

Passive inductive systems are used for identification of persons and items.

I-Code is designed especially for the following applications : baggage identification ( for example at the airport ), parcel services, retail ( barcode replacement ), access control....

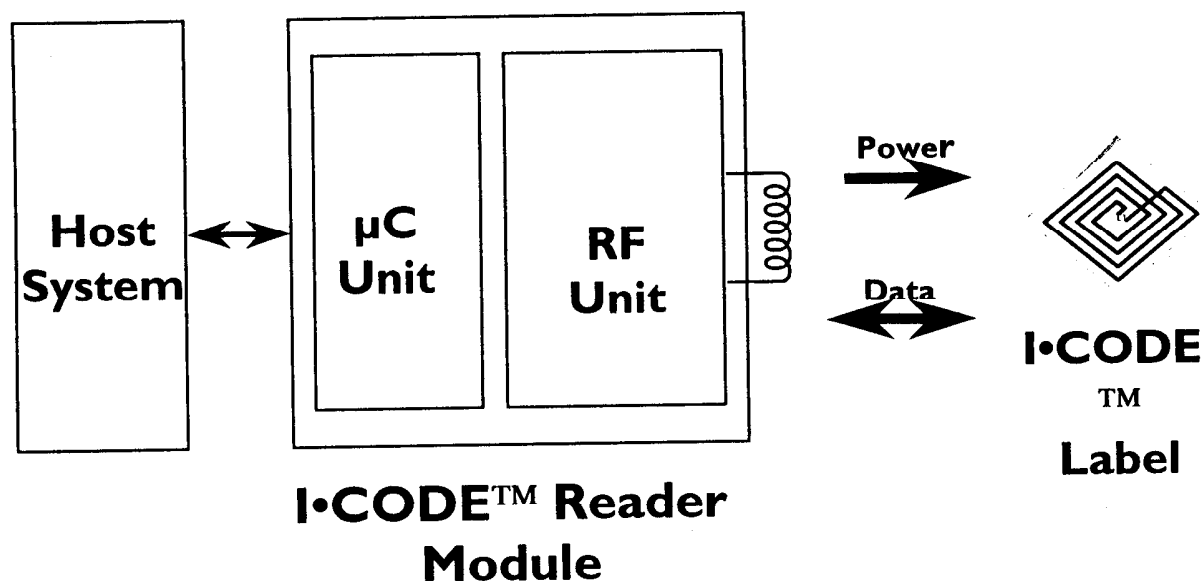


Fig.1.) Basic Principle of the I-Code system

Figure 1 shows the basic Principle of the I-Code System, which is the same as for all passive transponder systems.

The reader module is inductively coupled with one or more passive transponder. The reader module generates a 13.56 MHz magnetic field which induces a voltage in the tag resonant circuit for powering of the tag..

Nearly all the power is concentrated in the nearfield, the radiated power is much less (  $<<10\text{mW}$  ).

Data is transmitted to the tag by a 10% ASK modulation of this carrier. This data contains the command ( read, write.... ) and optional data which is stored in a EEPROM in the tag.

The passive tag responds by changing the load of the field. This change is very low, so the re-radiated signal from the tag is very low ( much below spurious emission limits ).

The reader is controlled over a RS232 from an external host computer.

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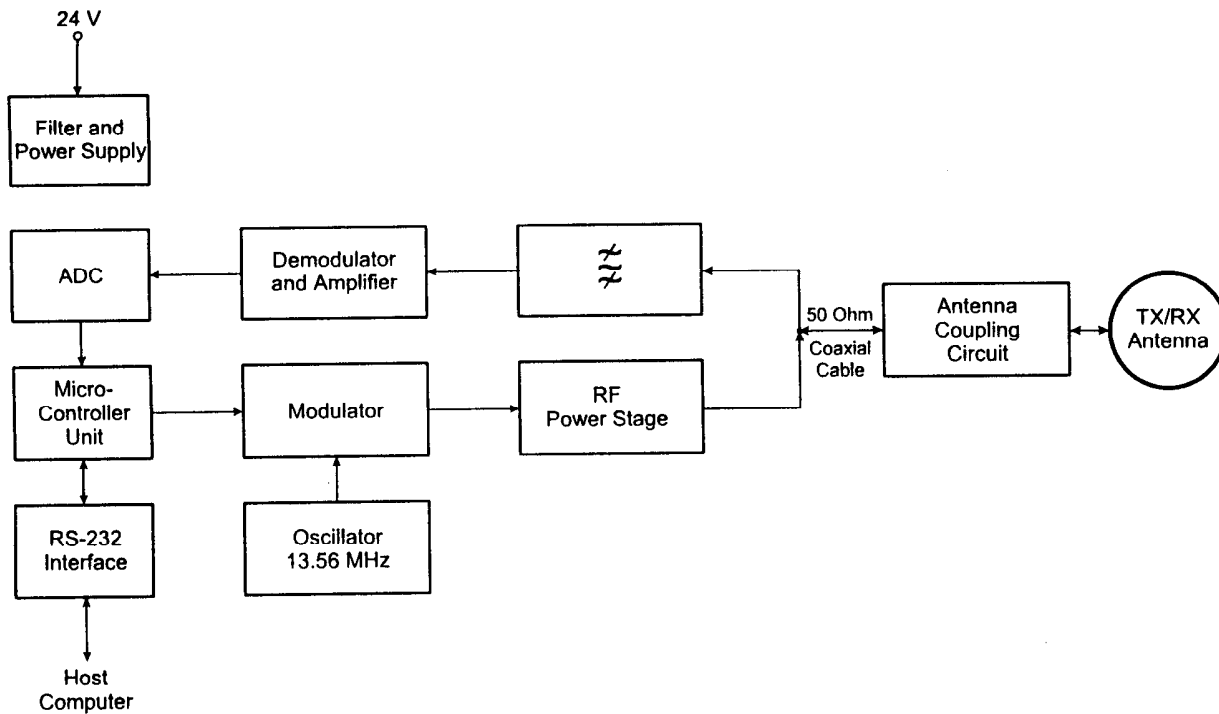


Fig.2.) block diagram of the reader

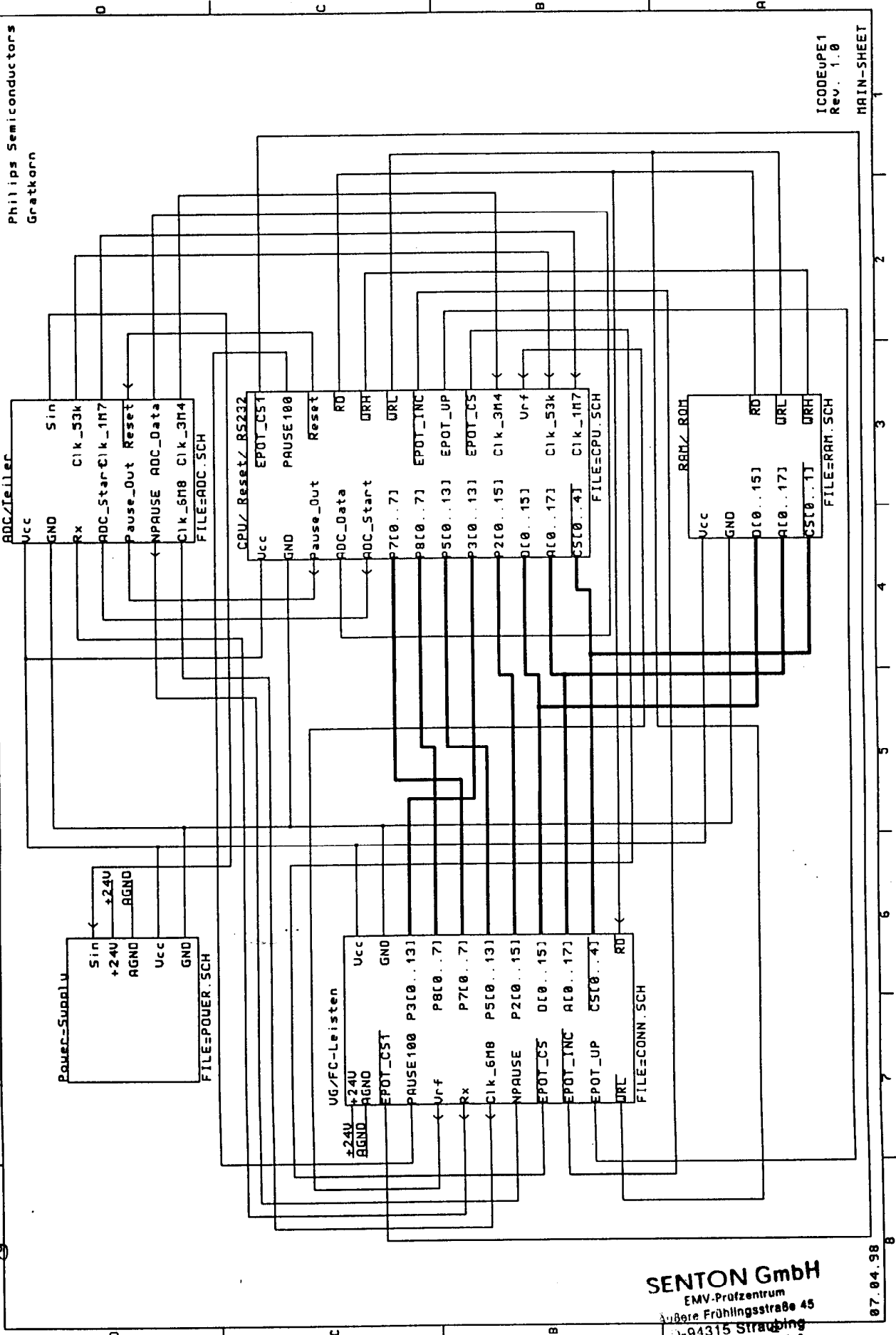
Fig.2.) gives a short overview of the internal blocks of the reader. In a 13.56 MHz crystal oscillator a 13.56 MHz signal is generated and modulated in the modulator block, which is controlled from the microcontroller unit.

