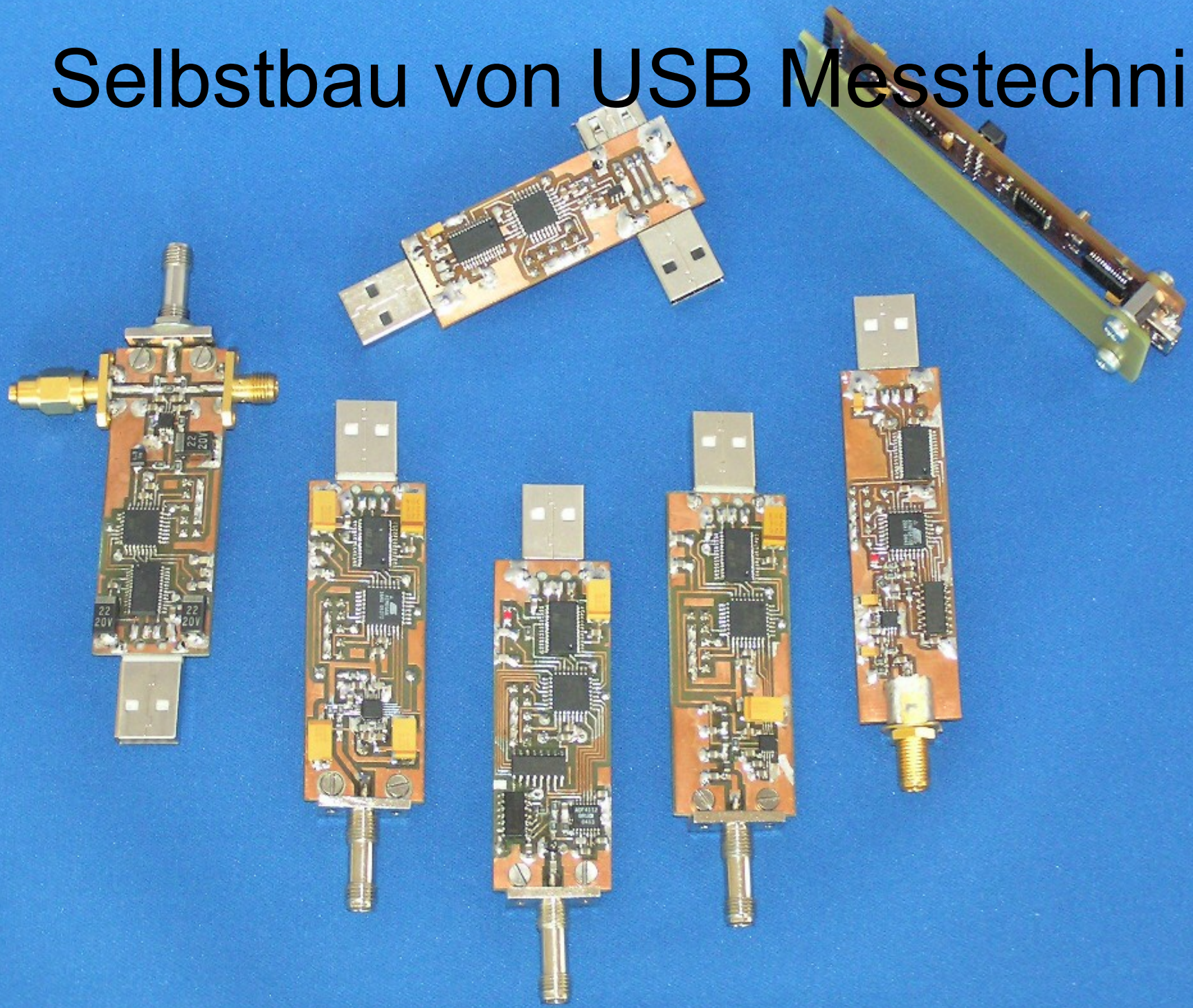
Selbstbau von USB Messtechnik



Themen

Allgemeines

Leistungsmesser
- Entwicklung
- Aufbau
- Inbetriebnahme

Messgeräte, Messplatz

Messvorführung

Der Werkzeugkasten

Schaltplan- und Layoutprogramm

