μ V/m) | Average (dB μ V/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

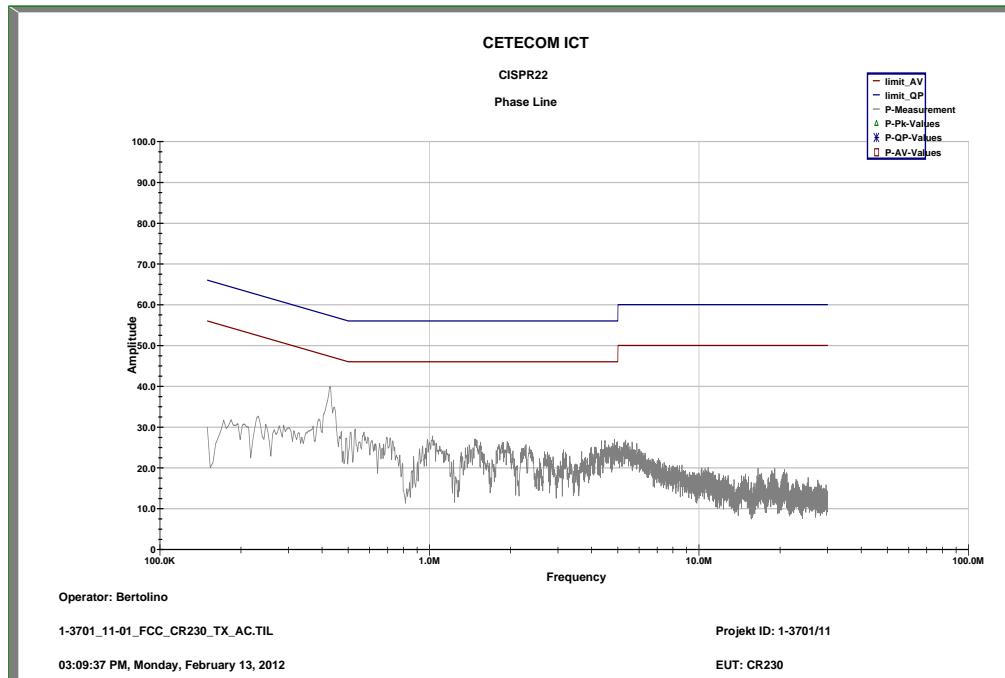
Results:

| Spurious Emissions Conducted < 30 MHz [dB μ V/m] | | |
|--|----------|----------------------|
| F [MHz] | Detector | Level [dB μ V/m] |
| No critical peaks detected! | | |
| | | |
| | | |
| | | |
| Measurement uncertainty | | ± 3 dB |

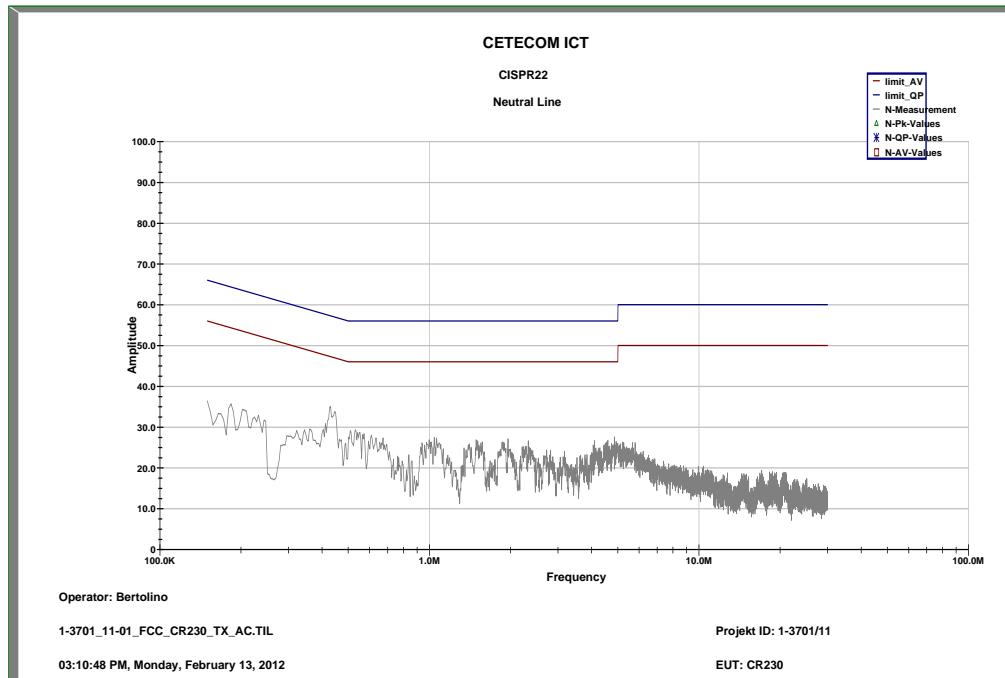
Result: The result of the measurement is passed.

