

# Test Report



DANAK  
Reg. no. 19

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## **Measurements of radio frequency interference from C-PEN 10**

### **Performed for C Technologies AB**

DANAK-195760

Project no.: K222253-1

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4 annexes

2001-10-11

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**Title** Measurements of radio frequency interference from C-PEN 10

**Test object** Scanner and mouse device, C-PEN 10

**Report no.** DANAK-195760

**Project no.** K222253-1

**Test period** 2001-09-25

**Client** C Technologies AB  
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**Contact person** Mr. Johan Fredrikson  
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**Manufacturer** C Technologies AB

**Specifications** FCC Part 15, Subpart B, Class B

**Results** The AC mains conducted emission and radiated electromagnetic fields emission from the test object were below the limits of FCC Part 15, Subpart B, Class B.

**Test personnel** Henrik Egeberg Nielsen

**Date** 2001-10-11

**Project manager**

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Per Hansen  
Facility Manager - EMC  
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**Responsible**

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Per Thåstrup Jensen  
Project Manager - EMC  
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(FCC Class B) (6 pages)

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## 1. **Summary of test results**

The results of the emission tests can be summarised as follows:

| <b>Emission tests</b>             | <b>FCC part 15 Subpart B<br/>Class B</b> |
|-----------------------------------|------------------------------------------|
| Conducted emission,<br>AC mains   | Passed                                   |
| Radiated<br>electromagnetic field | Passed                                   |

Abbreviations :      Passed                :      The emission was below the limit.  
                             Not done                :      No test was performed.  
                             N/A                         :      Not applicable.  
                             Not relevant        :      The test was not relevant for the test object.

The test results relate only to the specimen tested.

## **2.     *Test specimen***

|                  |   |                                                                                                |
|------------------|---|------------------------------------------------------------------------------------------------|
| Category         | : | Peripheral PC equipment                                                                        |
| Manufacturer     | : | C Technologies AB                                                                              |
| Model/Type       | : | C-PEN 10                                                                                       |
| Part no.         | : | CT 151018                                                                                      |
| Serial no.       | : | -                                                                                              |
| Supply voltage   | : | 115 VAC to the LapTop PC (5 VDC to EUT through USB connection)                                 |
| Operational mode | : | Test programme, continuously reading                                                           |
| Comments         | : | Cotec Corporation Ltd ferrite type 10-13-142635285-0 (K5A RH 14.2 x 6.35 x 28.5) on USB cable. |