HF-Simulationprogramm

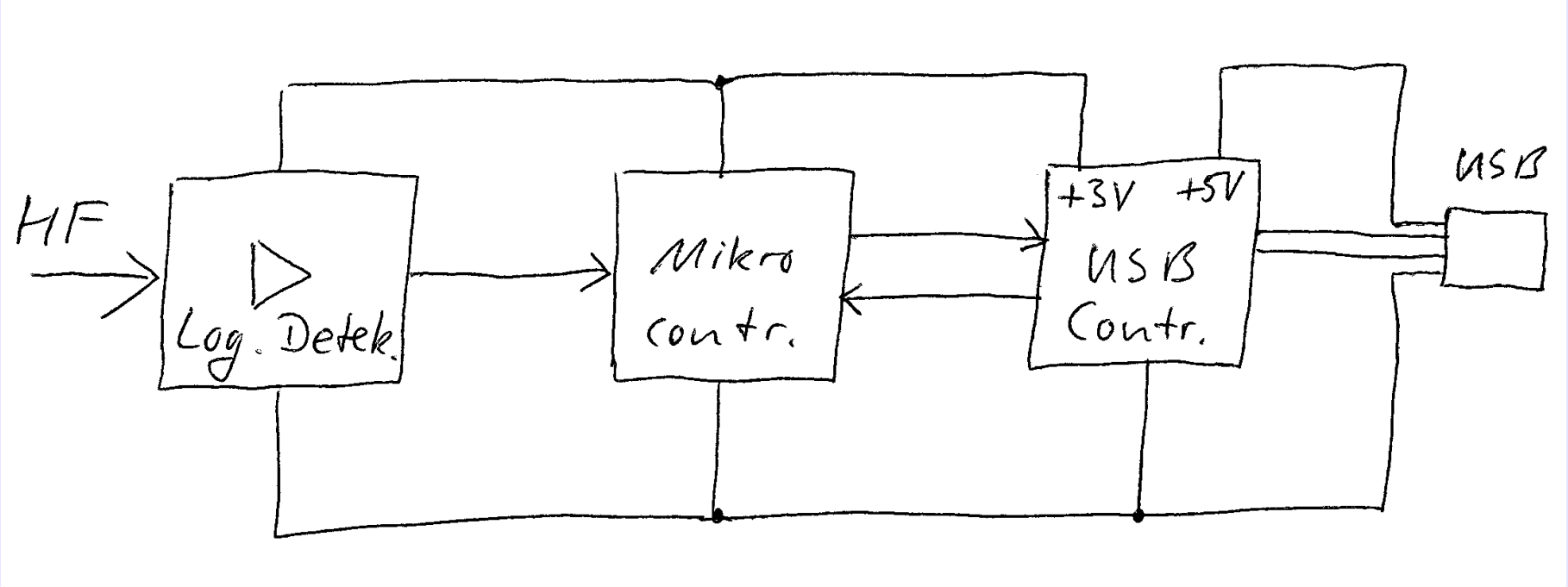
Entwicklungssoftware Windows

Entwicklungssoftware Mikrocontroller

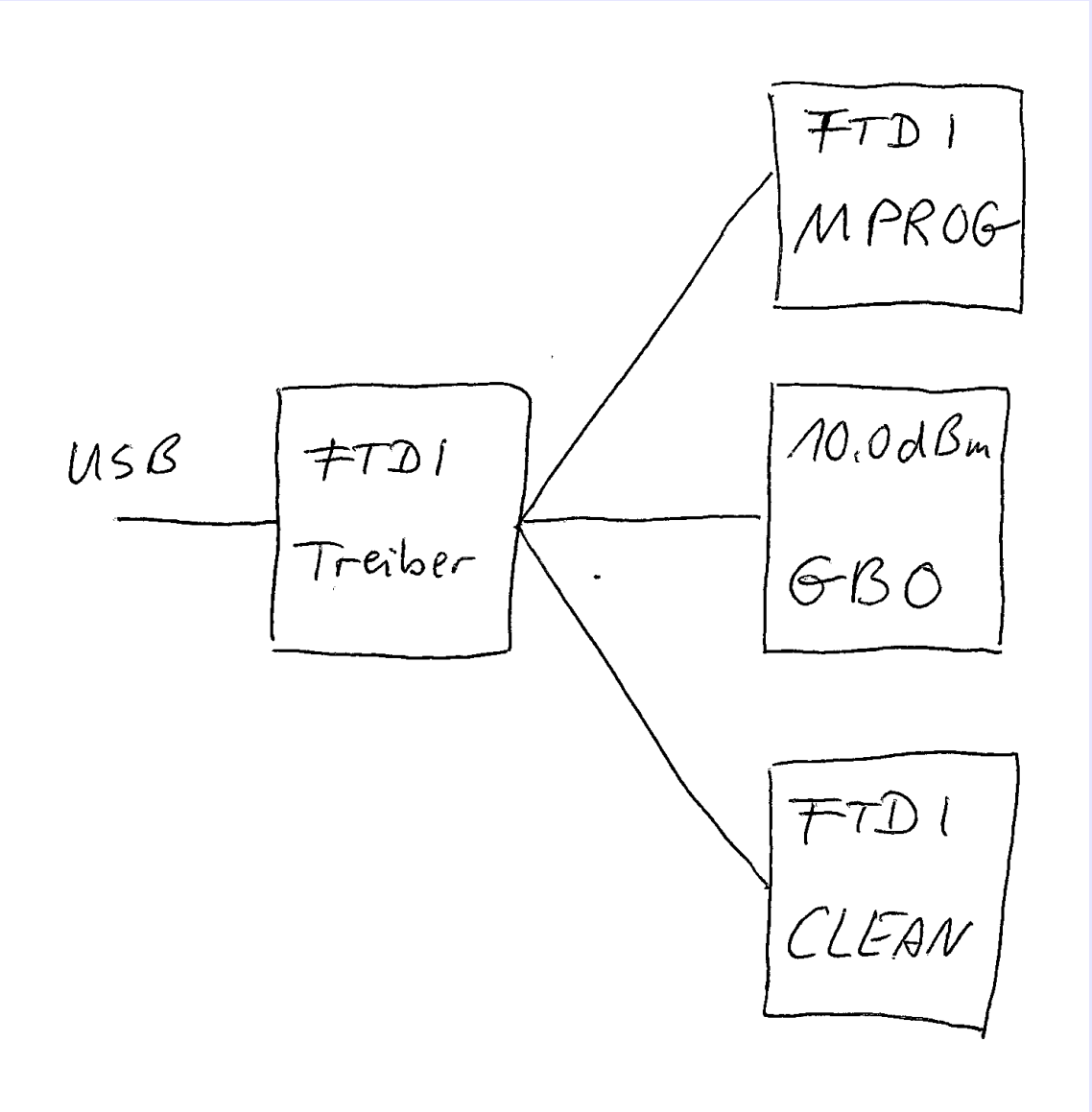
Programmiersoftware USB-Controller

Internetbrowser