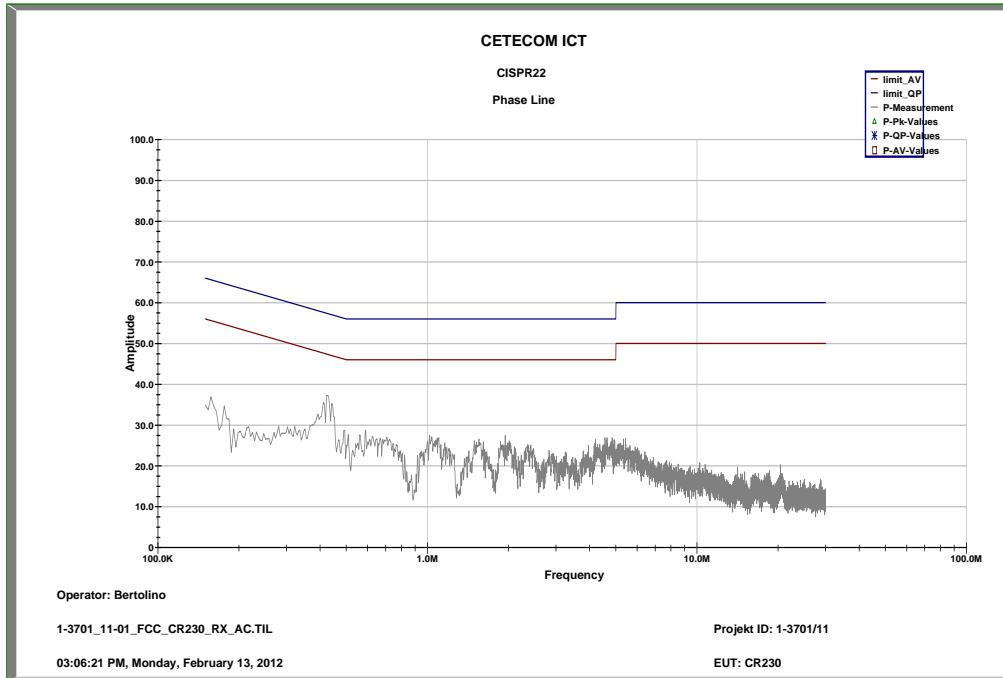
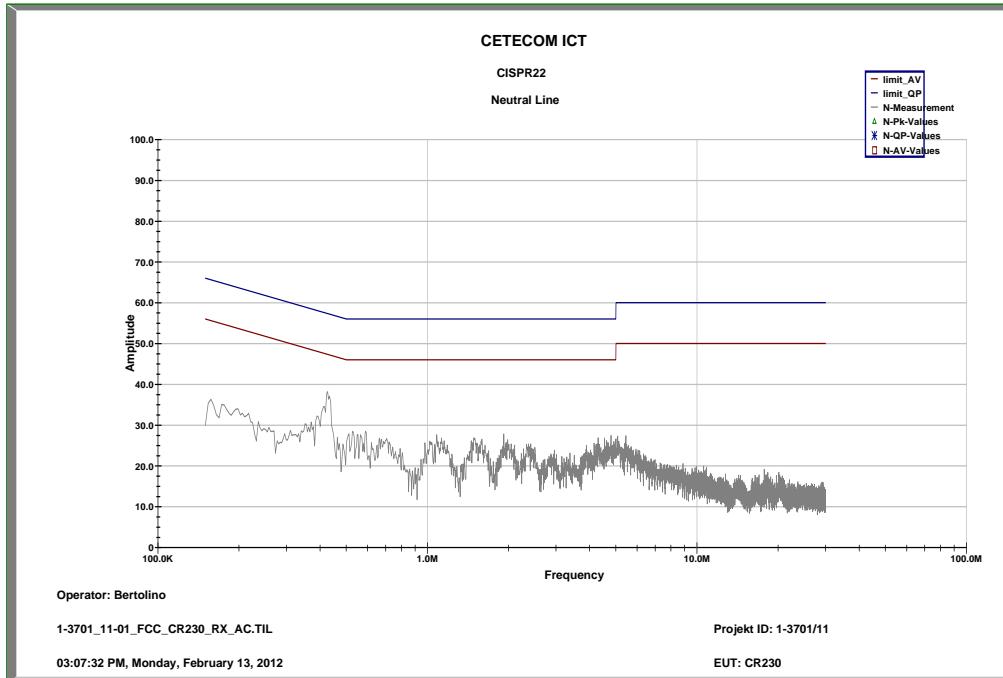
Plots: Nordic 1