### 3. General test conditions

#### 3.1 Test set-up

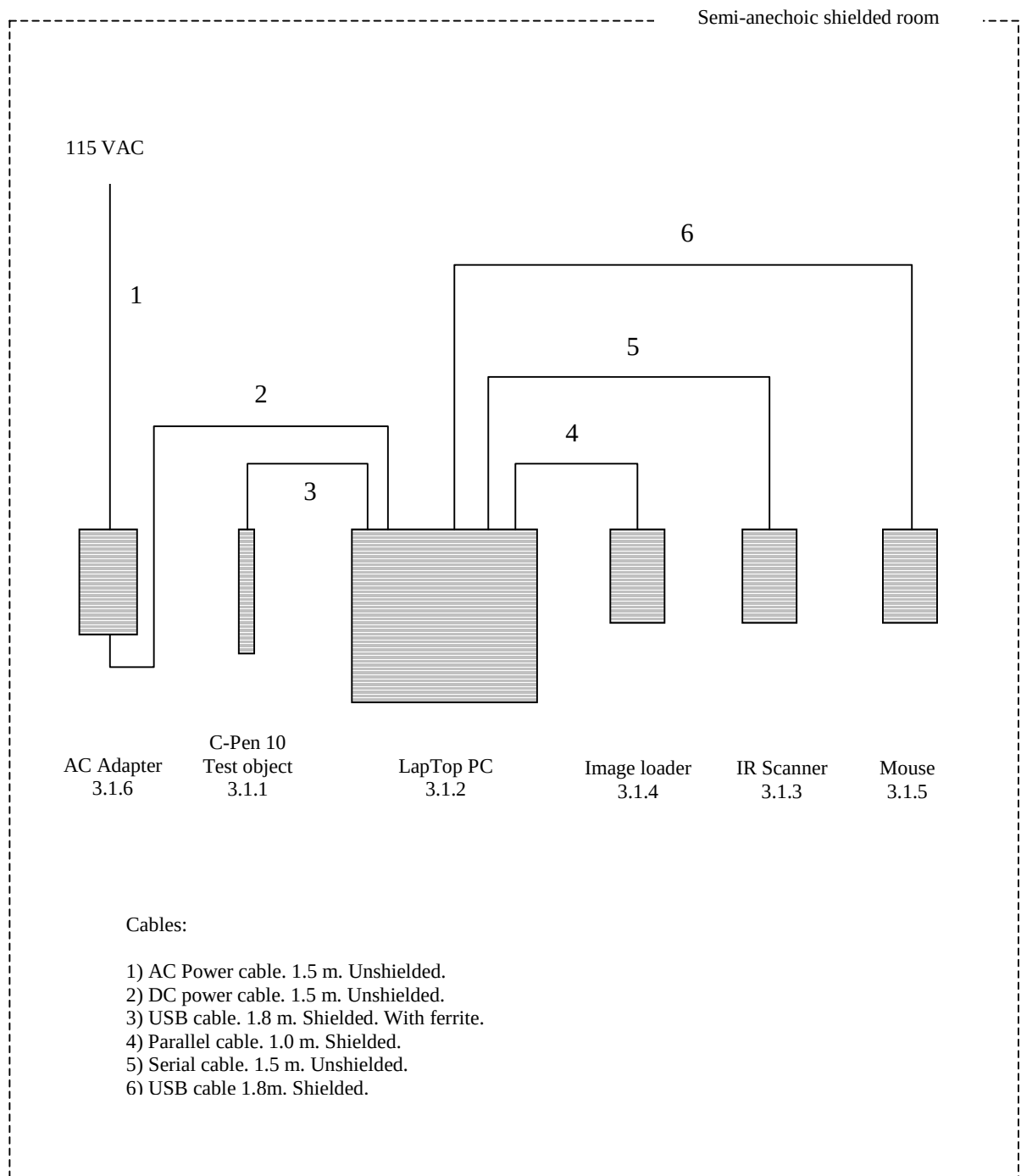


FIG. 1 Test set-up including test object and peripheral equipment.

The complete system used during the tests consisted of the following units:

|              |                     |                                     |
|--------------|---------------------|-------------------------------------|
| <b>3.1.1</b> | <b>C-Pen 10</b>     | <b>EUT 1</b>                        |
|              | Manufacturer :      | C Technologies AB                   |
|              | Model/Type :        | C-PEN 10                            |
|              | Part no. :          | CT 151018                           |
|              | Serial no. :        | -                                   |
|              | FCC ID :            | -                                   |
| <b>3.1.2</b> | <b>LapTop PC</b>    | <b>AUX 1</b>                        |
|              | Manufacturer :      | DELL                                |
|              | Model/Type :        | PPX                                 |
|              | Part no. :          | -                                   |
|              | Serial no. :        | -                                   |
|              | FCC ID :            | Tested to comply with FCC Standards |
| <b>3.1.3</b> | <b>IR Scanner</b>   | <b>AUX 2</b>                        |
|              | Manufacturer :      | -                                   |
|              | Model/Type :        | XTND Access                         |
|              | Part no. :          | -                                   |
|              | Serial no. :        | -                                   |
|              | FCC ID :            | -                                   |
| <b>3.1.4</b> | <b>Image loader</b> | <b>AUX 3</b>                        |
|              | Manufacturer :      | SanDisk                             |
|              | Model/Type :        | ImageMate, Compact flash            |