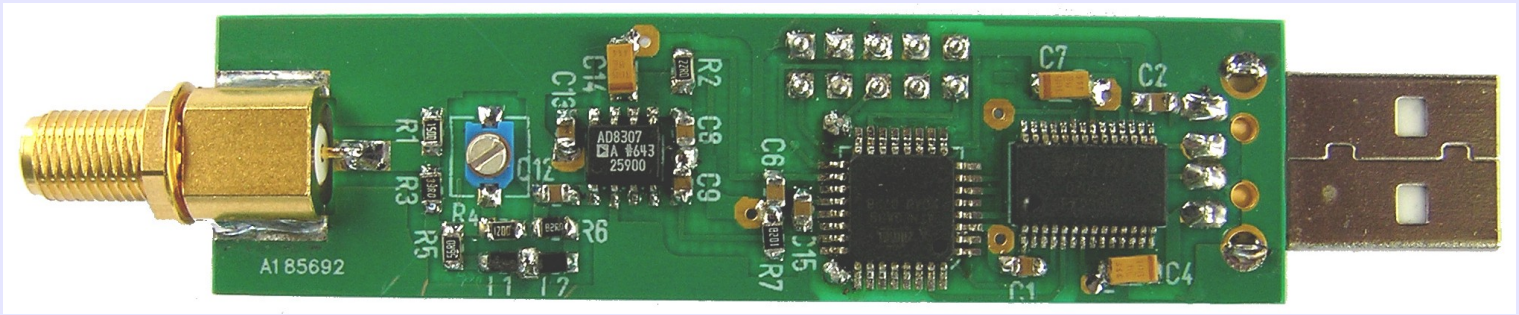
Die Idee



Software auf dem PC



Das Ergebnis



Themen

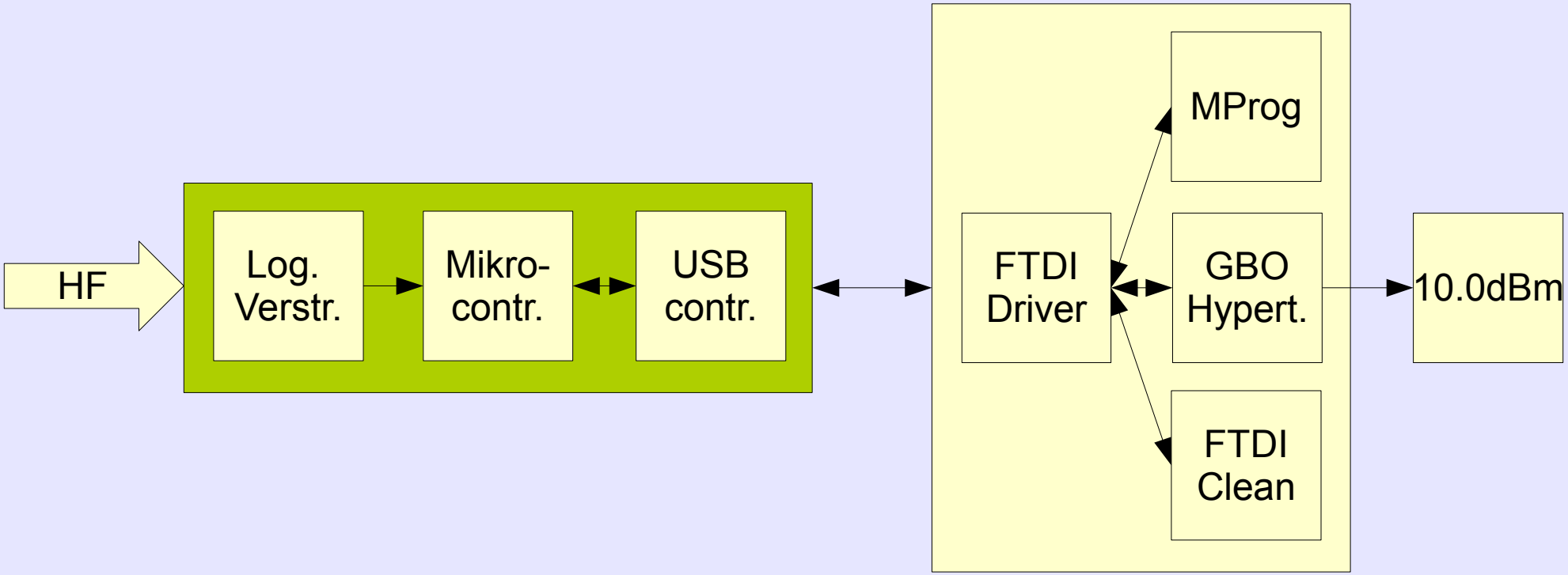
Allgemeines

Leistungsmesser
- Entwicklung
- Aufbau
- Inbetriebnahme