The RF Power stage amplifies and filters this signal. This filtered signal is supplied with a 50 Ohm cable to the tuned antenna.

The passive tag receives this signal, rectifies the carrier for generating the supply voltage, demodulates the signal and if a valid command is detected responds to the reader by using a load modulation technique, which is a small change of the reader field.

This re-radiated signal is received from the reader antenna, fitted via the 50 Ohm cable to the reader, filtered, demodulated and amplified. After an Analogue to Digital conversion this signal is processed in the microcontroller unit.

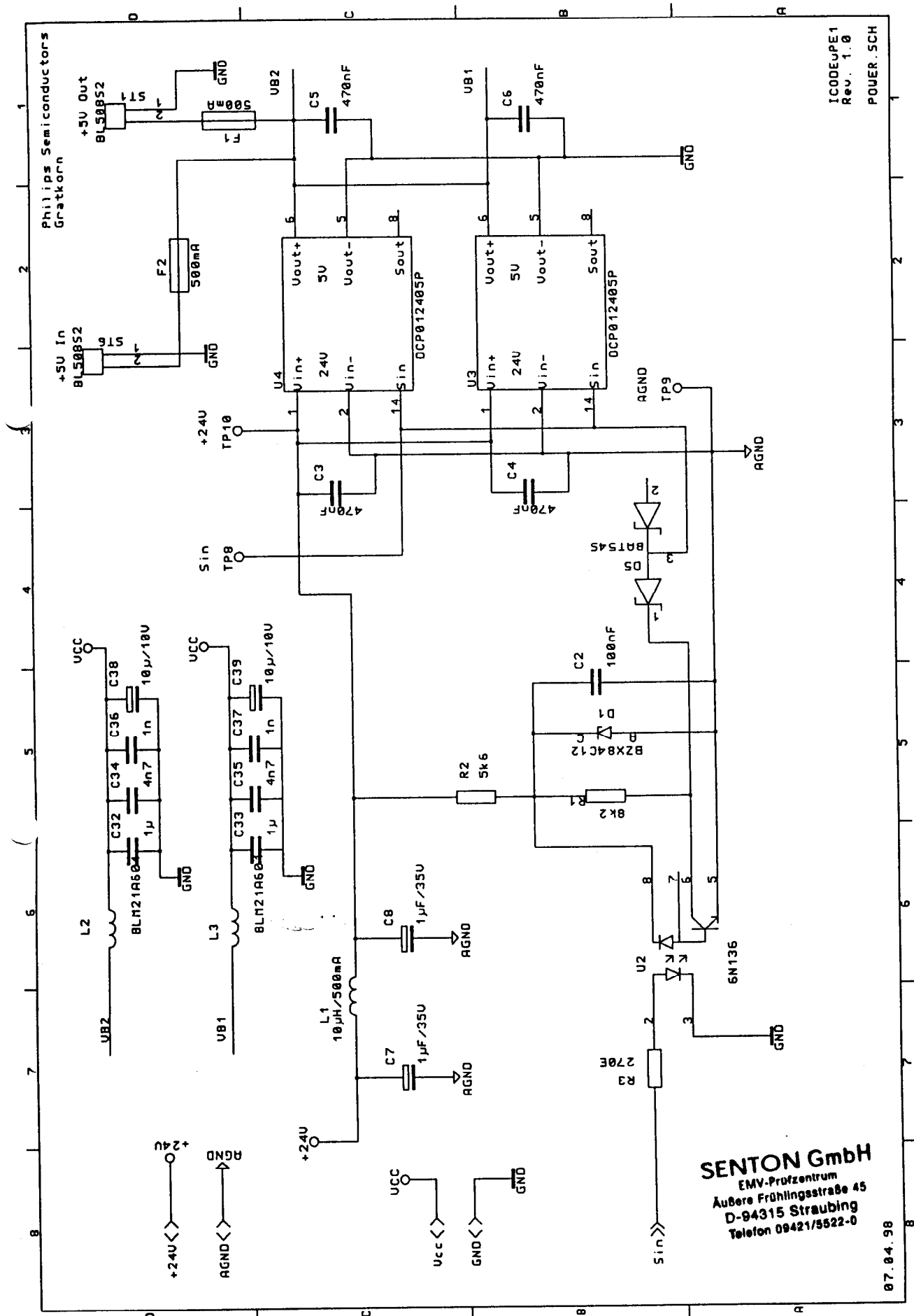
U. Philips board

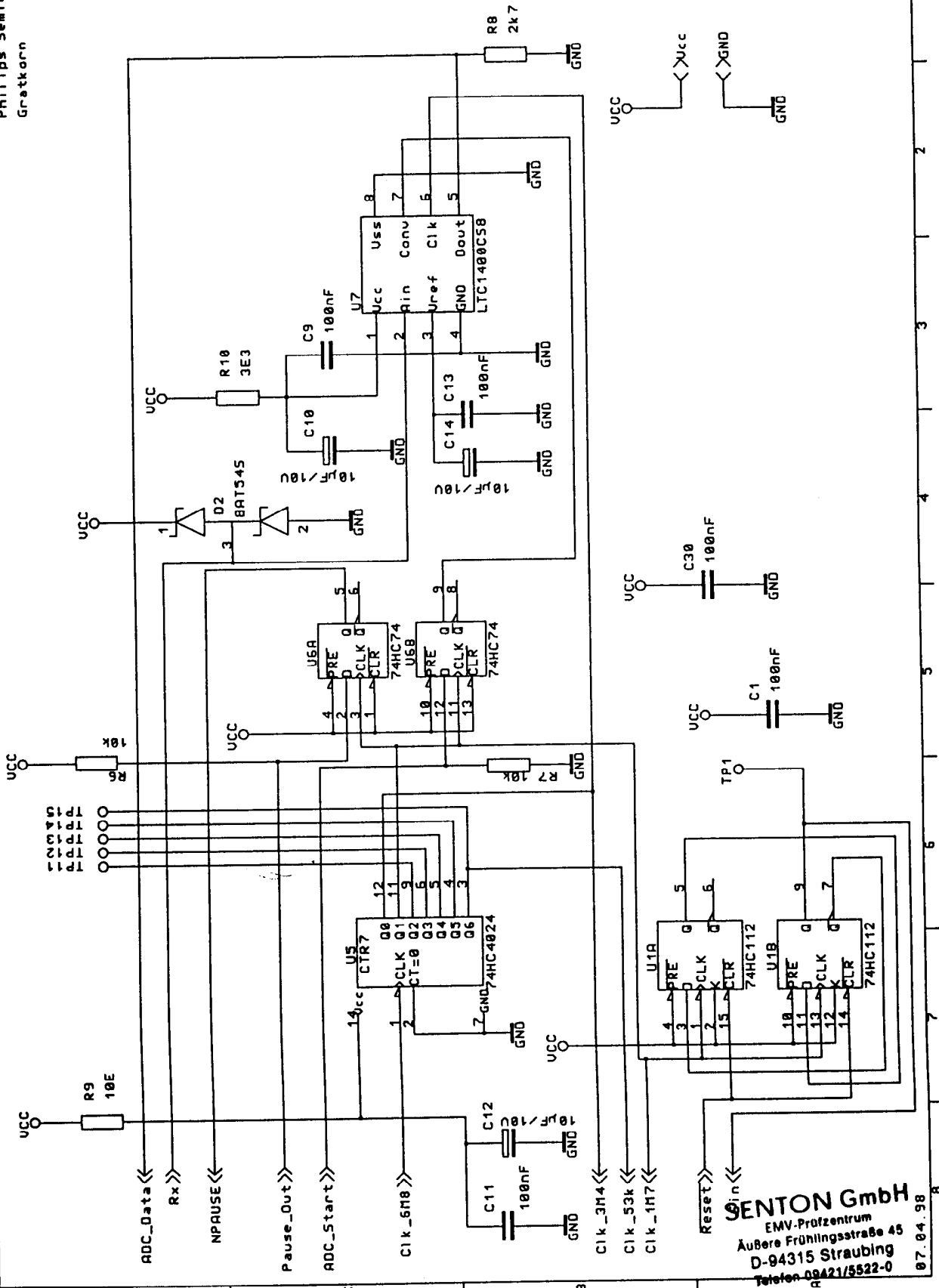


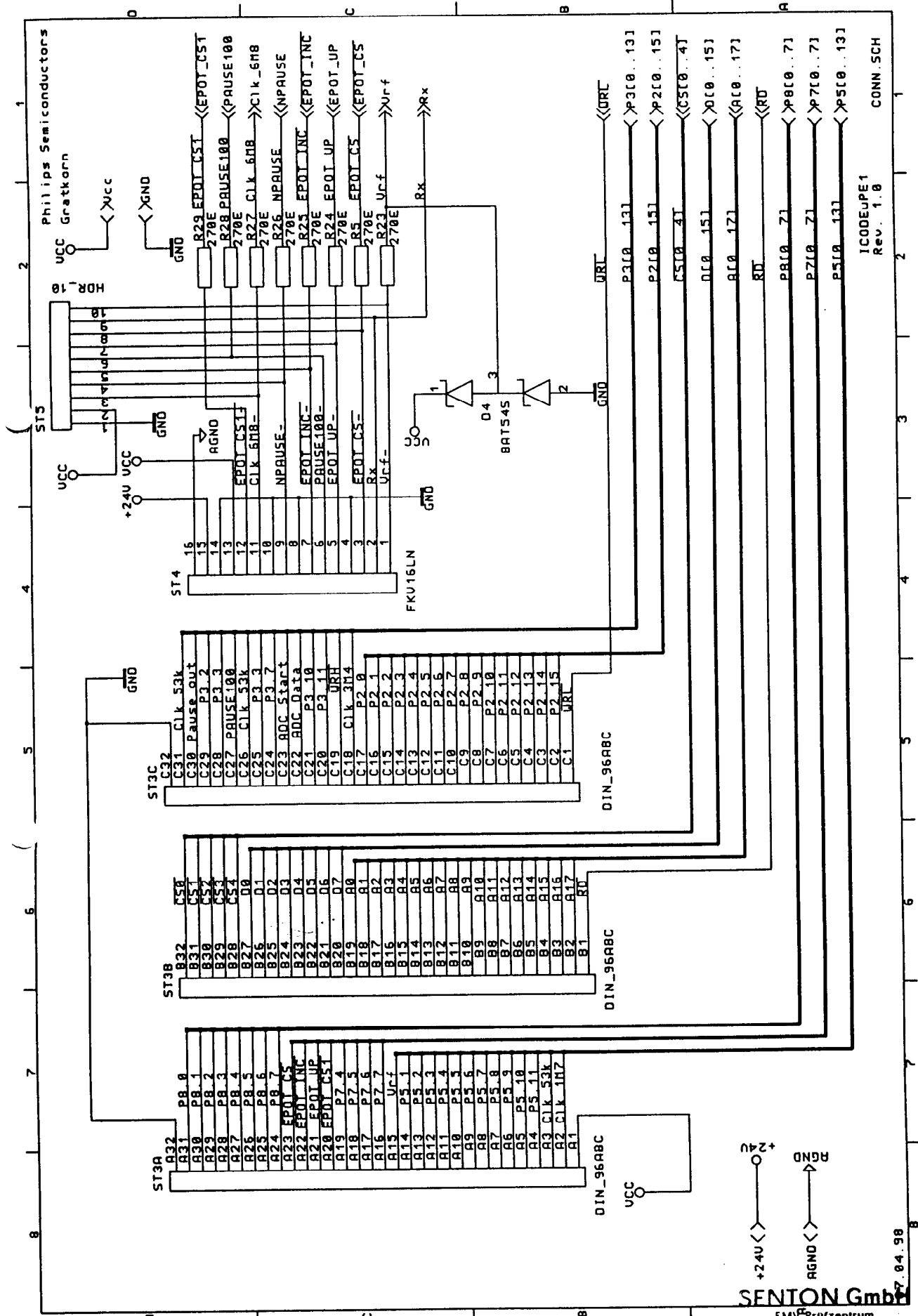
ICCODEUPE1  
Rev. 1.0  
MAIN-SHEET

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07.04.98







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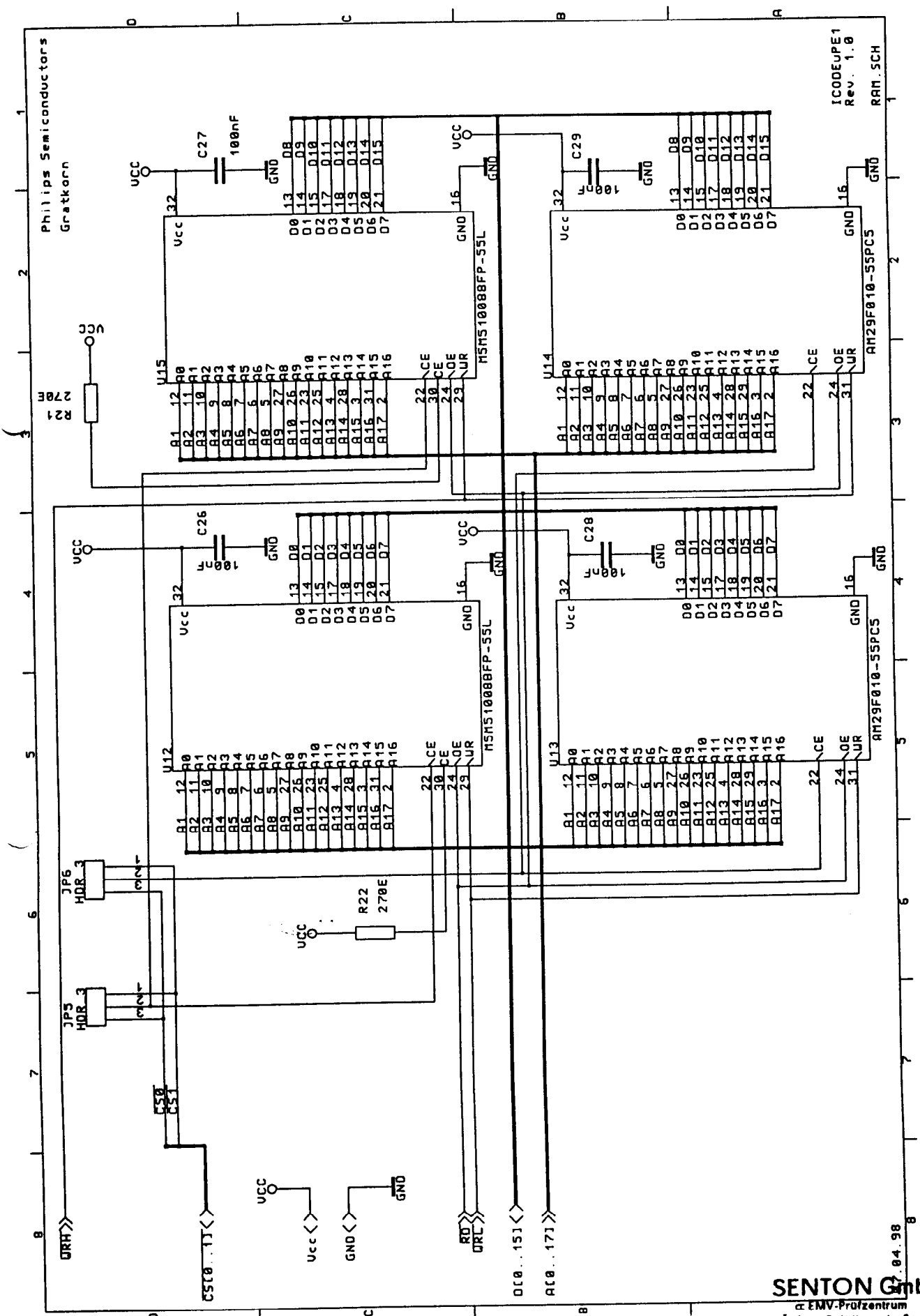
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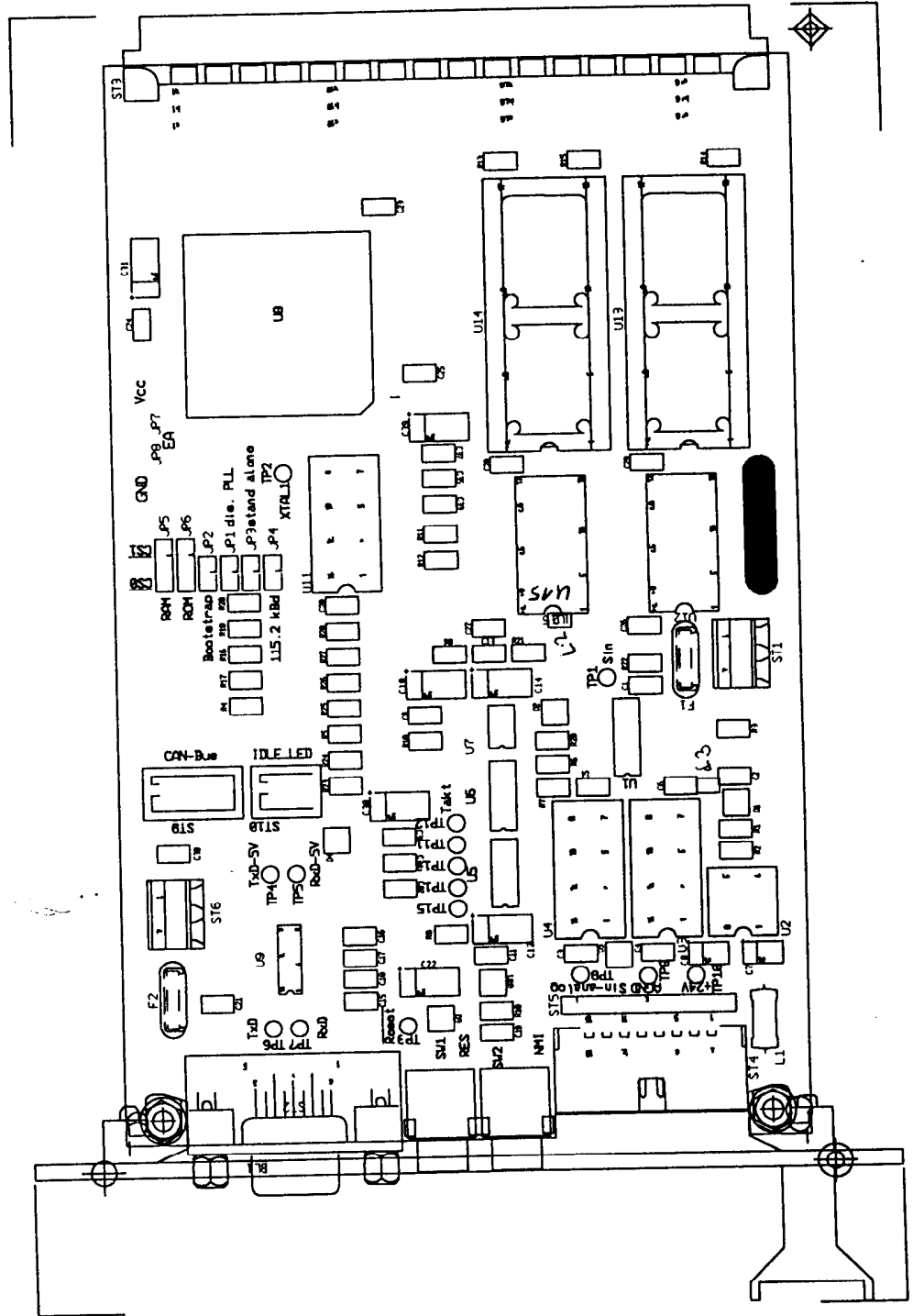
ICCODEUPE1  
 Rev. 1.0