|              | Part no. :          | -                                   |
|              | Serial no. :        | -                                   |
|              | FCC ID :            | -                                   |
| <b>3.1.5</b> | <b>Mouse</b>        | <b>AUX 4</b>                        |
|              | Manufacturer :      | Logitech                            |
|              | Model/Type :        | M-BD58                              |
|              | Part no. :          | 830386-0000                         |
|              | Serial no. :        | LZS10211393                         |
|              | FCC ID :            | Tested to comply with FCC Standards |

|              |                   |                  |
|--------------|-------------------|------------------|
| <b>3.1.6</b> | <b>AC Adapter</b> | <b>AUX 5</b>     |
|              | Manufacturer      | : DELL           |
|              | Model/Type        | : AA20031 (PA-6) |
|              | Part no.          | : 9364U          |
|              | Serial no.        | : -              |
|              | FCC ID            | : -              |

## 4. Tests and results

### 4.1 Conducted emission, AC mains (FCC Part 15, Subpart B, Class B)

|                     | Requirements                                               |
|---------------------|------------------------------------------------------------|
| Specification       | FCC Rules and Regulations Part 15:2000, Subpart B, Class B |
| Test method         | FCC Rules and Regulations Part 15:2000, Subpart B          |
| Test set-up         | ANSI C63.4:1992                                            |
| Frequency range     | 0.45-30 MHz                                                |
| Limit: (quasi-peak) | 0.45-30 MHz: 48 dB $\mu$ V                                 |
|                     |                                                            |
| Test record sheet   | Annex 2                                                    |

#### Results

The emission was within the specified limits.