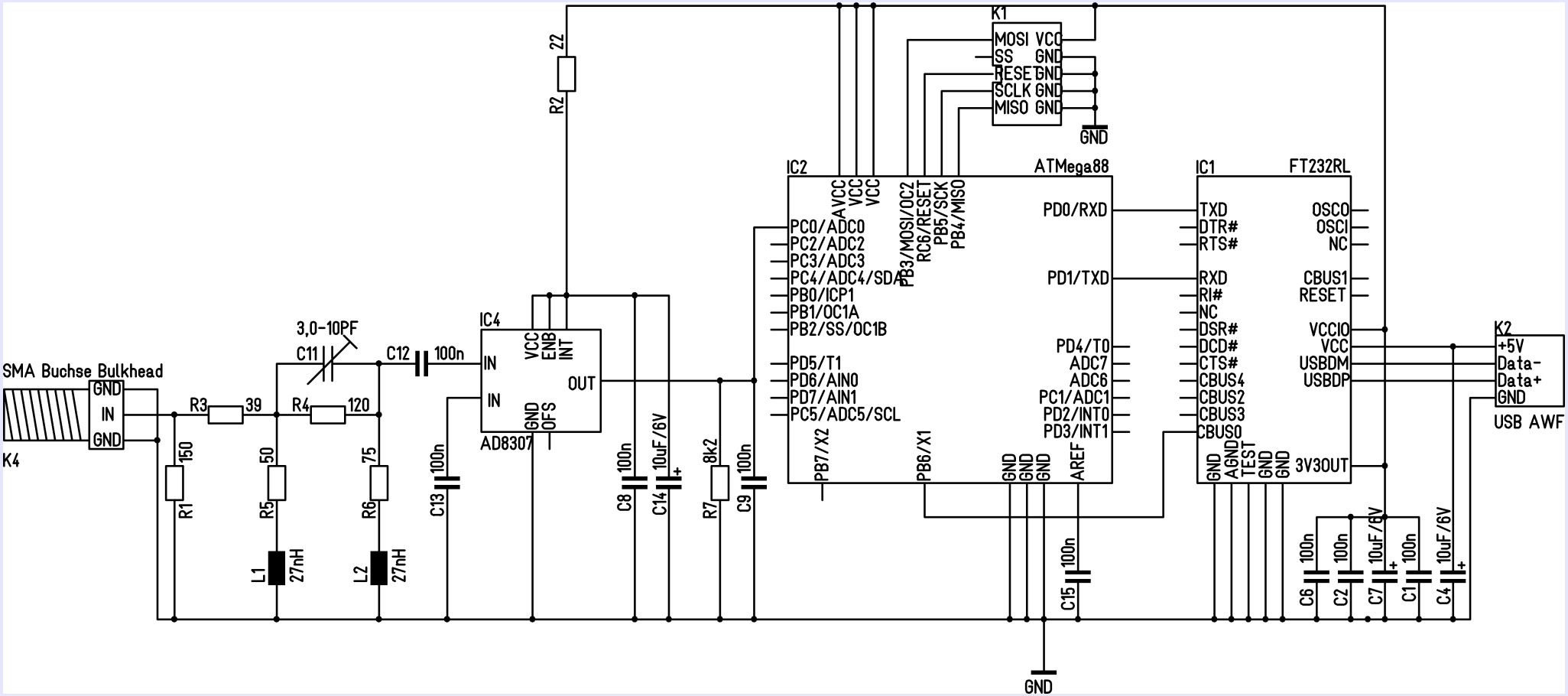
Messgeräte, Messplatz

Messvorführung

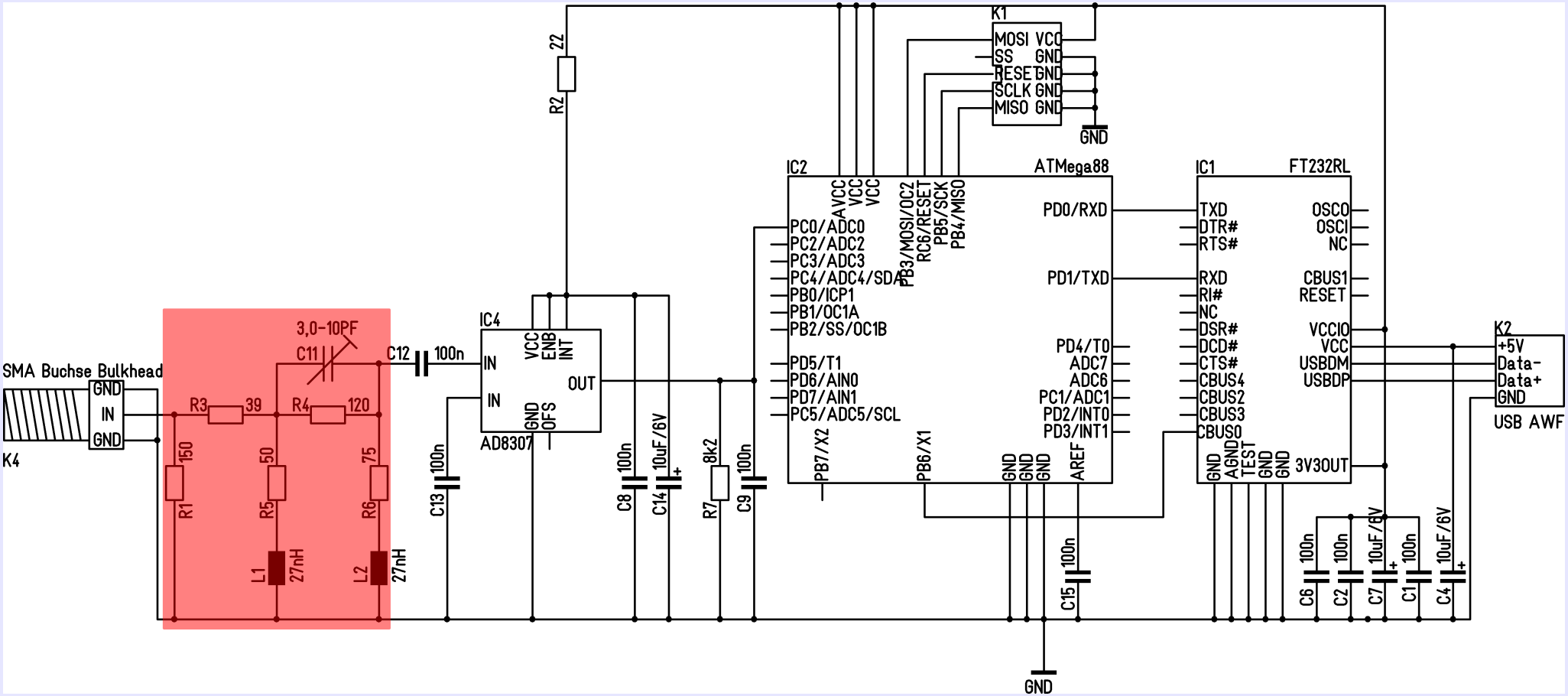
Konstruktion USB-Stick



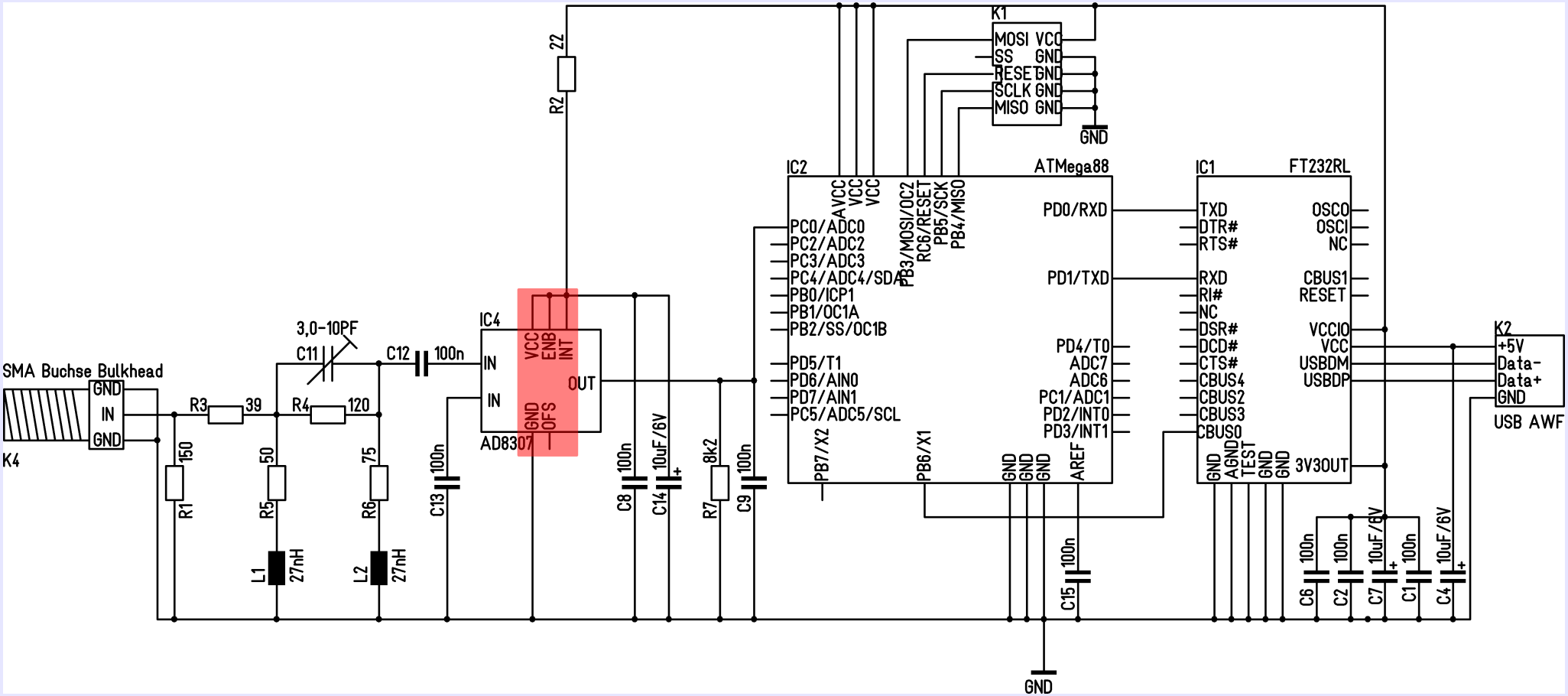
Schaltplan USB Leistungsmesser



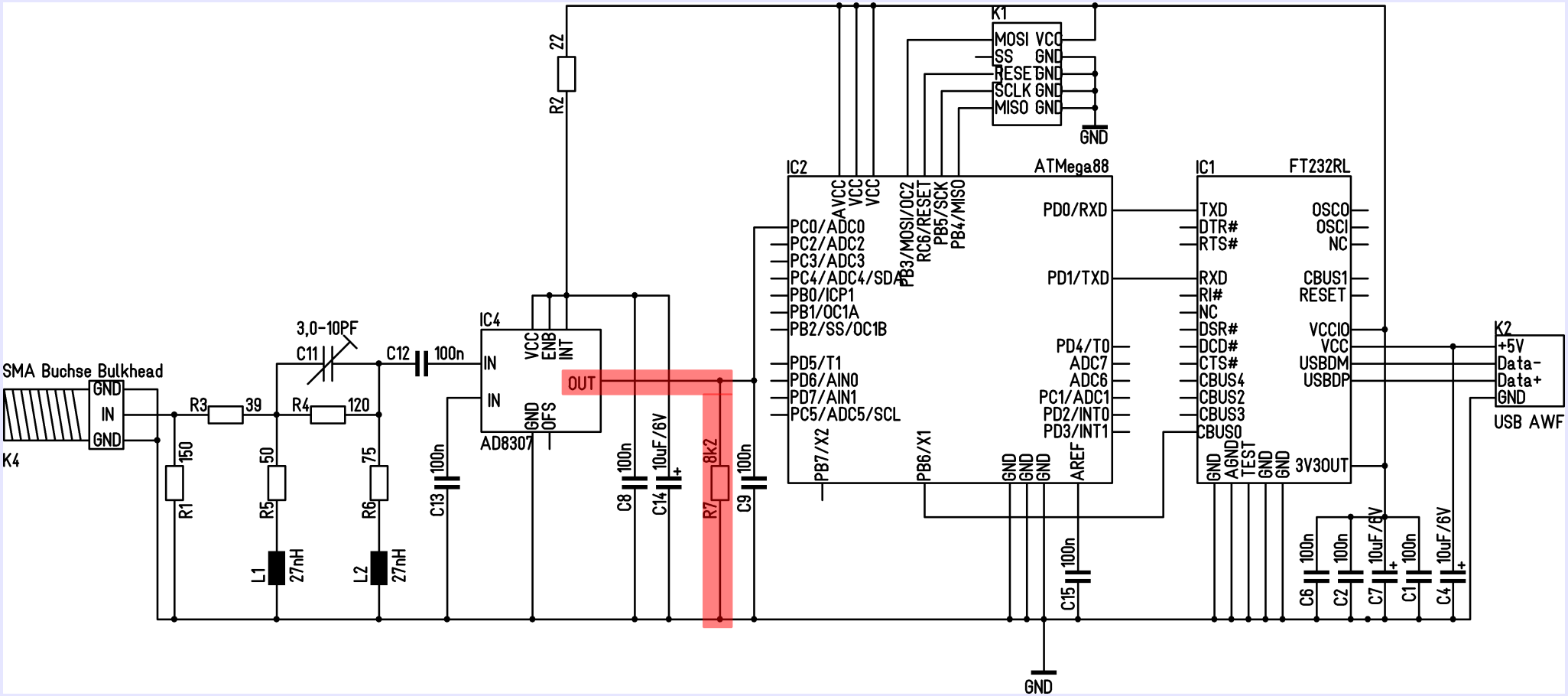