Plot 1: 9 kHz to 30 MHz, TX mode, phase line



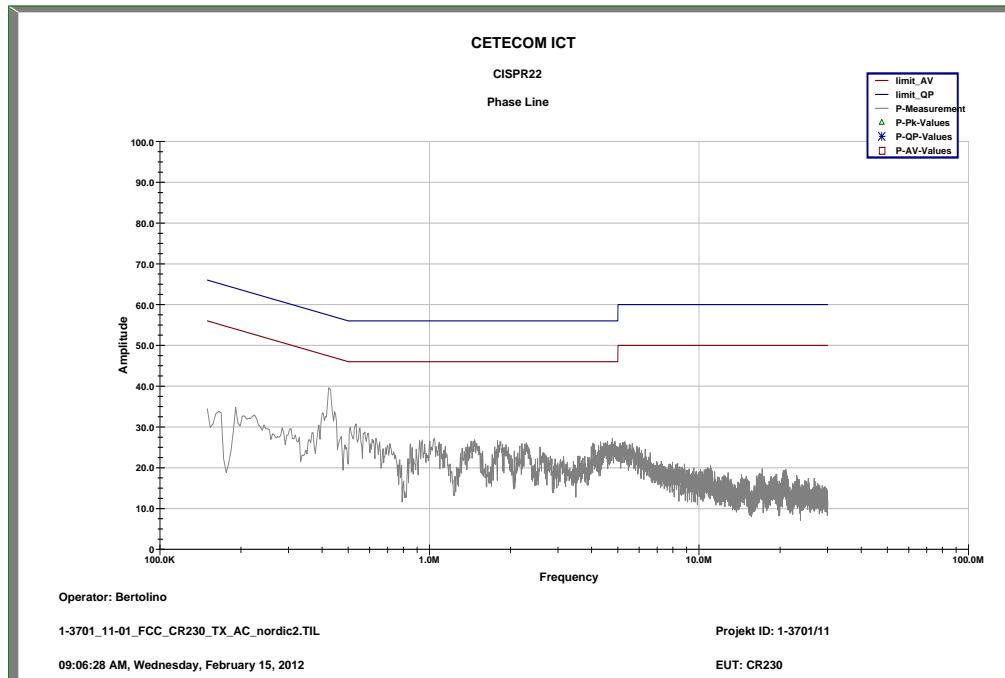
Plot 2: 9 kHz to 30 MHz, TX mode, neutral line



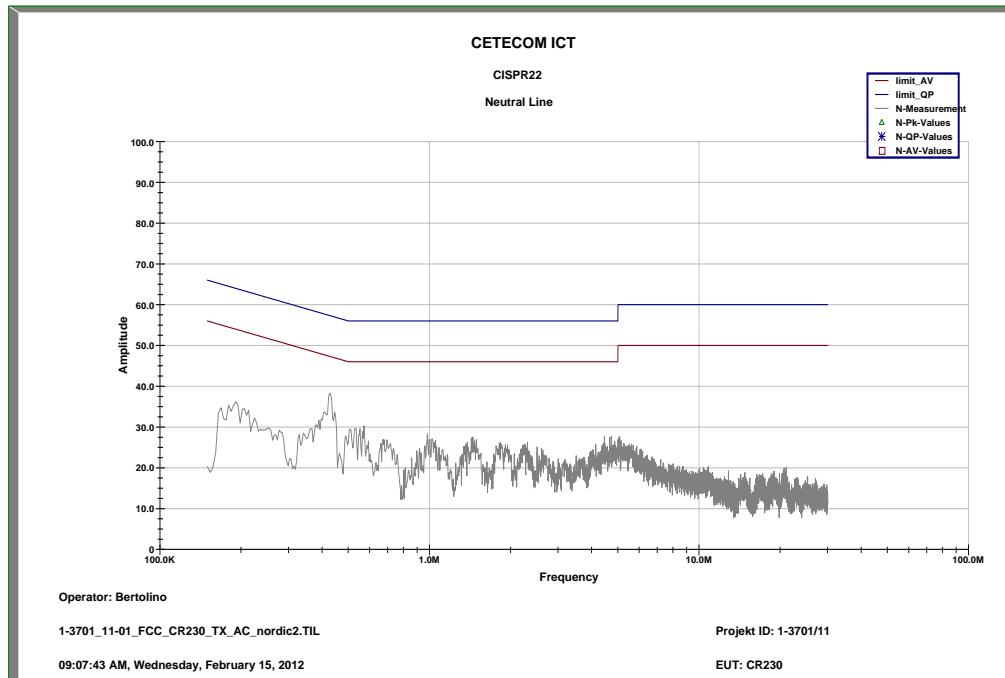
Plot 3: 9 kHz to 30 MHz, RX mode, phase line**Plot 4:** 9 kHz to 30 MHz, RX mode, neutral line