CONN. SCH

7.04.98



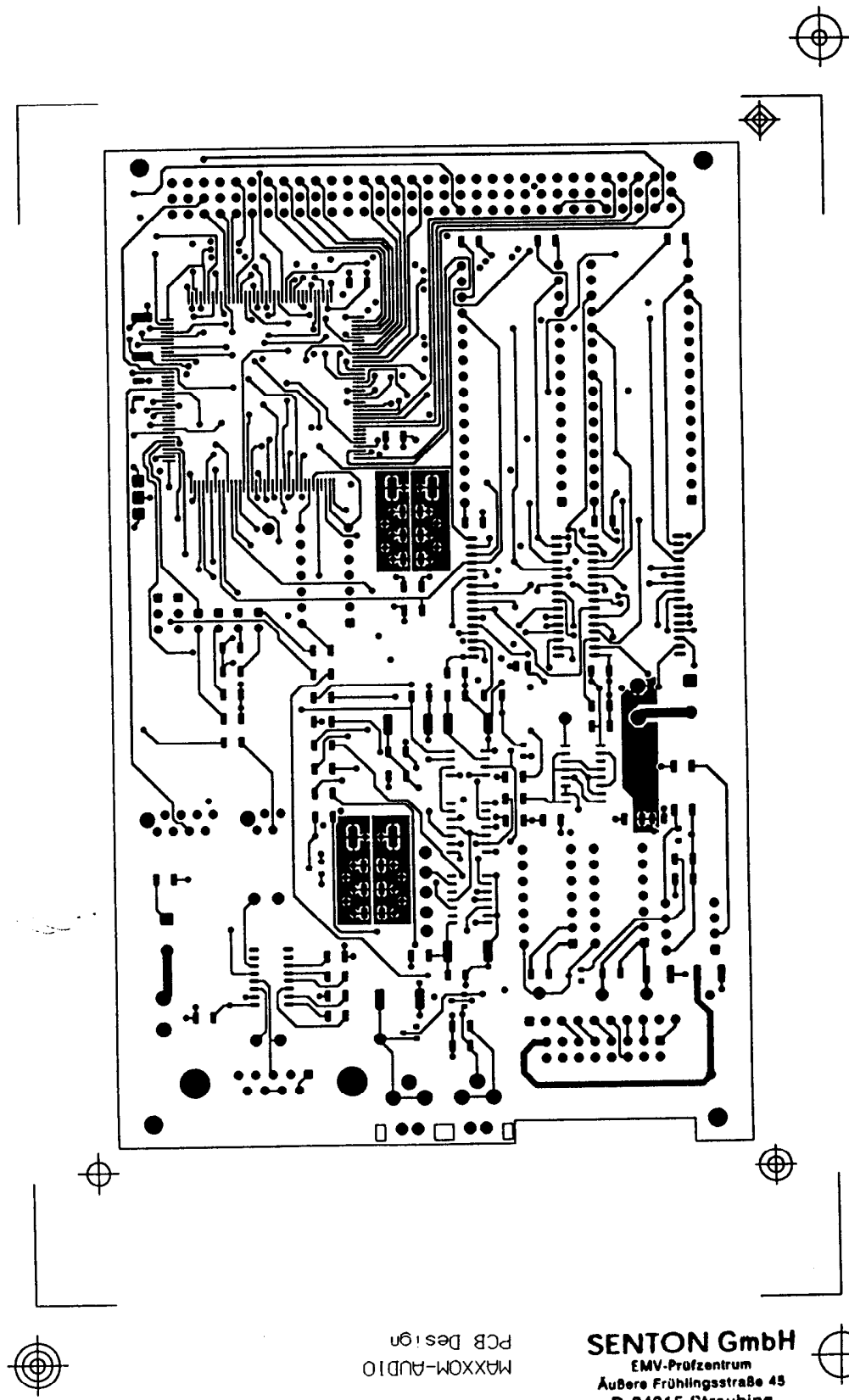




MAX9845-AUDIO  
PCB Design

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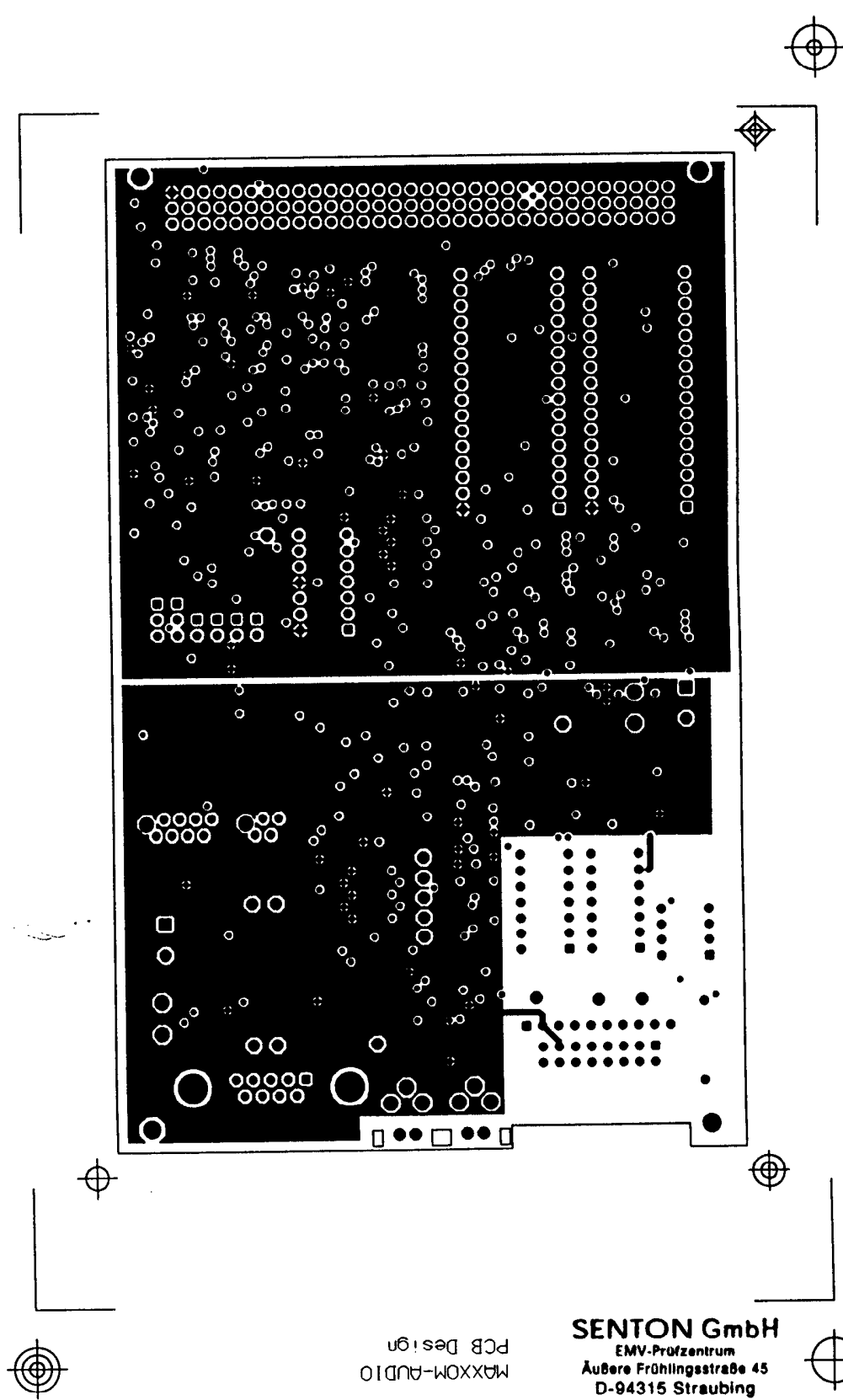
Upe1-2, Silkscreen (Apr. 7, 1998) (17:25) (MIKRON) SCALE: 100% ROTATED  