Eingangsnetzwerk



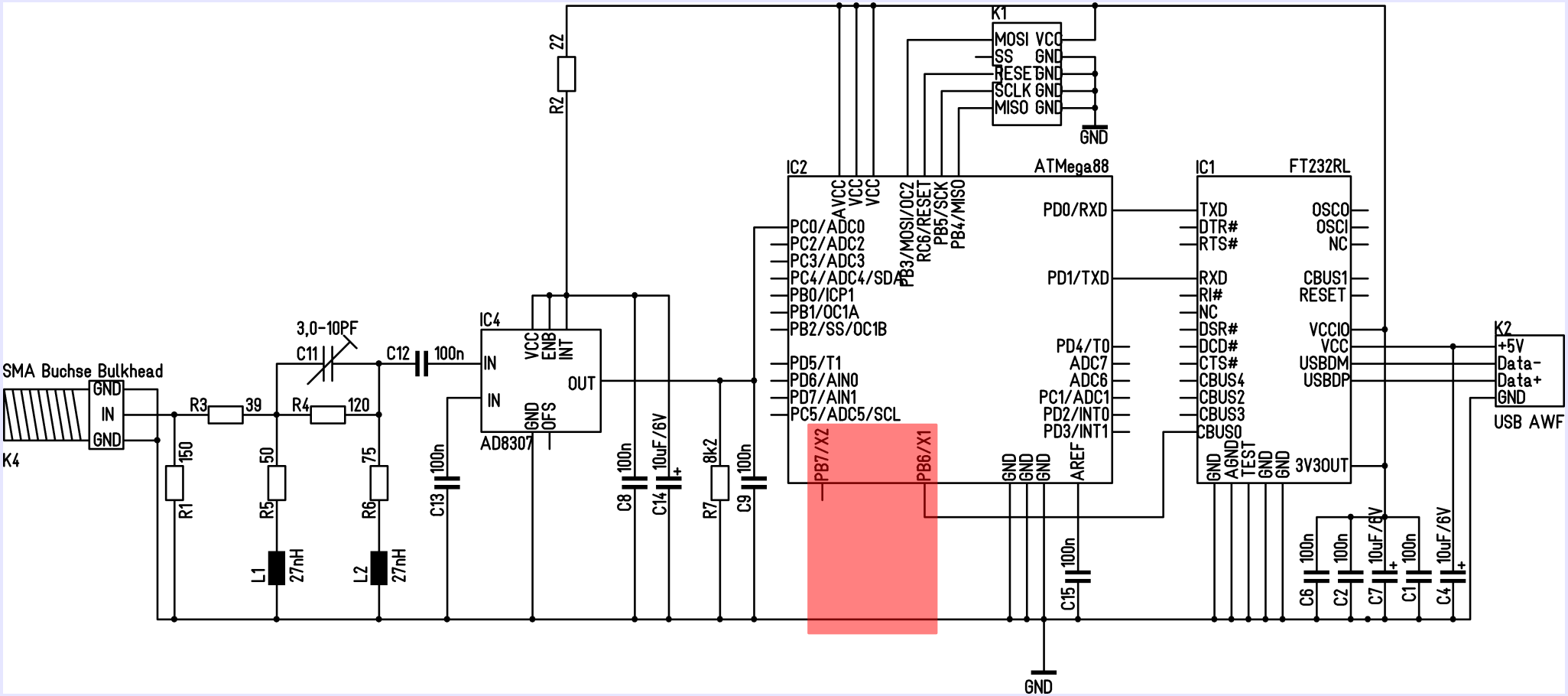
Intercept und Offset haben feste Werte



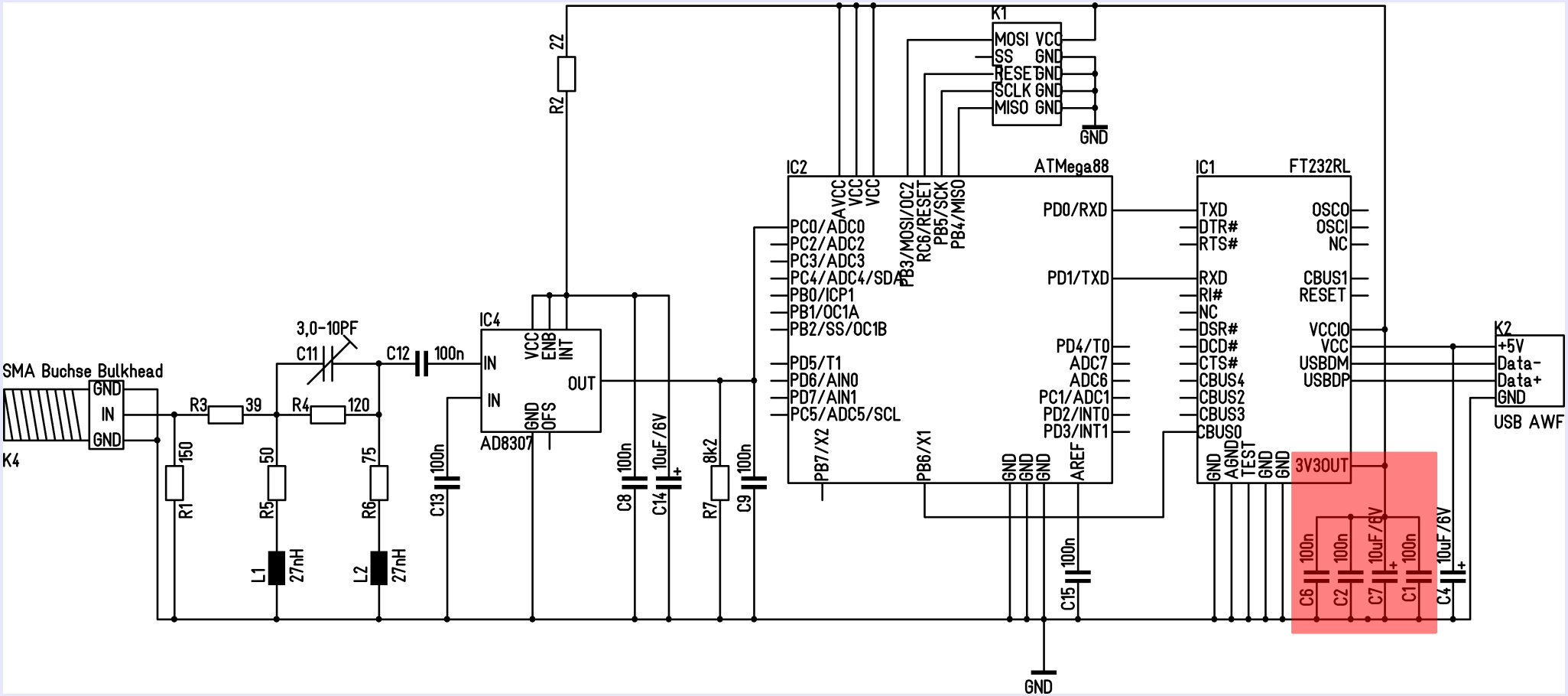
Slope mit R7 auf Uout max. 1.1Volt



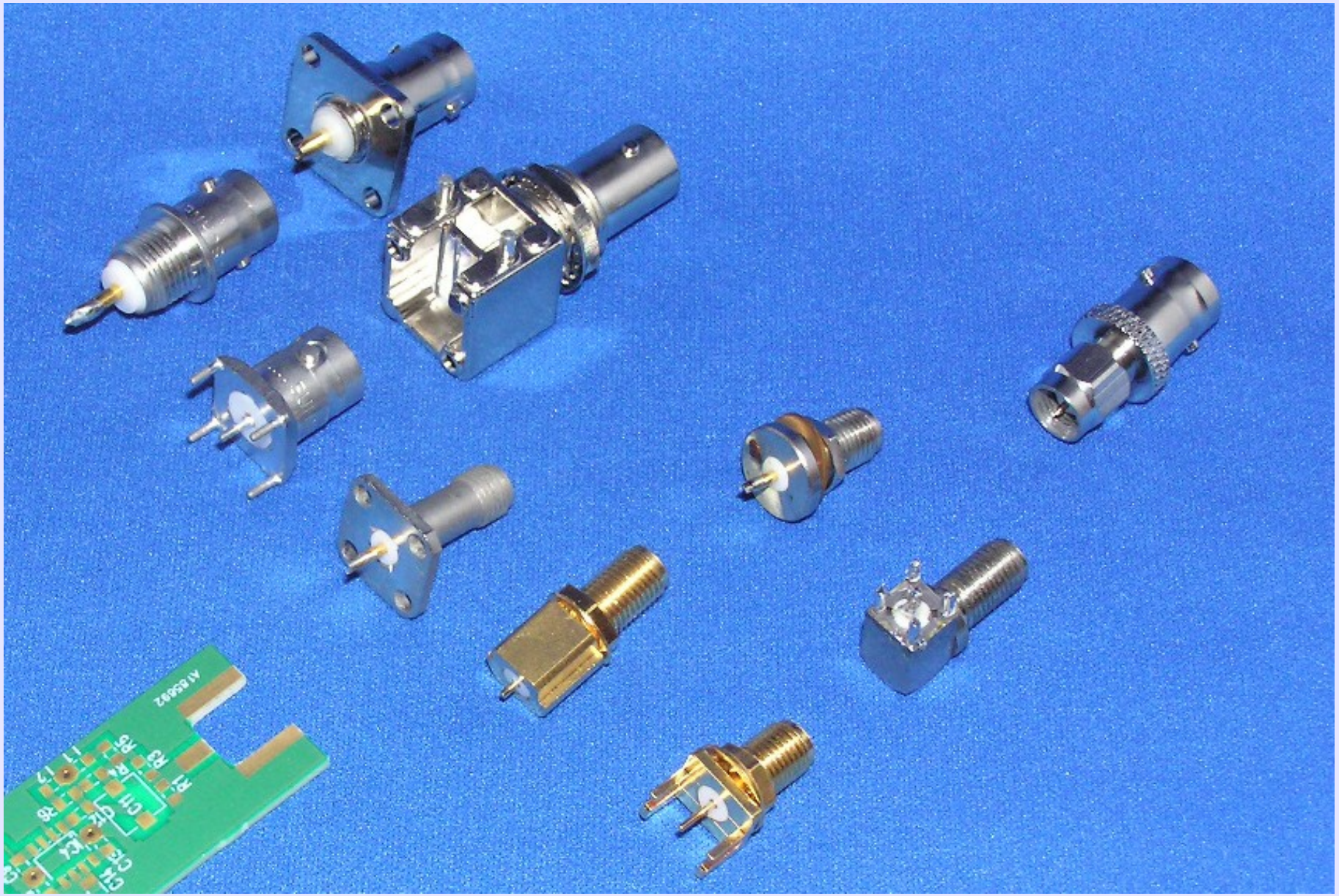