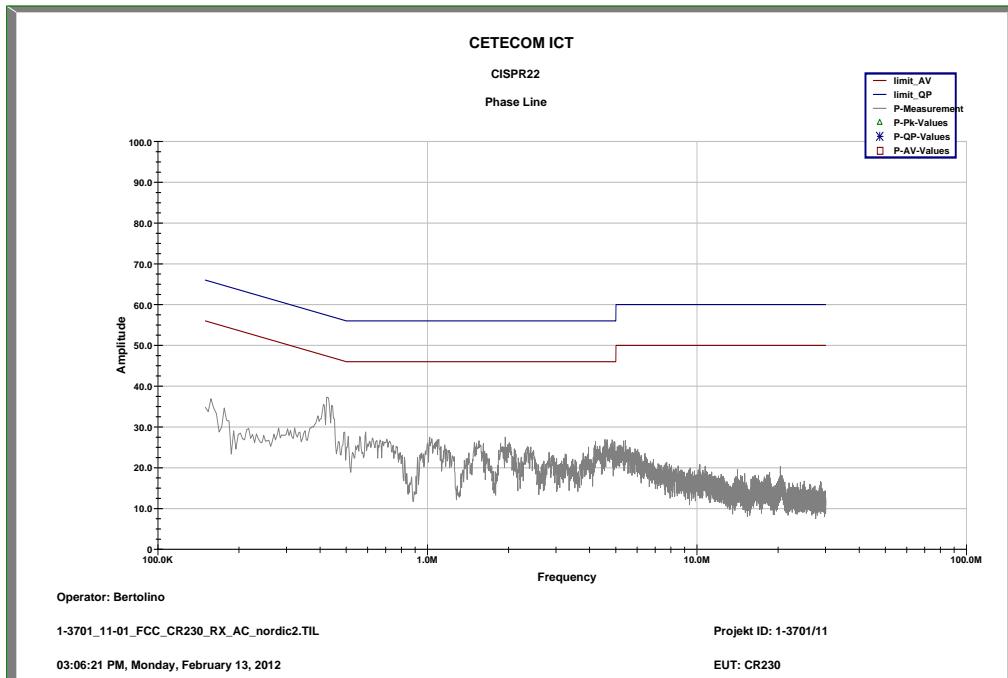
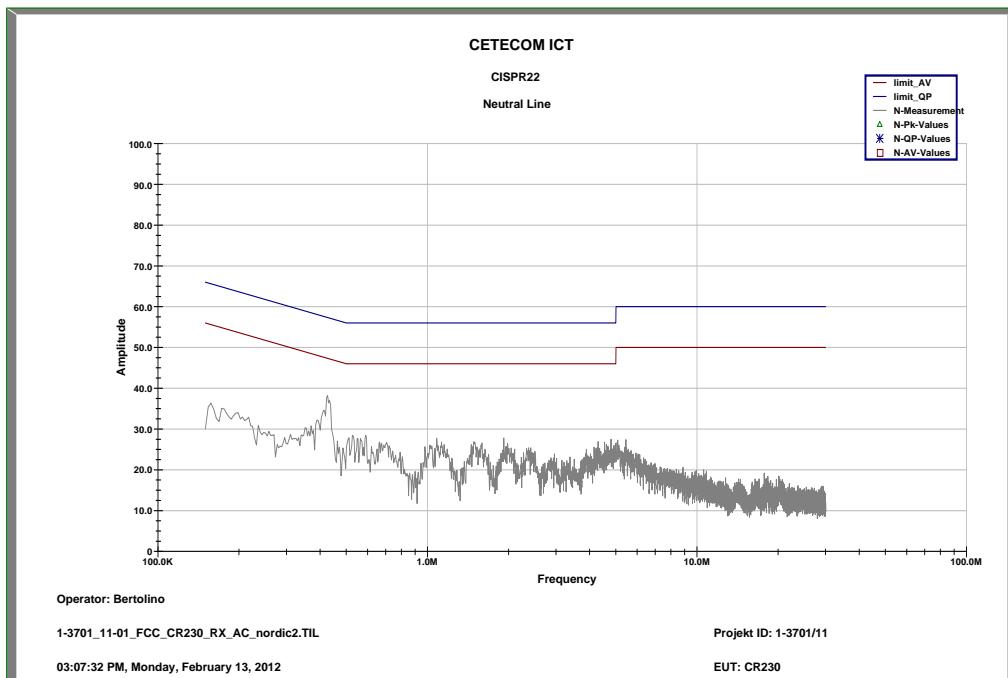
Plots: Nordic 2

Plot 1: 9 kHz to 30 MHz, TX mode, phase line



Plot 2: 9 kHz to 30 MHz, TX mode, neutral line



Plot 3: 9 kHz to 30 MHz, RX mode, phase line**Plot 4:** 9 kHz to 30 MHz, RX mode, neutral line

10 Test equipment and ancillaries used for tests

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

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

| No. | Lab / Item | Equipment | Type | Manufact. | Serial No. | INV. No Cetecom | Kind of Calibration | Last Calibration | Next Calibration |
|-----|------------|--|--------------------------------------|----------------------|----------------------|-----------------|---------------------|------------------|------------------|
| 11 | n. a. | Double-Ridged Waveguide Horn Antenna 1-18.0GHz | 3115 | EMCO | 8812-3088 | 300001032 | vIKI! | 11.05.2011 | 11.05.2013 |
| 2 | n. a. | Active Loop Antenna | 6502 | EMCO | 2210 | 300001015 | ne | | |
| 3 | n. a. | Anechoic chamber | FAC 3/5m | MWB / TDK | 87400/02 | 300000996 | | 23.03.2009 | |
| 4 | n. a. | Relais Matrix | 3488A | HP Meßtechnik | 2719A15013 | 300001156 | ne | | |
| 5 | n. a. | Three-Way Power Splitter, 50 Ohm | 11850C | HP Meßtechnik | | 300000997 | ne | | |
| 6 | n. a. | Switch / Control Unit | 3488A | HP | 2605e08770 | 300001443 | ne | | |
| 7 | n. a. | Amplifier | js42-00502650-28-5a | Parzich GMBH | 928979 | 300003143 | ne | | |
| 8 | n. a. | Band Reject filter | WRCG2400/2483-2375/2505-50/10SS | Wainwright | 11 | 300003351 | ev | | |
| 9 | n. a. | TILE-Software Emission | Quantum Change, Modell TILE-ICS/FULL | EMCO | none | 300003451 | ne | | |
| 10 | n. a. | PSA Spectrum Analyzer 3 Hz - 26.5 GHz | E4440A | Agilent Technologies | MY48250080 | 300003812 | k | 08.09.2010 | 08.09.2012 |
| 11 | n. a. | RF Filter Section 9kHz - 1GHz | N9039A | Agilent Technologies | MY48260003 | 300003825 | vIKI! | 08.09.2010 | 08.09.2012 |
| 12 | n. a. | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck | 371 | 300003854 | vIKI! | 14.10.2011 | 14.10.2014 |
| 13 | 11b | Microwave System Amplifier, 0.5-26.5 GHz | 83017A | HP Meßtechnik | 00419 | 300002268 | ev | 10.03.2011 | |
| 14 | A026 | Std. Gain Horn Antenna 12.4 to 18.0 GHz | 639 | Narda | | 300000787 | ne | | |
| 15 | A029 | Std. Gain Horn Antenna 18.0 to 26.5 GHz | 638 | Narda | | 300002442 | ne | | |
| 16 | 45 | Switch-Unit | 3488A | HP Meßtechnik | 2719A14505 | 300000368 | g | | |
| 17 | 50 | DC power supply, 60Vdc, 50A, 1200 W | 6032A | HP Meßtechnik | 2920A04466 | 300000580 | ne | | |
| 18 | n. a. | software | SPS_PHE 1.4f | Spitzberger & Spieß | B5981; 5D1081; B5979 | 300000210 | ne | | |
| 19 | n. a. | EMI Test Receiver | ESCI 1166.5950.03 | R&S | 100083 | 300003312 | k | 05.01.2011 | 05.01.2013 |
| 20 | n. a. | Analyzer-Reference-System | ARS 16/1 | SPS | A3509 07/0 0205 | 300003314 | k | 14.07.2011 | 14.07.2013 |