Drill Ref Pnt: 0.000, 0.000 (inch)



MAXXOM-AUDIO  
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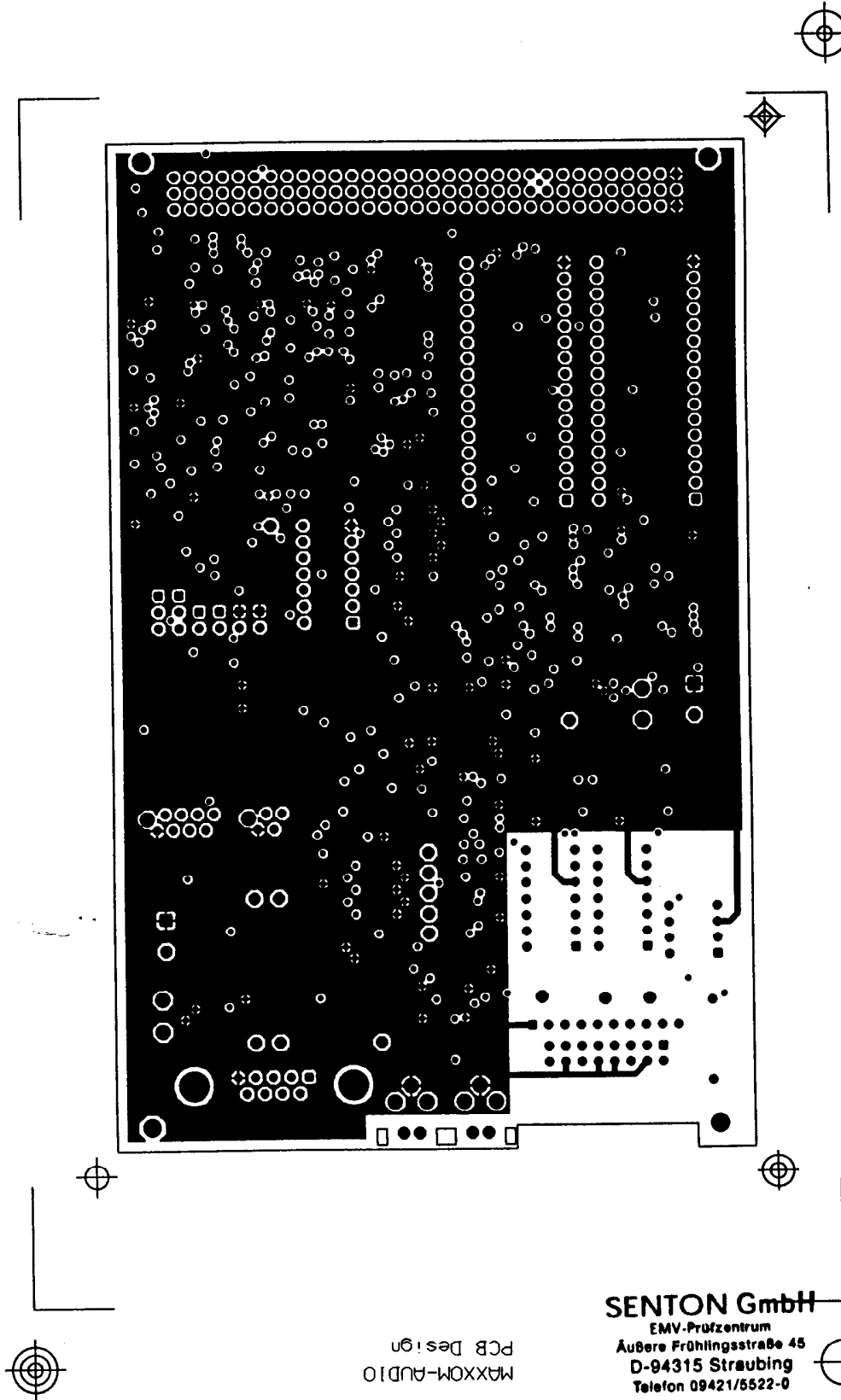
Upe1-2, Top (Apr. 7, 1998) (17:25) (MIKRON) SCALE: 100% ROTATED  
Drill Ref Pnt: 0.966, 0.516 (inch)