#### Climatic conditions:

22.7°C and 40.5% R.H.

#### Comments

Supply power was 115 VAC to the LapTop PC (5 VDC to EUT through USB connection).

#### 4.2 Radiated electromagnetic field (FCC Part 15, Subpart B, Class B)

|                        | Requirements                                               |                   |
|------------------------|------------------------------------------------------------|-------------------|
| Specification          | FCC Rules and Regulations Part 15:2000, Subpart B, Class B |                   |
| Test method            | FCC Rules and Regulations Part 15:2000, Subpart B          |                   |
| Test set-up            | ANSI C63.4:1992                                            |                   |
| Measuring distance     | 3 m                                                        |                   |
| Frequency range        | 30-1000 MHz                                                |                   |
| Limit:<br>(quasi-peak) | 30-88 MHz:                                                 | 40.0 dB $\mu$ V/m |
|                        | 88-216 MHz:                                                | 43.5 dB $\mu$ V/m |
|                        | 216-960 MHz:                                               | 46.0 dB $\mu$ V/m |
|                        | 960-1000 MHz:                                              | 54.0 dB $\mu$ V/m |
|                        |                                                            |                   |
| Test record sheets     | Annex 3                                                    |                   |

#### Results

The emission was within the specified limits.

#### Climatic conditions:

22.7°C and 40.5% R.H.

#### Comments

Supply power was 115 VAC to the LapTop PC (5 VDC to EUT through USB connection).

***Annex 1***

***List of instruments***

***(1 page)***

***LIST OF INSTRUMENTS***

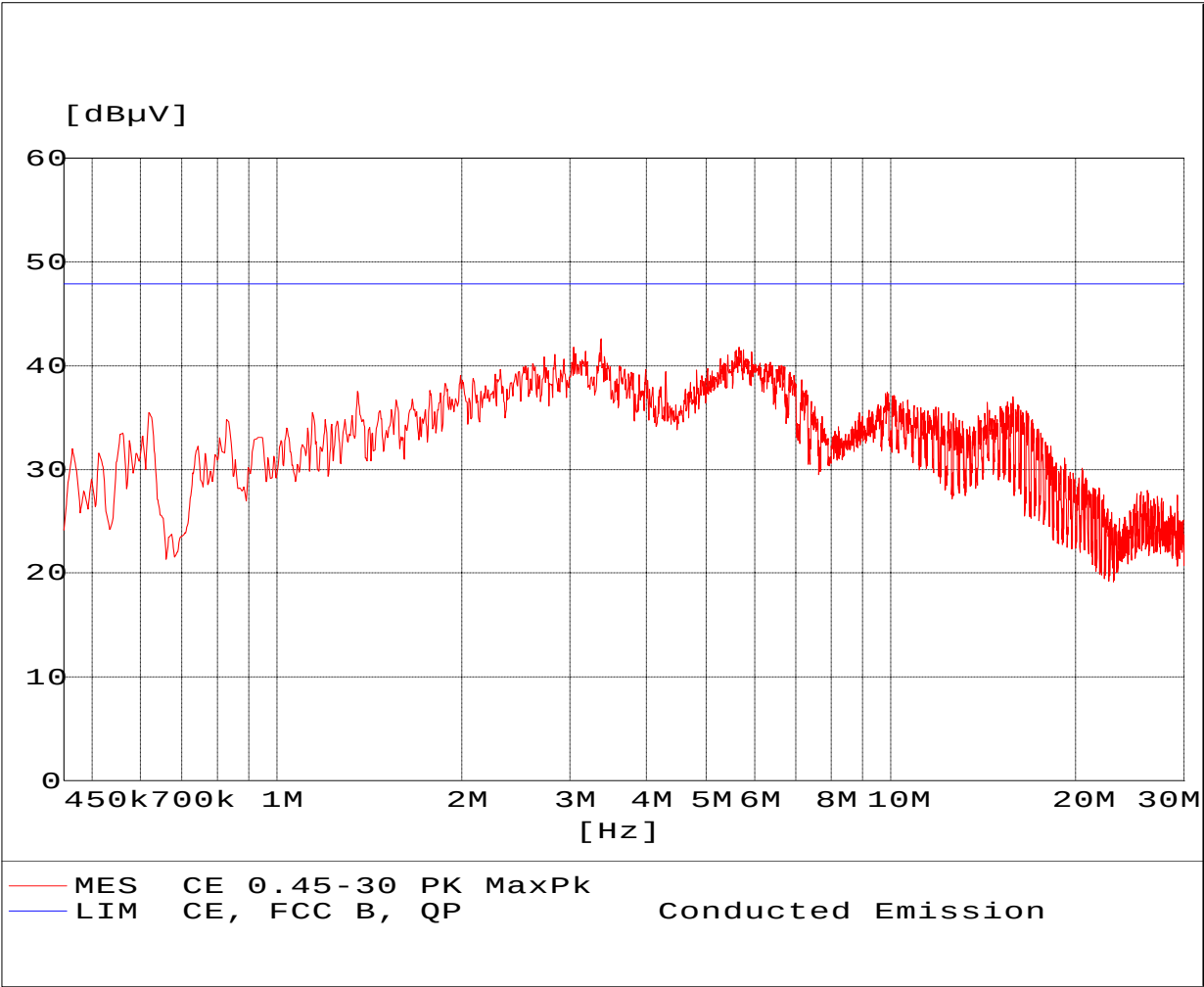
| EC NO. | INSTRUMENT                 | MANUFACTURER    | TYPE      |
|--------|----------------------------|-----------------|-----------|
| 29797  | BILOG ANTENNA, 30-1000 MHz | CHASE           | CBL 6111A |
| 29461  | ARTIFICIAL MAINS NETWORK   | ROHDE & SCHWARZ | ESH2-Z5   |
| 29916  | AUTOMATIC EMI RECEIVER     | ROHDE & SCHWARZ | ESCS-30   |
| 29861  | EMI-SOFTWARE Ver. 1.6      | ROHDE & SCHWARZ | ES-K1     |