Mikrocontroller auf externen Takt



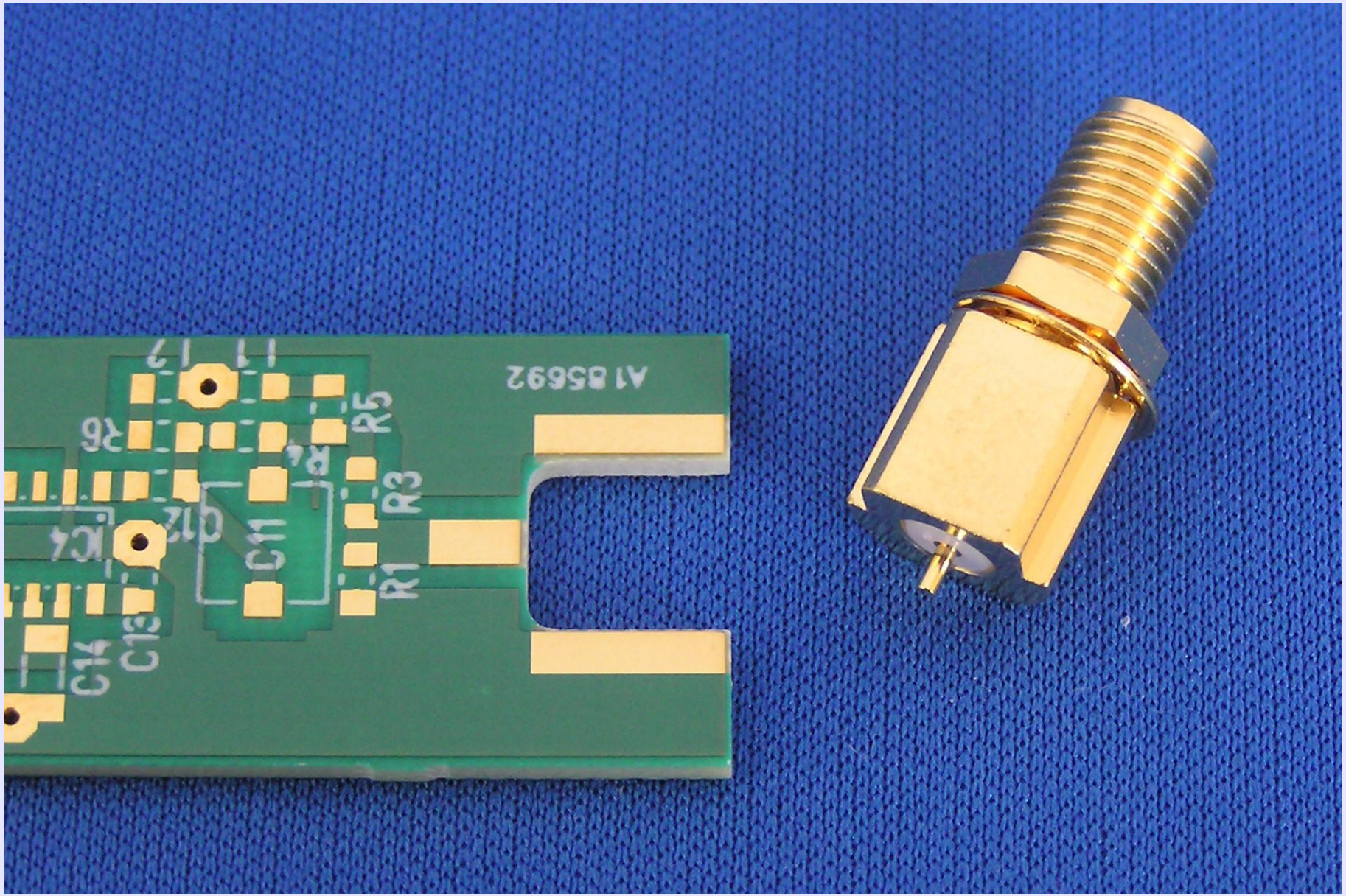
USB-Controller erzeugt 3.3Volt



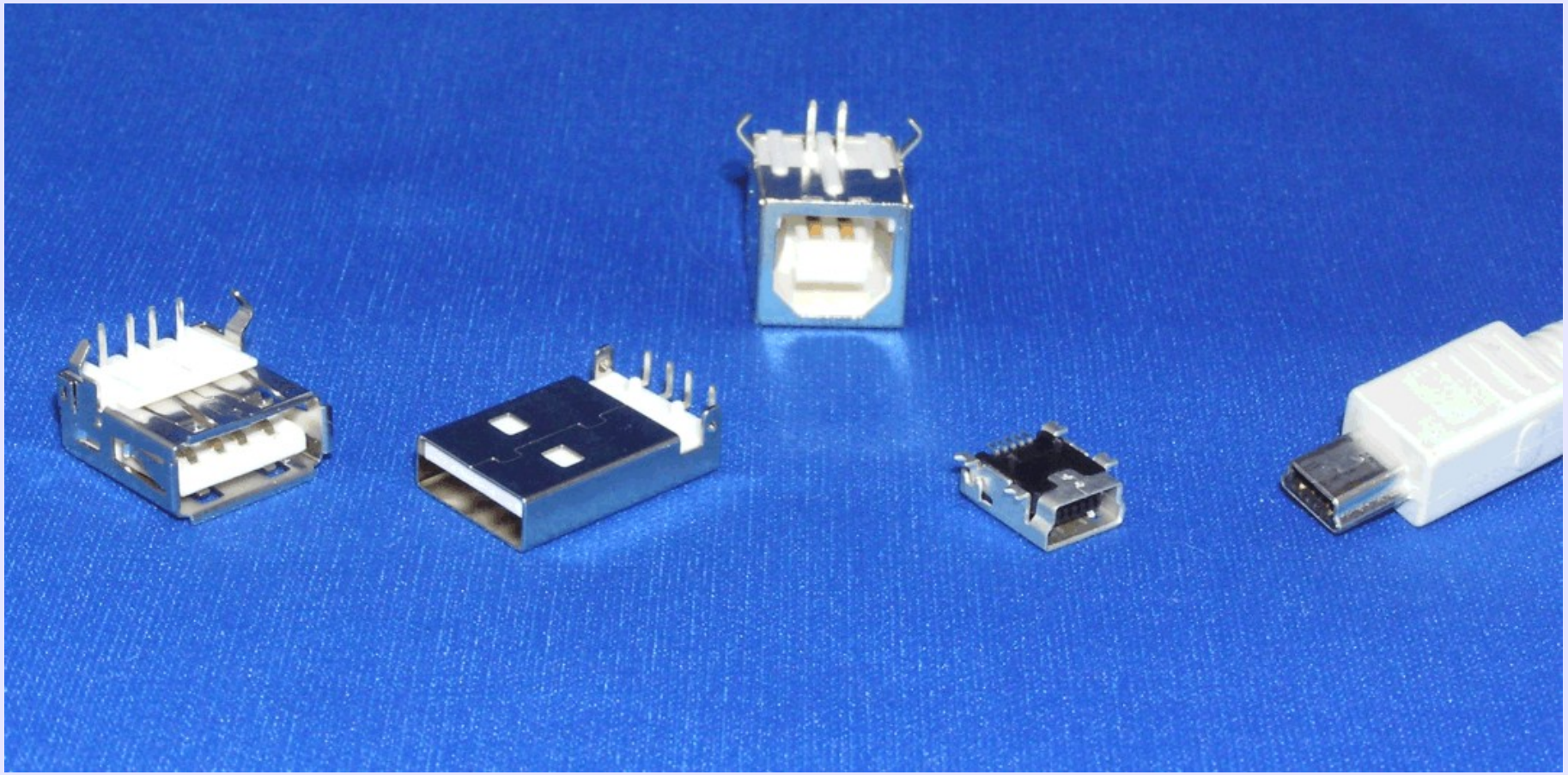
Gehäuseauswahl



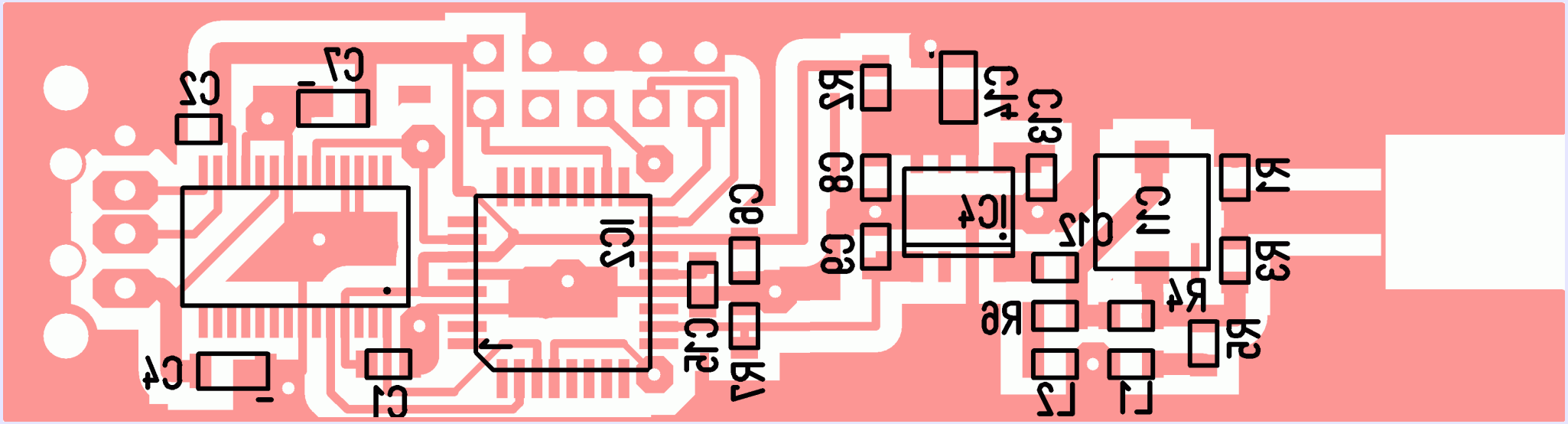