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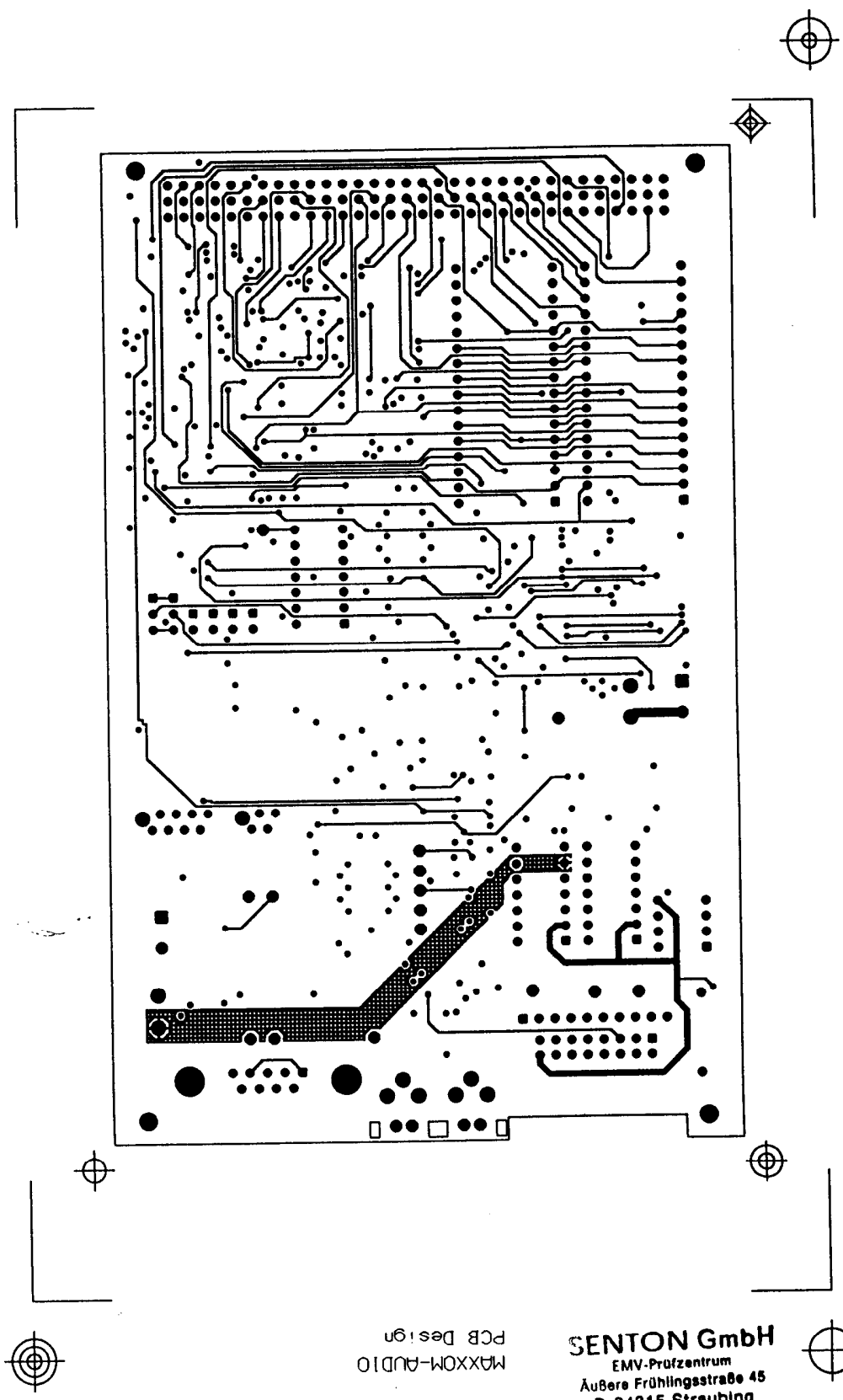
Upe1-2, Inner1 (Apr 7, 1998) (17:25) (MIKRON) SCALE: 100% ROTATED  
Drill Ref Pnt: 0.966, 0.516 (inch)



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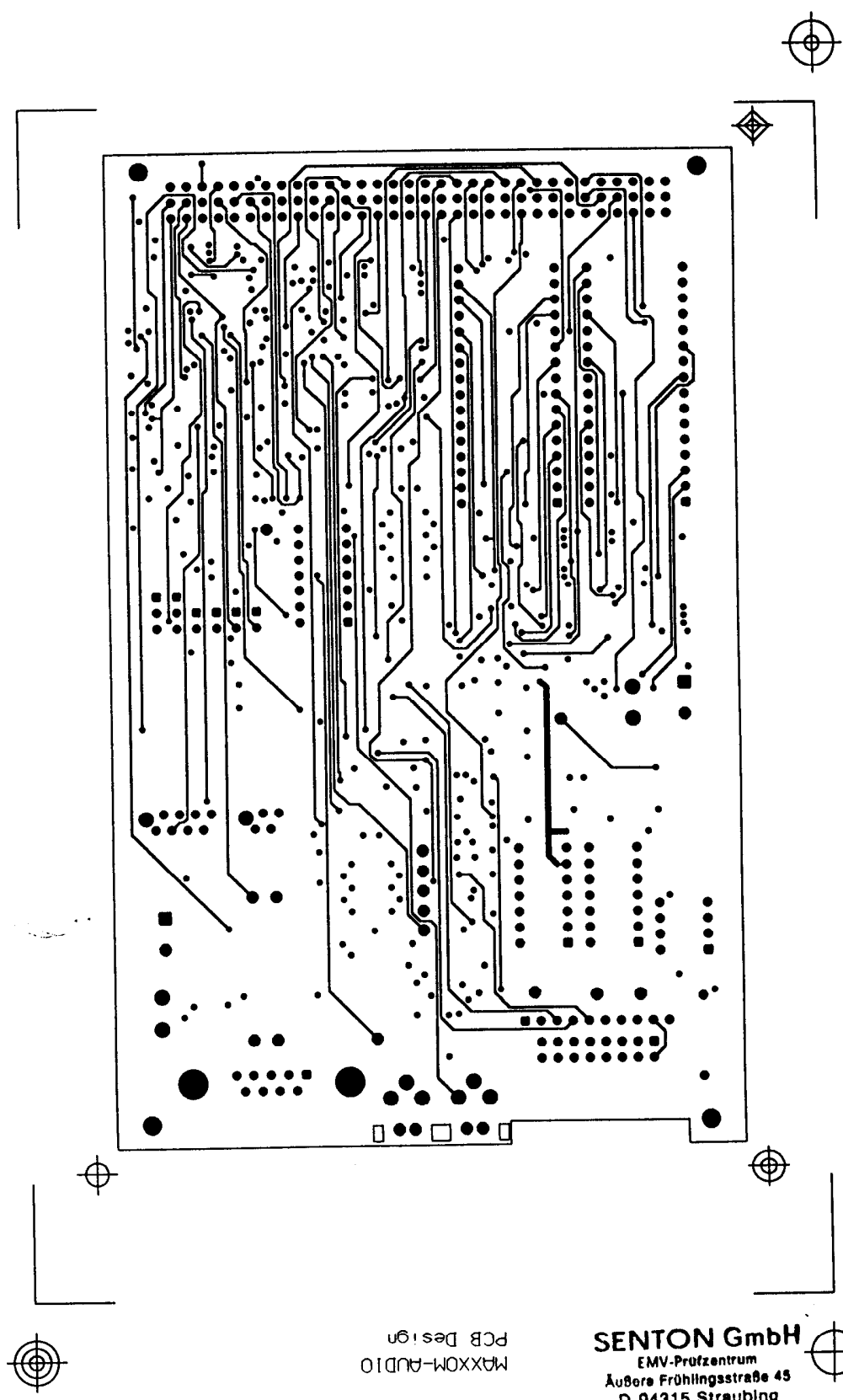
Upe1-2, Inner2 (Apr. 7. 1998) (17:26) (MIKRON) SCALE: 100% ROTATED  
Drill Ref Pnt: Ø 966, Ø 516 (inch)