***Annex 2***

***Test record sheets and photos regarding  
conducted emission, AC mains (FCC Class B)***

***(3 pages)***

EUT: C-pen 10.  
Manufacturer: C Technologies AB  
Operating Condition: Line no.: Neutral. 115 VAC  
Test Site: EMC-5  
Operator: HEN-K222253  
Test Specification: FCC B  
Comment: Sheet 9  
Start of Test: 2001-09-25



EUT: C-pen 10.  
Manufacturer: C Technologies AB  
Operating Condition: Line no.: Line 1. 115 VAC  
Test Site: EMC-5  
Operator: HEN-K222253  
Test Specification: FCC B  
Comment: Sheet 10  
Start of Test: 2001-09-25

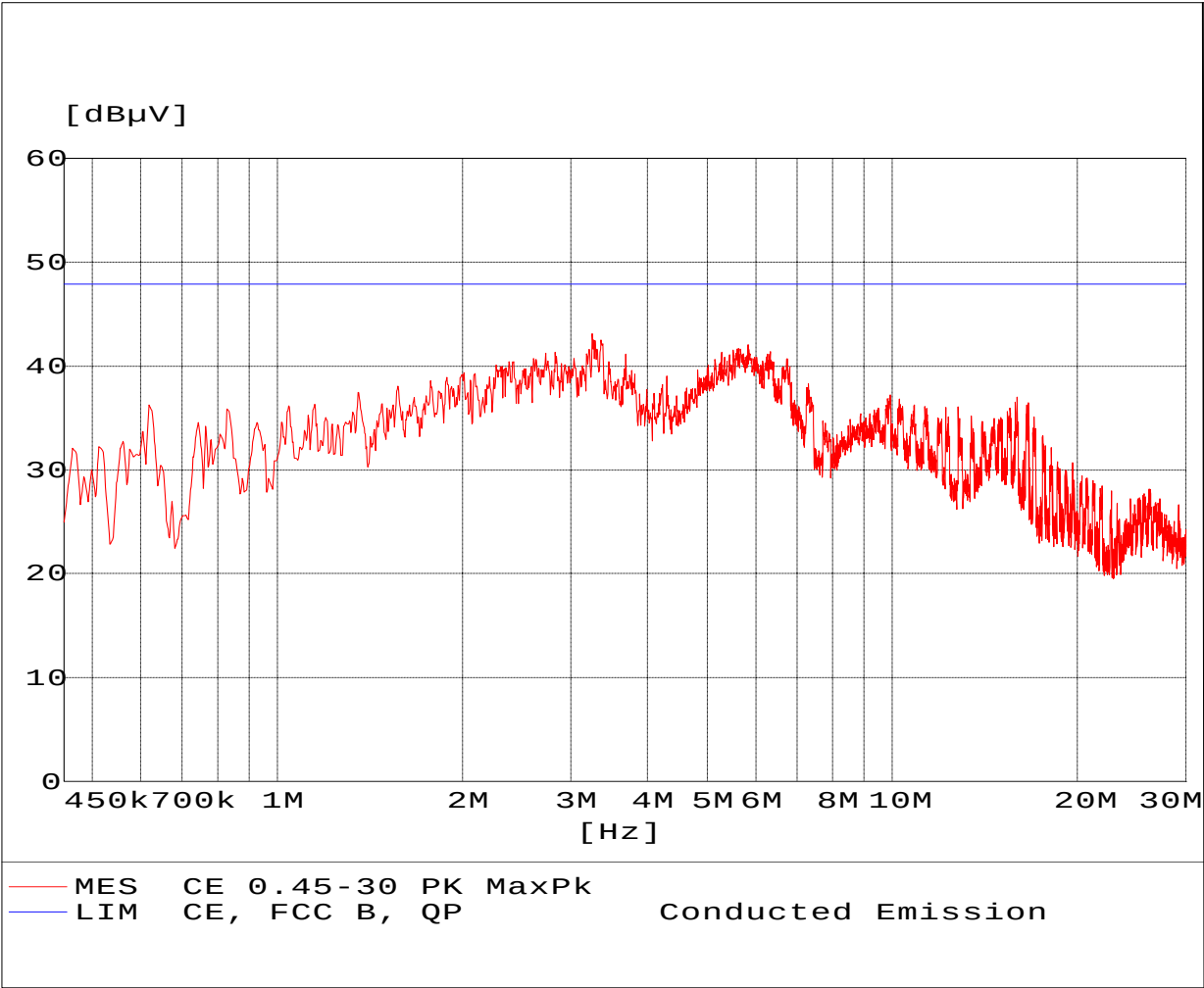




PHOTO A2.1 AC mains conducted emission measuring



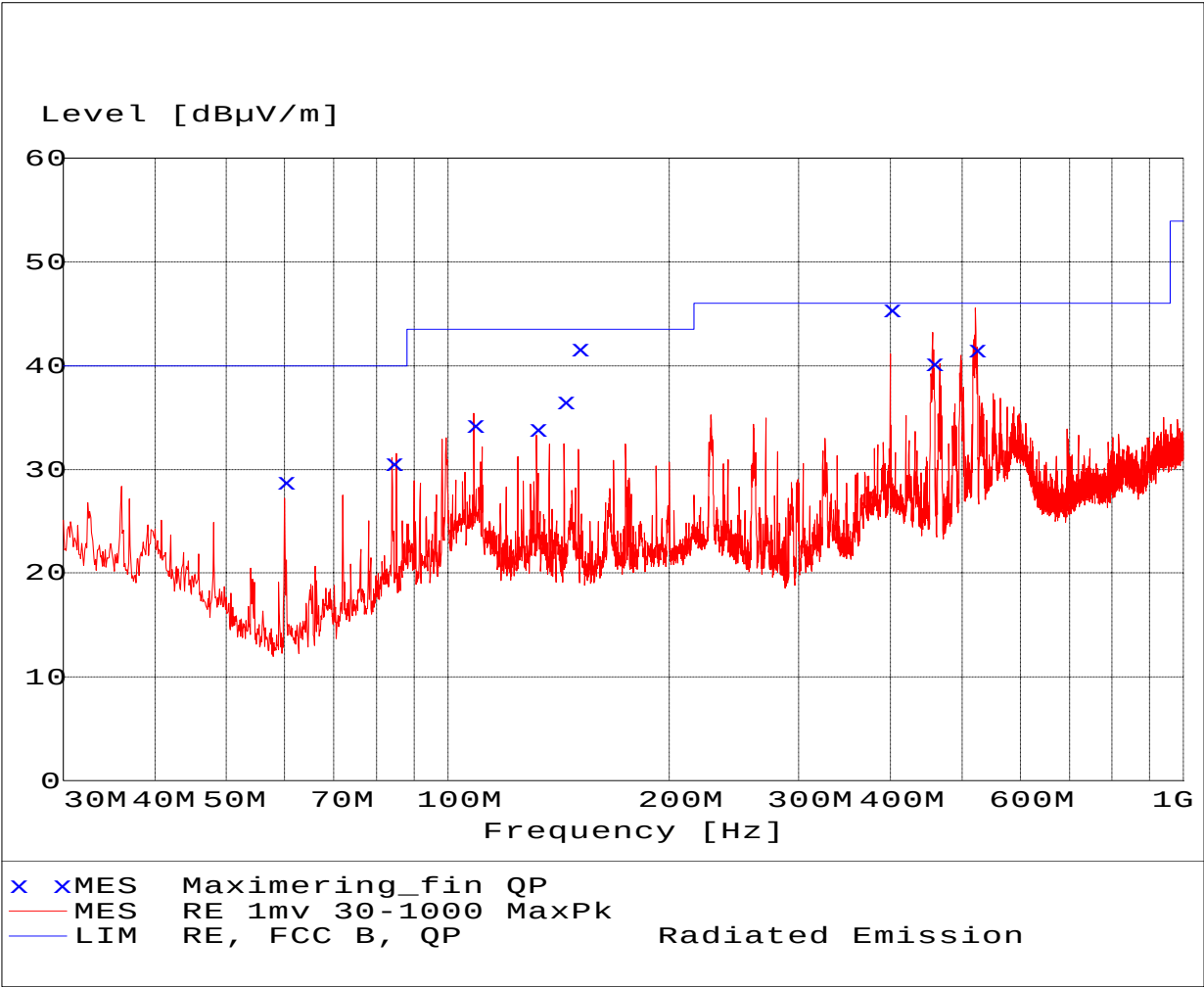
PHOTO A2.2 AC mains conducted emission measuring