| | | (Harmonics and Flicker) | | | | | | |
|----|-------|--|---------------------|--------------|---------|-----------|-----|-----------------------|
| 21 | n. a. | Amplifier | JS42-00502650-28-5A | MITEQ | 1084532 | 300003379 | ev | |
| 22 | n. a. | Antenna Tower | Model 2175 | ETS-LINDGREN | 64762 | 300003745 | izw | |
| 23 | n. a. | Positioning Controller | Model 2090 | ETS-LINDGREN | 64672 | 300003746 | izw | |
| 24 | n. a. | Turntable Interface-Box | Model 105637 | ETS-LINDGREN | 44583 | 300003747 | izw | |
| 25 | n. a. | TRILOG Broadband Test-Antenna 30 MHz - 3 GHz | VULB9163 | Schwarzbeck | 295 | 300003787 | k | 01.04.2010 01.04.2012 |
| 26 | n. a. | Spectrum-Analyzer | FSU26 | R&S | 200809 | 300003874 | k | 10.01.2011 10.01.2013 |

Agenda: Kind of Calibration

k calibration / calibrated
 ne not required (k, ev, izw, zw not required)
 ev periodic self verification
 Ve long-term stability recognized
 vkl! Attention: extended calibration interval
 NK! Attention: not calibrated

EK limited calibration
 zw cyclical maintenance (external cyclical maintenance)
 izw internal cyclical maintenance
 g blocked for accredited testing
 *) next calibration ordered / currently in progress

11 Observations

No observations exceeding those reported with the single test cases have been made.

Annex A Photographs of the test setup

Photo documentation:

Photo 1:

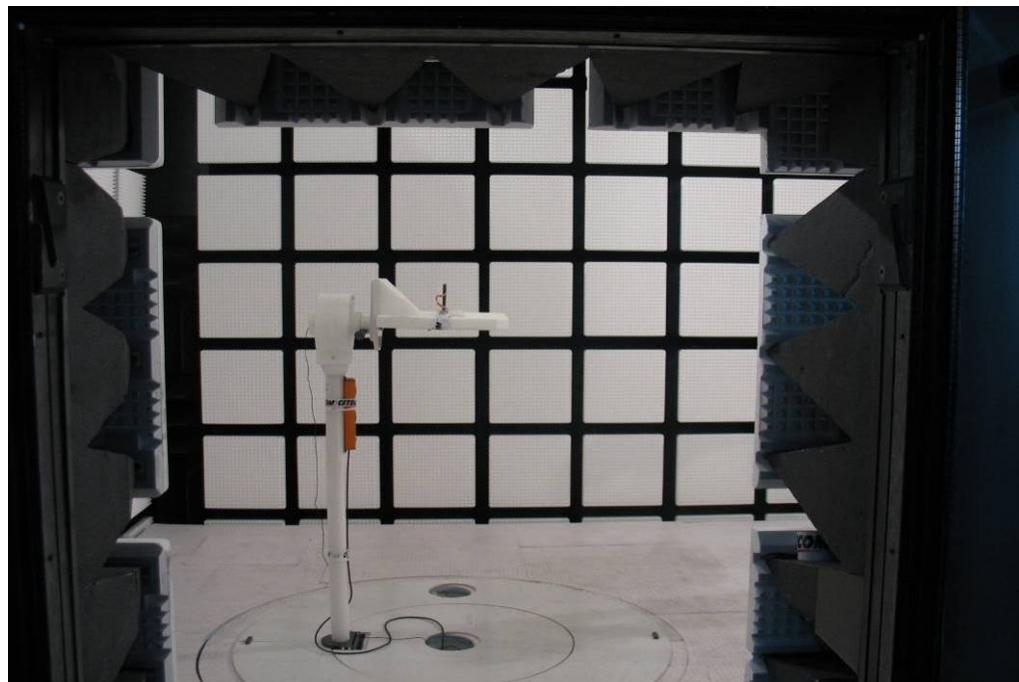


Photo 2:



Photo 3:



Photo 4:

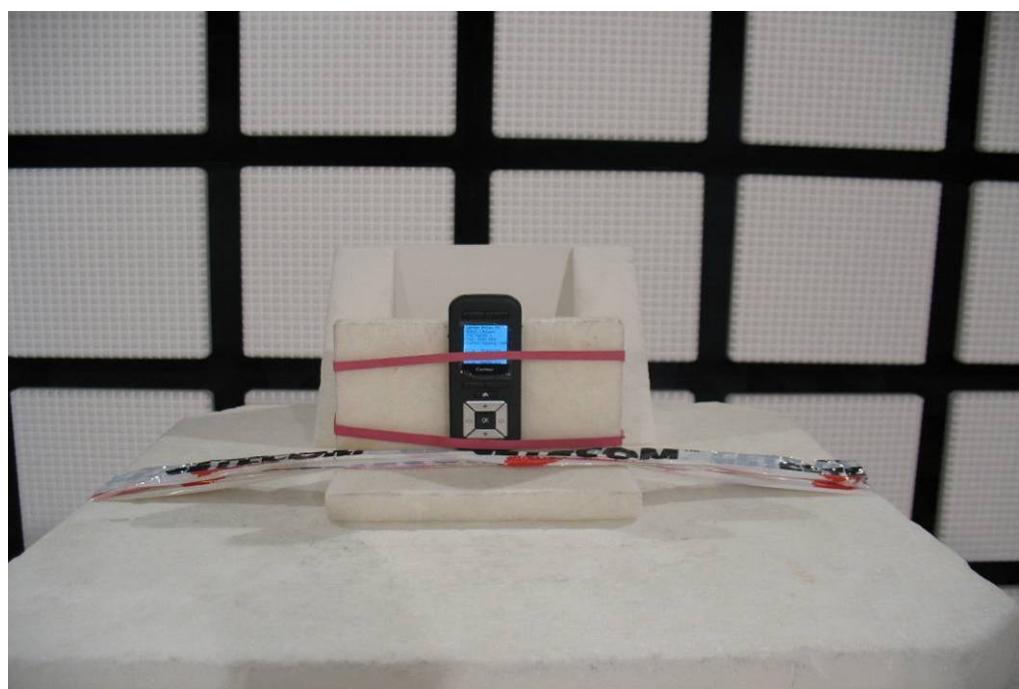


Photo 5:



Photo 6:



Photo 7:



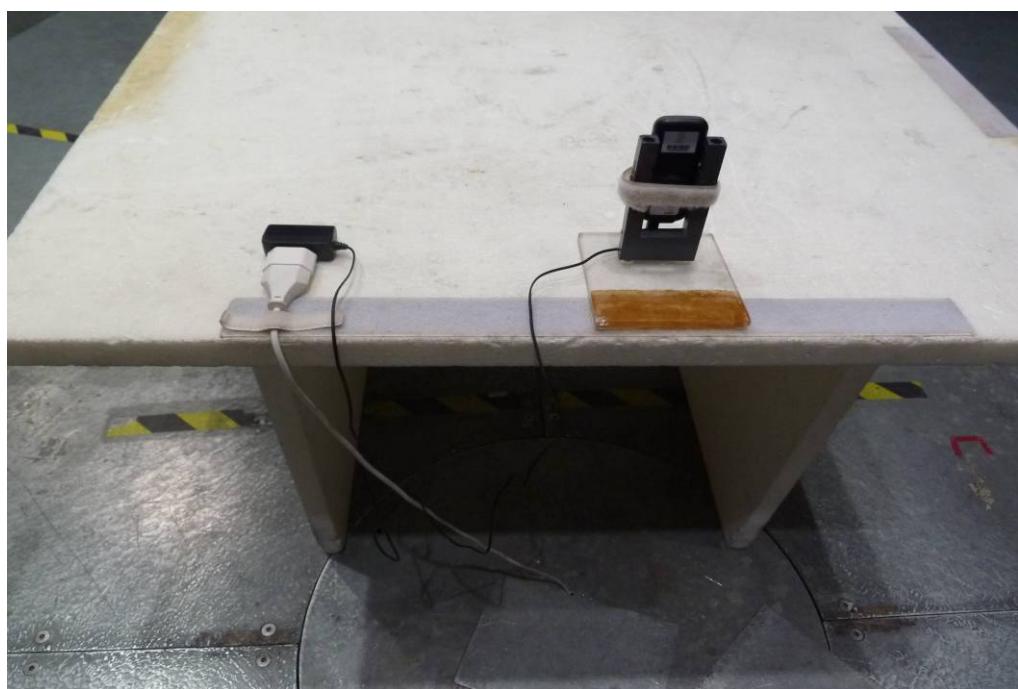
Photo 8:



Photo 9:



Photo 10:



Annex B External photographs of the EUT

Photo documentation:

Photo 1:



Photo 2:



Photo 3:



Photo 4:



Photo 5:



Photo 6:



Photo 7:



Annex C Internal photographs of the EUT

Photo documentation:

Photo 1:



Photo 2:



Photo 3:



Photo 4:



Photo 5:



Photo 6:

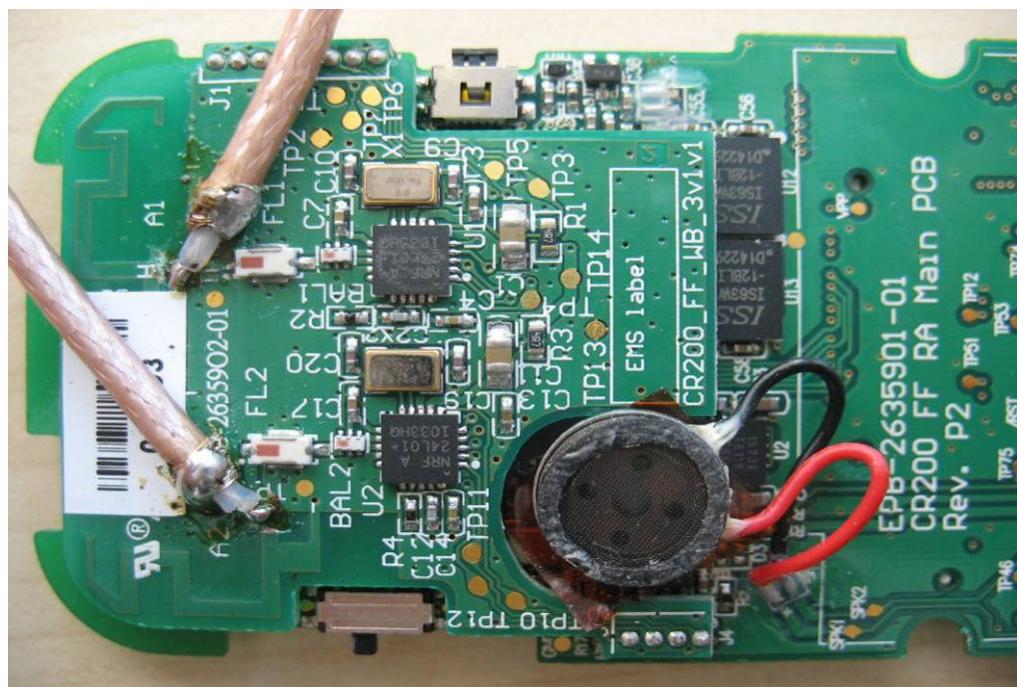


Photo 7:

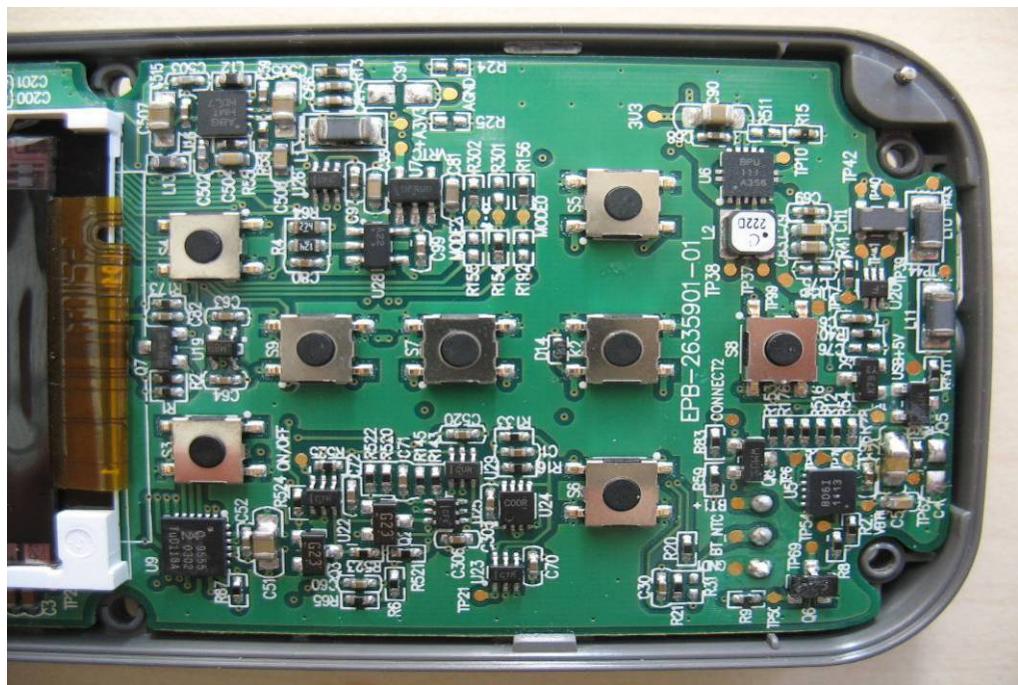
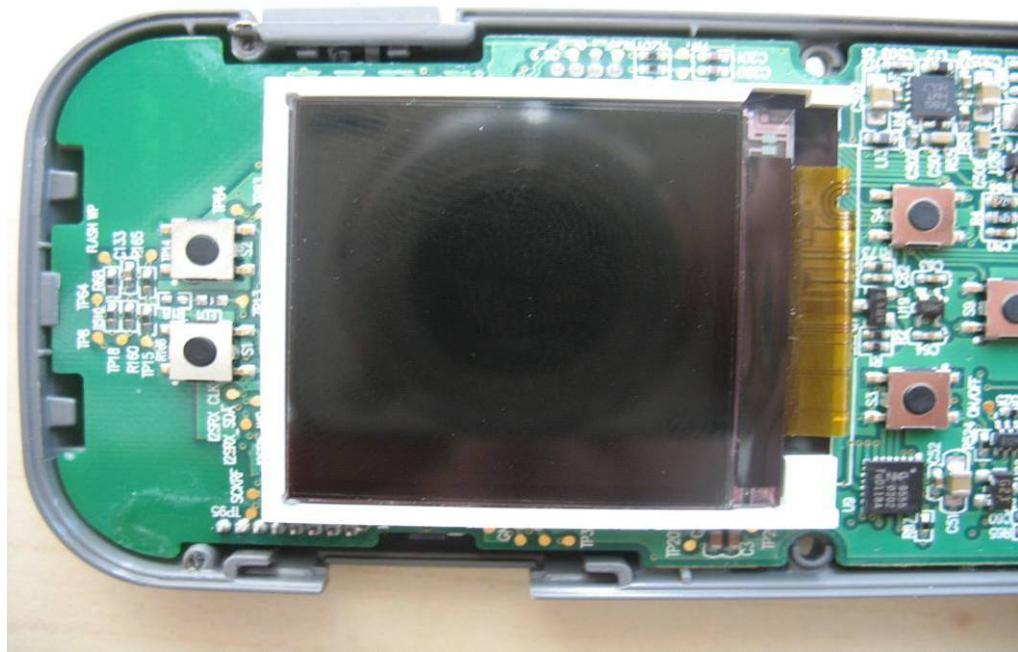