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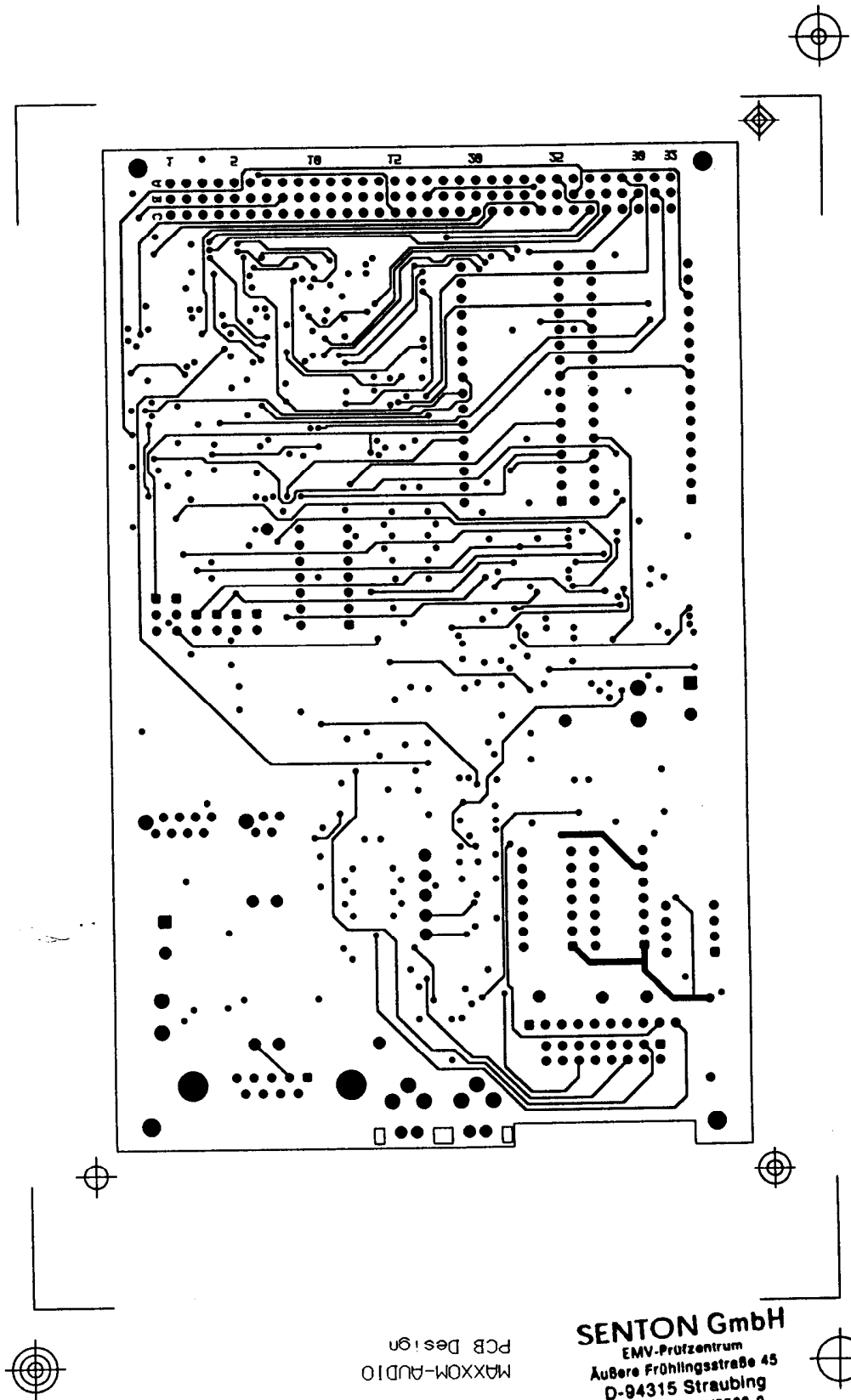
Joel-2, Inner3 (Apr. 7, 1998) (17:26) (MIKRON) SCALE: 100% ROTATED  
Drill Ref Pnt: 0.966, 0.516 (inch)



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Upe1-2, Inner4 (Apr. 7. 1998) (17:26) (MIKRON) SCALE: 100% ROTATED  
Drill Ref Pnt: Ø 966, Ø 516 (inch)



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Upe1-2, Bottom (Apr. 7, 1998) (17:26) (MIKRON) SCALE: 100% ROTATED  
Drill Ref Pnt: 0.966, 0.516 (inch)

# Stückliste

|          |            |              |     |
|----------|------------|--------------|-----|
| Projekt: | ICODEuPE1  |              |     |
| Datum:   | 09.03.1999 | Version Nr.: | 2.1 |

| Bez. | Wert      | Ker. | Tol. | Baugröße | Hersteller | Bestellnummer | Ersatztyp | Anmerkung |
|------|-----------|------|------|----------|------------|---------------|-----------|-----------|
| PCB  | ICODEuPE1 |      |      | 160x100  |            |               |           |           |
| R1   | 8k2       |      | 5%   | 1206     |            |               |           |           |
| R2   | 5k6       |      | 5%   | 1206     |            |               |           |           |
| R3   | 270E      |      | 5%   | 1206     |            |               |           |           |
| R4   | 2k7       |      | 5%   | 1206     |            |               |           |           |
| R5   | 270E      |      | 5%   | 1206     |            |               |           |           |
| R6   | 10k       |      | 5%   | 1206     |            |               |           |           |
| R7   | 10k       |      | 5%   | 1206     |            |               |           |           |
| R8   | 2k7       |      | 5%   | 1206     |            |               |           |           |
| R9   | 10E       |      | 5%   | 1206     |            |               |           |           |
| R10  | 3R3       |      | 5%   | 1206     |            |               |           |           |
| R11  | 15k       |      | 5%   | 1206     |            |               |           |           |
| R12  | 15k       |      | 5%   | 1206     |            |               |           |           |
| R13  | 15k       |      | 5%   | 1206     |            |               |           |           |
| R14  | 15k       |      | 5%   | 1206     |            |               |           |           |
| R15  | 15k       |      | 5%   | 1206     |            |               |           |           |
| R16  | 15k       |      | 5%   | 1206     |            |               |           |           |
| R17  | 15k       |      | 5%   | 1206     |            |               |           |           |
| R18  | 10k       |      | 5%   | 1206     |            |               |           |           |
| R19  | 10k       |      | 5%   | 1206     |            |               |           |           |
| R20  | 10k       |      | 5%   | 1206     |            |               |           |           |
| R21  | 270E      |      | 5%   | 1206     |            |               |           |           |
| R22  | 270E      |      | 5%   | 1206     |            |               |           |           |
| R23  | 270E      |      | 5%   | 1206     |            |               |           |           |
| R24  | 270E      |      | 5%   | 1206     |            |               |           |           |
| R25  | 270E      |      | 5%   | 1206     |            |               |           |           |
| R26  | 270E      |      | 5%   | 1206     |            |               |           |           |

|          |            |              |     |
|----------|------------|--------------|-----|
| Projekt: | ICCODEuPE1 |              |     |
| Datum:   | 09.03.1999 | Version Nr.: | 2.1 |

| Bez. | Wert     | Ker.   | Tol. | Baugröße | Hersteller | Bestellnummer | Ersatztyp | Anmerkung |
|------|----------|--------|------|----------|------------|---------------|-----------|-----------|
| R27  | 270E     |        | 5%   | 1206     |            |               |           |           |
| R28  | 270E     |        | 5%   | 1206     |            |               |           |           |
| R29  | 270E     |        | 5%   | 1206     |            |               |           |           |
|      |          |        |      |          |            |               |           |           |
| C1   | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C2   | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C3   | 470nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C4   | 470nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C5   | 470nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C6   | 470nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C7   | 1µF/35V  | Tantal | 20%  | B        |            |               |           |           |
| C8   | 1µF/35V  | Tantal | 20%  | B        |            |               |           |           |
| C9   | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C10  | 10µF/10V | Tantal | 20%  | C        |            |               |           |           |
| C11  | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C12  | 10µF/10V | Tantal | 20%  | C        |            |               |           |           |
| C13  | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C14  | 10µF/10V | Tantal | 20%  | C        |            |               |           |           |
| C15  | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C16  | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C17  | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C18  | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C19  | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C20  | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C21  | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C22  | 10µF/10V | Tantal | 20%  | C        |            |               |           |           |
| C23  | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C24  | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C25  | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C26  | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |
| C27  | 100nF    | X7R    | 10%  | 1206     |            |               |           |           |