SMA Buchse Kartenrand



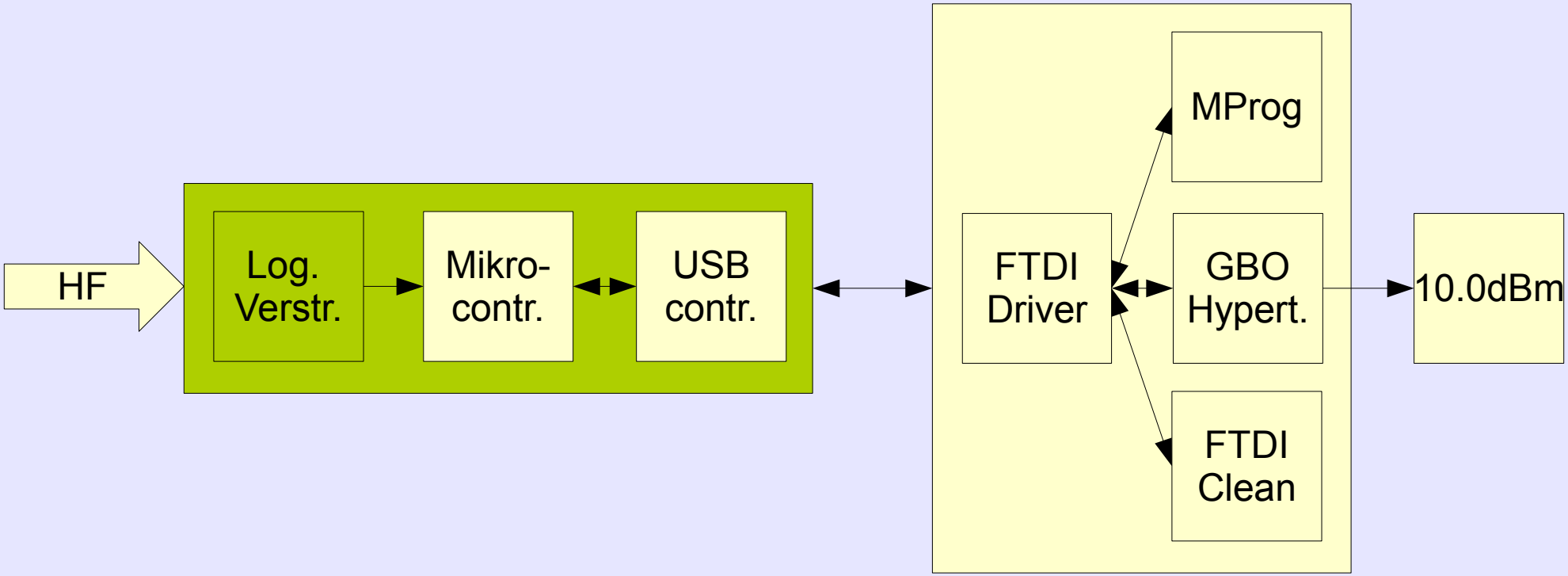
USB-Stecker/Buchsen



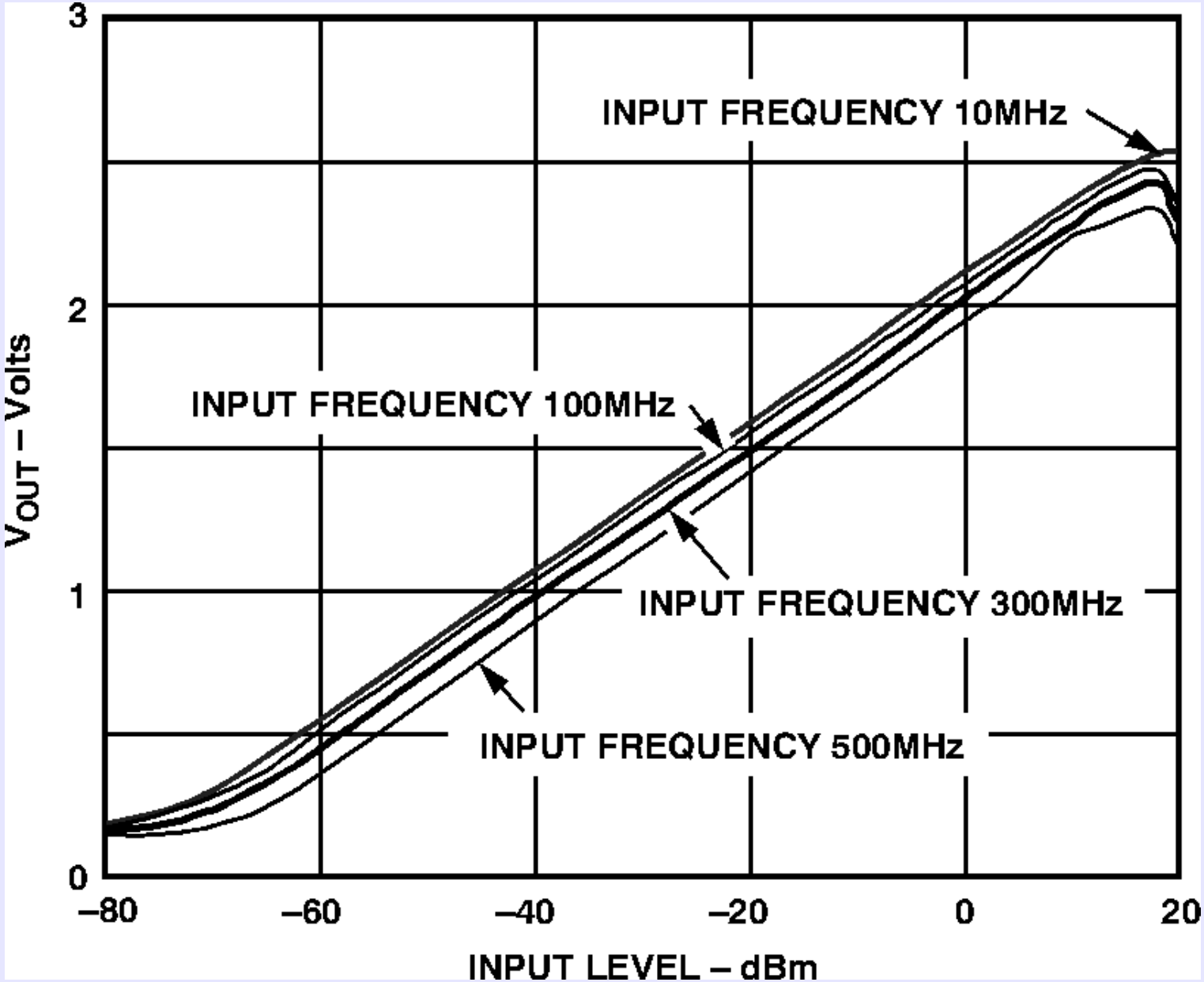
IC's, R und C als SMD



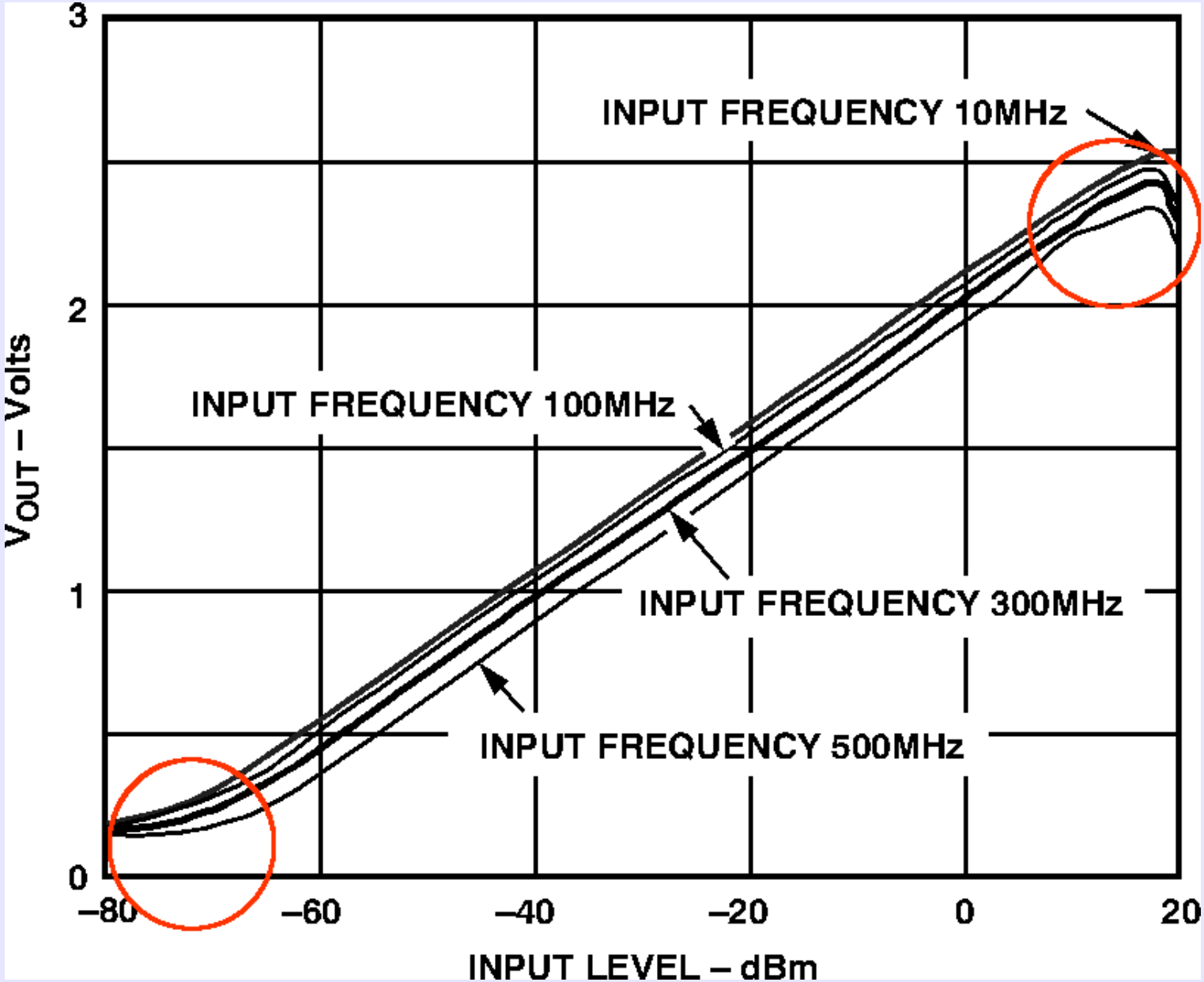
Kompensation Freqeunzgang