***Annex 3***

***Test record sheets and photos regarding  
radiated electromagnetic field (FCC Class B)***

***(6 pages)***

EUT: C-pen 10.  
Manufacturer: C Technologies AB  
Operating Condition: Ant. 1 m vertical. 115 VAC  
Test Site: EMC-5  
Operator: HEN-K222253  
Test Specification: FCC B  
Comment: Sheet 7  
Start of Test: 2001-09-25

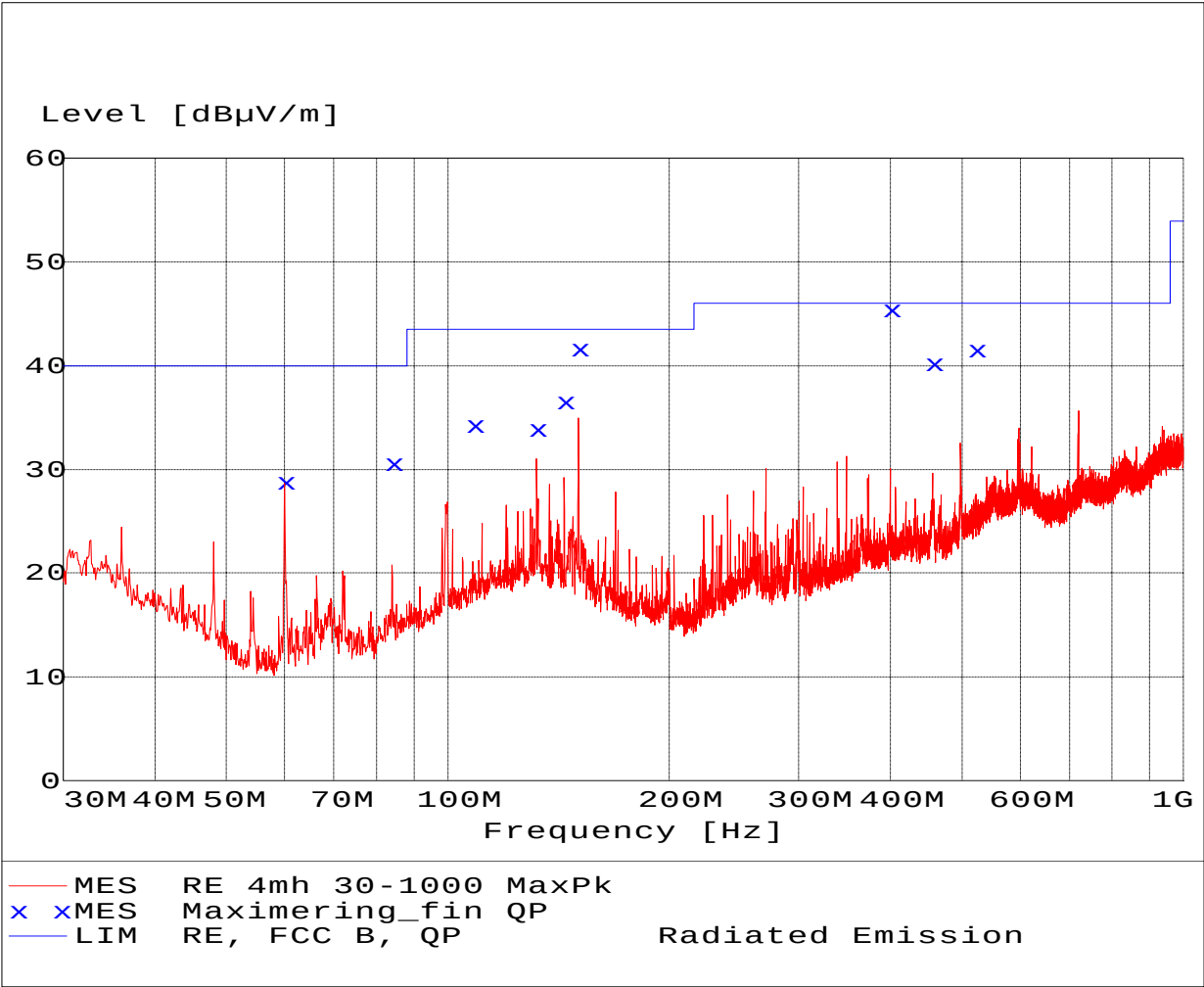


**MEASUREMENT RESULT: "Maximering\_fin QP"**

2001-09-25 13:59

| Frequency<br>MHz | Level<br>dB $\mu$ V/m | Transd.<br>dB | Limit<br>dB $\mu$ V/m | Margin<br>dB | Height<br>cm | Azimuth<br>deg. | Polarisation |
|------------------|-----------------------|---------------|-----------------------|--------------|--------------|-----------------|--------------|
| 60.00            | 28.70                 | 7.60          | 40.00                 | 11.30        | 329.00       | 202.00          | Horizontal   |
| 84.00            | 30.60                 | 10.10         | 40.00                 | 9.40         | 124.00       | 192.00          | Vertical     |
| 108.51           | 34.20                 | 13.50         | 43.50                 | 9.30         | 101.00       | 207.00          | Vertical     |
| 132.00           | 33.80                 | 14.90         | 43.50                 | 9.70         | 221.00       | 263.00          | Horizontal   |
| 144.00           | 36.50                 | 14.10         | 43.50                 | 7.00         | 168.00       | 242.00          | Horizontal   |
| 150.57           | 41.60                 | 13.90         | 43.50                 | 1.90         | 142.00       | 264.00          | Horizontal   |
| 400.20           | 45.30                 | 18.90         | 46.00                 | 0.70         | 210.00       | 211.00          | Horizontal   |
| 456.10           | 40.20                 | 20.20         | 46.00                 | 5.80         | 101.00       | 35.00           | Vertical     |
| 521.30           | 41.50                 | 21.90         | 46.00                 | 4.50         | 101.00       | 7.00            | Vertical     |

EUT: C-pen 10.  
Manufacturer: C Technologies AB  
Operating Condition: Ant. 4 m horizontal. 115 VAC  
Test Site: EMC-5  
Operator: HEN-K222253  
Test Specification: FCC B  
Comment: Sheet 8  
Start of Test: 2001-09-25