Photo 8:



Annex D Document history

| Version | Applied changes | Date of release |
|---------|-----------------|-----------------|
| -A | Initial release | 2012-03-30 |

Annex E Further information**Glossary**

| | | |
|----------|---|--|
| AVG | - | Average |
| DUT | - | Device under test |
| EMC | - | Electromagnetic Compatibility |
| EN | - | European Standard |
| EUT | - | Equipment under test |
| ETSI | - | European Telecommunications Standard Institute |
| FCC | - | Federal Communication Commission |
| FCC ID | - | Company Identifier at FCC |
| HW | - | Hardware |
| IC | - | Industry Canada |
| Inv. No. | - | Inventory number |
| N/A | - | Not applicable |
| PP | - | Positive peak |
| QP | - | Quasi peak |
| S/N | - | Serial number |
| SW | - | Software |

Annex F Accreditation Certificate



Deutsche Akkreditierungsstelle GmbH
German Accreditation Body

Intrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV
Signatory to the Multilateral Agreements of EA, ILAC and IAF for Mutual Recognition

Accreditation



The Deutsche Akkreditierungsstelle GmbH (German Accreditation Body) attests that the testing laboratory

CETECOM ICT Services GmbH
Untertürkheimer Straße 6-10
66117 Saarbrücken

is competent under the terms of DIN EN ISO/IEC 17025:2005 to carry out tests in the following fields:

Wired communications and DECT
Acoustic
RFid
Shirt Range Devices [SRD]
RFID
WiMax and Richtfunk
Mobile radio (GSM / DCS), Over the Air (OTA) Performance
Electromagnetic Compatibility (EMC) incl. Automotive
Product safety
SAR and Hearing Aid Compatibility (HAC)
Environmental simulation
Smart Card Terminals
Bluetooth
Wi-Fi-Services

The accreditation certificate shall only apply in connection with the notice of accreditation of 13.04.2011 with the accreditation number D-PL-12076-01 and is valid until 03.09.2014. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 82 pages.

Registration number of the certificate: D-PL-12076-01-01

Frankfurt am Main, 13.04.2011

Dipl.-Ing. (FH) Jürgen Eigner

Head of Division 2

This document is a translation. The definitive version is the original German accreditation certificate.
See note overleaf.

Deutsche Akkreditierungsstelle GmbH

Office Berlin
Spittelmarkt 10
10117 Berlin

Office Frankfurt am Main
Gartenstraße 6
60594 Frankfurt am Main

Office Braunschweig
Bundesallee 100
38116 Braunschweig

The publication of extracts of the accreditation certificate is subject to the prior written approval by Deutsche Akkreditierungsstelle GmbH (DAkkS). Exempted is the unchanged form of separate disseminations of the cover sheet by the conformity assessment body mentioned overleaf.

No impression shall be made that the accreditation also extends to fields beyond the scope of accreditation attested by DAkkS.

The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I No. 16/2009) and the Regulation (EC) No. 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkkS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations.

The up-to-date state of membership can be retrieved from the following websites:

EA: www.european-accreditation.org

ILAC: www.ilac.org

IAF: www.iaf.nu

Front side of certificate

Back side of certificate

Note:

The current certificate including annex is published on our website (see link below) or may be received from CETECOM ICT Services on request.

http://www.cetecom.com/fileadmin/de/CETECOM_D_Saarbruecken/accreditations_Jan_2010/DAKKs_Akkreditierung_URK_EN17025-En_incl_Annex.pdf