|          |            |              |     |
|----------|------------|--------------|-----|
| Projekt: | IC0DEuPE1  |              |     |
| Datum:   | 09.03.1999 | Version Nr.: | 2.1 |

| Bez. | Wert          | Ker.   | Tol. | Baugröße     | Hersteller          | Bestellnummer  | Ersatztyp | Anmerkung          |
|------|---------------|--------|------|--------------|---------------------|----------------|-----------|--------------------|
| C28  | 100nF         | X7R    | 10%  | 1206         |                     |                |           |                    |
| C29  | 100nF         | X7R    | 10%  | 1206         |                     |                |           |                    |
| C30  | 100nF         | X7R    | 10%  | 1206         |                     |                |           |                    |
| C31  | 10µF/10V      | Tantal | 20%  | C            |                     |                |           |                    |
| C32  | 1µF           | X7R    | 10%  | 1206         |                     |                |           |                    |
| C33  | 1µF           | X7R    | 10%  | 1206         |                     |                |           |                    |
| C34  | 4n7           | X7R    | 10%  | 1206         |                     |                |           |                    |
| C35  | 4n7           | X7R    | 10%  | 1206         |                     |                |           |                    |
| C36  | 1nF           | X7R    | 10%  | 1206         |                     |                |           |                    |
| C37  | 1nF           | X7R    | 10%  | 1206         |                     |                |           |                    |
| C38  | 10µF/10V      | Tantal | 20%  | C            |                     |                |           |                    |
| C39  | 10µF/10V      | Tantal | 20%  | C            |                     |                |           |                    |
| L1   | 10µH/500mA    |        |      | bedrahtet    | Siemens             | B781*8-T1103-K |           | bedrahtete Drossel |
| L2   | BLM21A601     |        |      | 0805         | MURATA              |                |           | SMD-Drossel        |
| L3   | BLM21A601     |        |      | 0805         | MURATA              |                |           | SMD-Drossel        |
| D1   | BZX84C12      |        |      | SOT23        |                     |                |           | Z-Diode 12V        |
| D2   | BAT54S        |        |      | SOT23        |                     |                |           |                    |
| D3   | BAT54S        |        |      | SOT23        |                     |                |           |                    |
| D4   | BAT54S        |        |      | SOT23        |                     |                |           |                    |
| D5   | BAT54S        |        |      | SOT23        |                     |                |           |                    |
| U1   | 74HC112       |        |      | S016         |                     |                |           |                    |
| U2   | 6N136         |        |      | DIP8A        |                     |                |           |                    |
| U3   | DCP012405P    |        |      | DIP14A       | BURR-BROWN          |                |           |                    |
| U4   | DCP012405P    |        |      | DIP14A       | BURR-BROWN          |                |           |                    |
| U5   | 74HC4024      |        |      | S014         |                     |                |           |                    |
| U6   | 74HC74        |        |      | S014         |                     |                |           |                    |
| U7   | LTC1400CS8    |        |      | S08          | Linear Technologies |                |           |                    |
| U8   | SAB-C167CR-LM |        |      | P-MQFP-144-1 | Siemens             |                |           |                    |

|          |            |              |     |
|----------|------------|--------------|-----|
| Projekt: | ICODEuPE1  |              |     |
| Datum:   | 09.03.1999 | Version Nr.: | 2.1 |

| Bez. | Wert              | Ker. | Tol. | Baugröße    | Hersteller        | Bestellnummer | Ersatztyp | Anmerkung                                 |
|------|-------------------|------|------|-------------|-------------------|---------------|-----------|-------------------------------------------|
| U9   | MAX202EESE        |      |      | S016        | Maxim             |               |           |                                           |
| U10  | MAX809LEUR-T      |      |      | SOT23       | Maxim             |               |           |                                           |
| U11  | VX-8231 3,6864MHz |      |      | DIP14A      | Jauch             |               |           | Quarzoszillator                           |
| U12  | M5M51008BFP-55L   |      |      | S032 525    | Mitsubishi        |               |           | SRAM 128k x 8, 55ns                       |
| U13  | AM29F010-55PC5    |      |      | DIP32A      | AMD               |               |           | gesockelt                                 |
| U14  | AM29F010-55PC5    |      |      | DIP32A      | AMD               |               |           | gesockelt                                 |
| U15  | M5M51008BFP-55L   |      |      | S032 525    | Mitsubishi        |               |           | SRAM 128k x 8, 55ns                       |
| F1   | 500mA Polyfuse    |      |      | FLST2R5     |                   |               |           | nicht bestücken                           |
| F2   | 500mA Polyfuse    |      |      | FLST2R5     |                   |               |           | nicht bestücken                           |
| JP1  | Stiftleiste 1x2   |      |      | RM 2,54     |                   |               |           |                                           |
| JP2  | Stiftleiste 1x2   |      |      | RM 2,54     |                   |               |           |                                           |
| JP3  | Stiftleiste 1x2   |      |      | RM 2,54     |                   |               |           |                                           |
| JP4  | Stiftleiste 1x2   |      |      | RM 2,54     |                   |               |           |                                           |
| JP5  | Stiftleiste 1x3   |      |      | RM 2,54     |                   |               |           |                                           |
| JP6  | Stiftleiste 1x3   |      |      | RM 2,54     |                   |               |           |                                           |
| JP7  | 0 Ohm             |      |      | 1206        |                   |               |           | Lötjumper                                 |
| JP8  | 0 Ohm             |      |      | 1206        |                   |               |           | Lötjumper                                 |
| ST1  | BL508S2           |      |      | MKDSN_2RMI  | Weidmüller RM5.08 |               |           | Schraubklemmen 2polig,<br>nicht bestücken |
| ST2  | DELTA 9HF         |      |      | DB9SL       |                   |               |           | SubD 9pol. Female                         |
| ST3  | DIN 96ABC         |      |      | DIN41612ABC |                   |               |           | VG-Leiste 96pol. Male                     |
| ST4  | Stiftwanne 16pol. |      |      | FKV16LN     |                   |               |           | Stiftwanne gewinkelt                      |
| ST5  | Stiftleiste 1x10  |      |      | RM 2,54     |                   |               |           |                                           |
| ST6  | BL508S2           |      |      | MKDSN_2RMI  | Weidmüller RM5.08 |               |           | Schraubklemmen 2polig,<br>nicht bestücken |
| ST9  | Stecker           |      |      |             | Micro-Match       |               |           |                                           |

|          |            |              |     |
|----------|------------|--------------|-----|
| Projekt: | ICCODEuPE1 |              |     |
| Datum:   | 09.03.1999 | Version Nr.: | 2.1 |

| Bez. | Wert         | Ker. | Tol. | Baugröße | Hersteller  | Bestellnummer | Ersatztyp | Anmerkung       |
|------|--------------|------|------|----------|-------------|---------------|-----------|-----------------|
| ST10 | Stecker      |      |      |          | Micro-Match |               |           | nicht bestücken |
| SW1  | Taster 1xEin |      |      | HDR1X2   | Mantor      |               |           | Baufrom 2210    |
| SW2  | Taster 1xEin |      |      | HDR1X2   | Mantor      |               |           | Baufrom 2210    |
| TP1  | TESTPIN      |      |      | PIN      |             |               |           |                 |
| TP2  | TESTPIN      |      |      | PIN      |             |               |           |                 |
| TP3  | TESTPIN      |      |      | PIN      |             |               |           |                 |
| TP4  | TESTPIN      |      |      | PIN      |             |               |           |                 |
| TP5  | TESTPIN      |      |      | PIN      |             |               |           |                 |
| TP6  | TESTPIN      |      |      | PIN      |             |               |           |                 |
| TP7  | TESTPIN      |      |      | PIN      |             |               |           |                 |
| TP8  | TESTPIN      |      |      | PIN      |             |               |           |                 |
| TP9  | TESTPIN      |      |      | PIN      |             |               |           |                 |
| TP10 | TESTPIN      |      |      | PIN      |             |               |           |                 |
| TP11 | TESTPIN      |      |      | PIN      |             |               |           |                 |
| TP12 | TESTPIN      |      |      | PIN      |             |               |           |                 |
| TP13 | TESTPIN      |      |      | PIN      |             |               |           |                 |
| TP14 | TESTPIN      |      |      | PIN      |             |               |           |                 |
| TP15 | TESTPIN      |      |      | PIN      |             |               |           |                 |