**MEASUREMENT RESULT: "Maximering\_fin QP"**

2001-09-25 13:59

| Frequency<br>MHz | Level<br>dB $\mu$ V/m | Transd.<br>dB | Limit<br>dB $\mu$ V/m | Margin<br>dB | Height<br>cm | Azimuth<br>deg. | Polarisation |
|------------------|-----------------------|---------------|-----------------------|--------------|--------------|-----------------|--------------|
| 60.00            | 28.70                 | 7.60          | 40.00                 | 11.30        | 329.00       | 202.00          | Horizontal   |
| 84.00            | 30.60                 | 10.10         | 40.00                 | 9.40         | 124.00       | 192.00          | Vertical     |
| 108.51           | 34.20                 | 13.50         | 43.50                 | 9.30         | 101.00       | 207.00          | Vertical     |
| 132.00           | 33.80                 | 14.90         | 43.50                 | 9.70         | 221.00       | 263.00          | Horizontal   |
| 144.00           | 36.50                 | 14.10         | 43.50                 | 7.00         | 168.00       | 242.00          | Horizontal   |
| 150.57           | 41.60                 | 13.90         | 43.50                 | 1.90         | 142.00       | 264.00          | Horizontal   |
| 400.20           | 45.30                 | 18.90         | 46.00                 | 0.70         | 210.00       | 211.00          | Horizontal   |
| 456.10           | 40.20                 | 20.20         | 46.00                 | 5.80         | 101.00       | 35.00           | Vertical     |
| 521.30           | 41.50                 | 21.90         | 46.00                 | 4.50         | 101.00       | 7.00            | Vertical     |



PHOTO A3.1 Radiated electromagnetic field emission



PHOTO A3.2 Radiated electromagnetic field emission



PHOTO A3.3 Radiated electromagnetic field emission (3 meter antenna distance)

***Annex 4***  
***Technical details***  
***(1 page)***

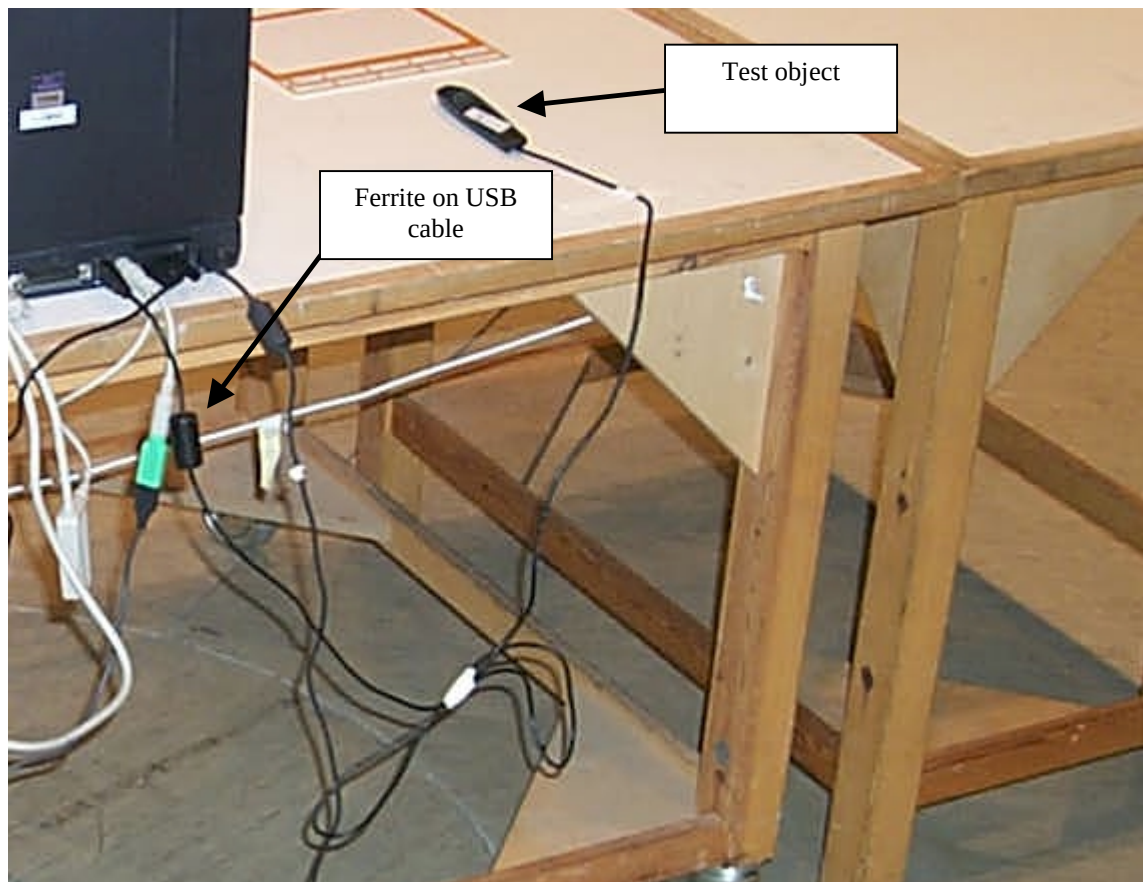


Photo A4.1 Detail on USB cable ferrite