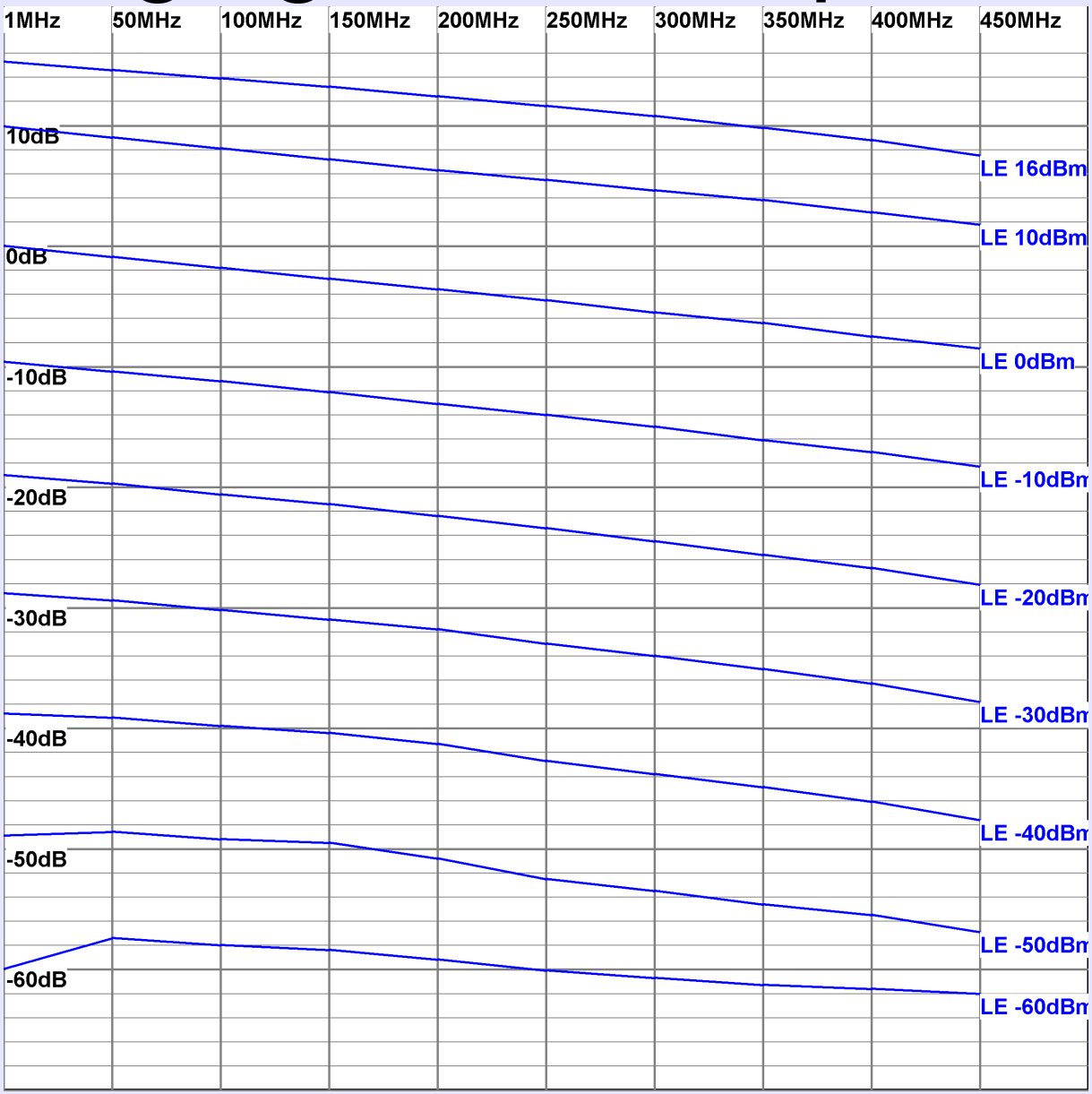
Kennlinien AD8307



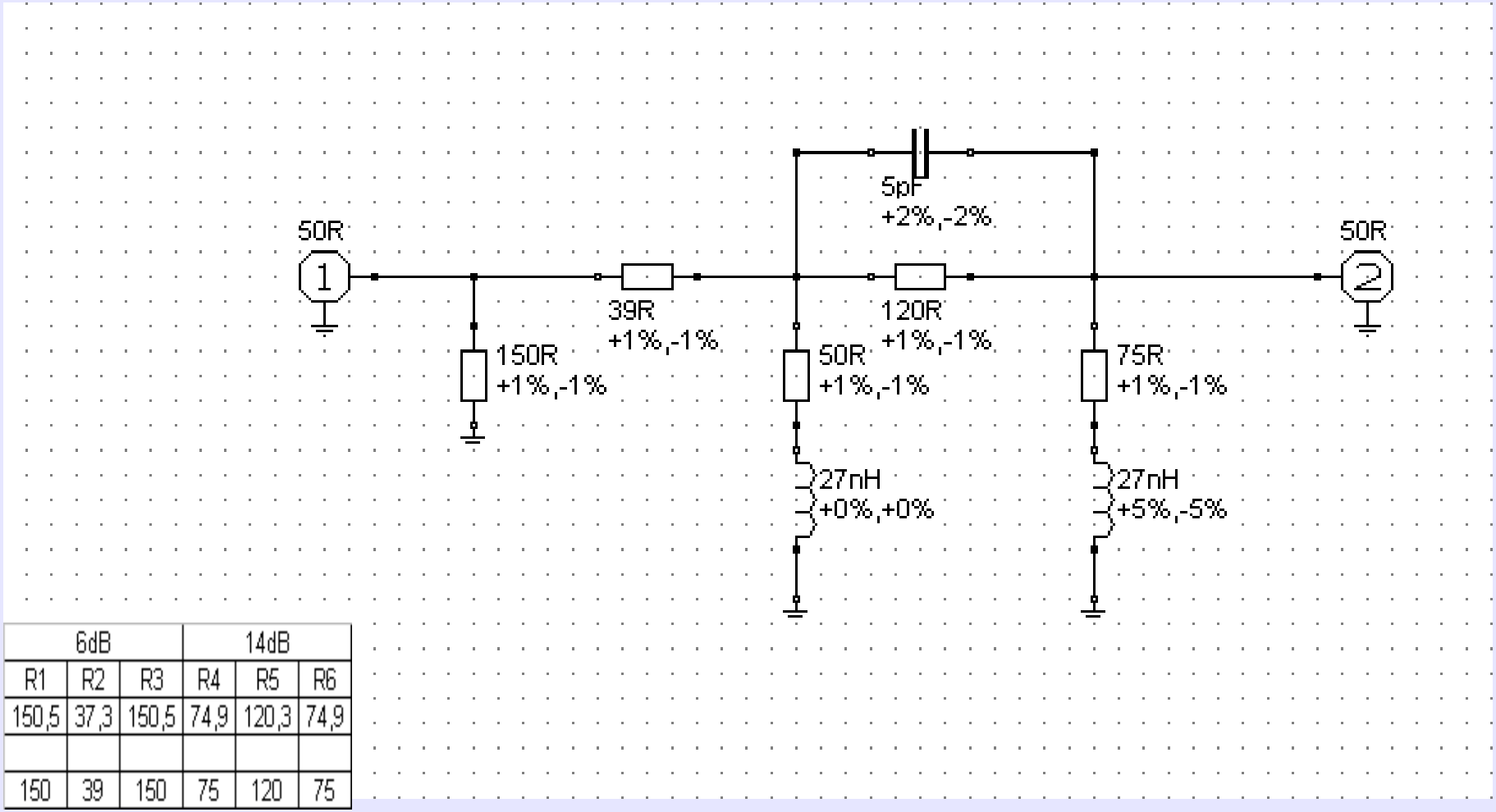
S-förmiger Bereich nicht linear



Schräglage vor Kompensation

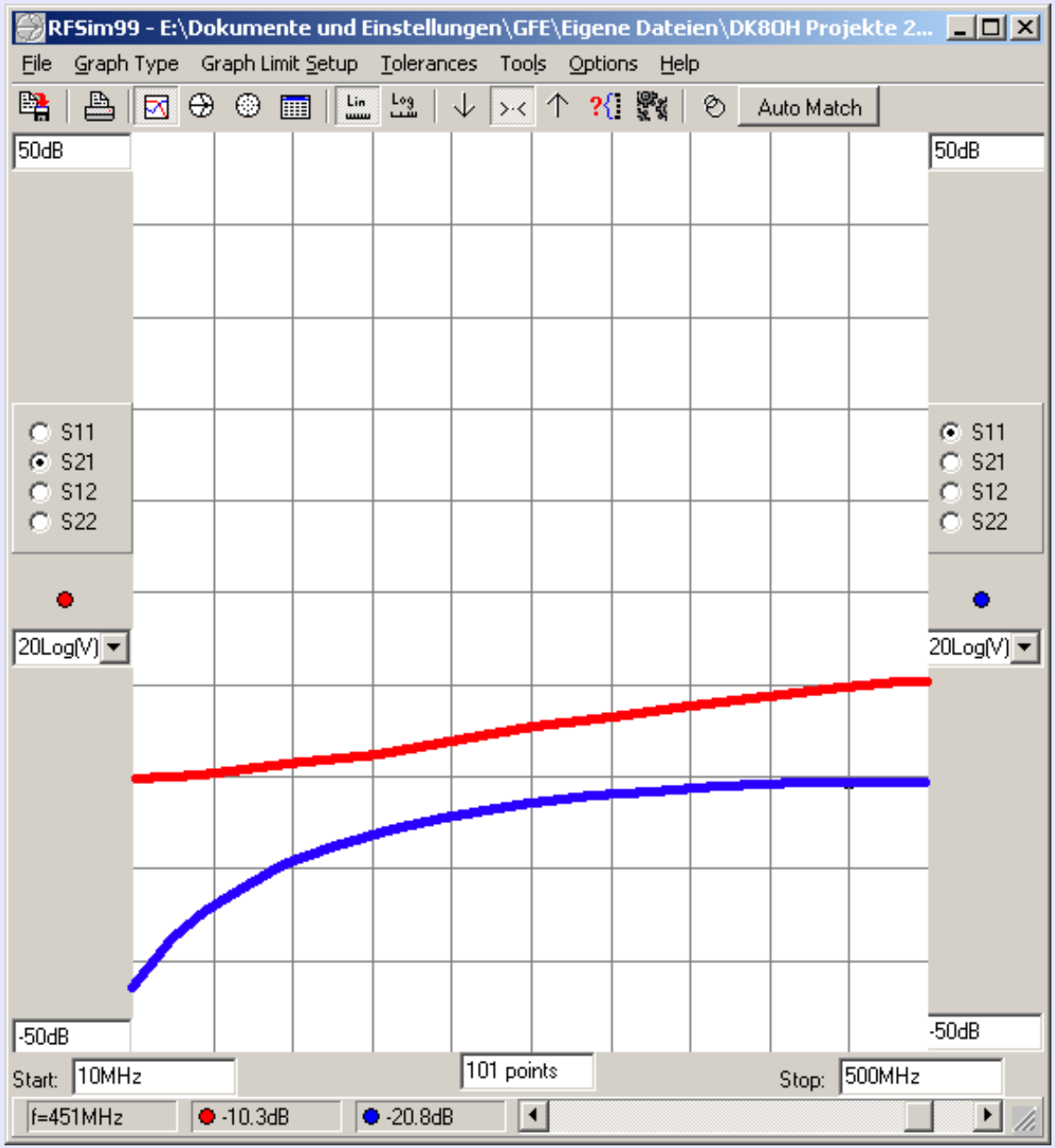


Anpassungs- und Schräglagenetzwerk

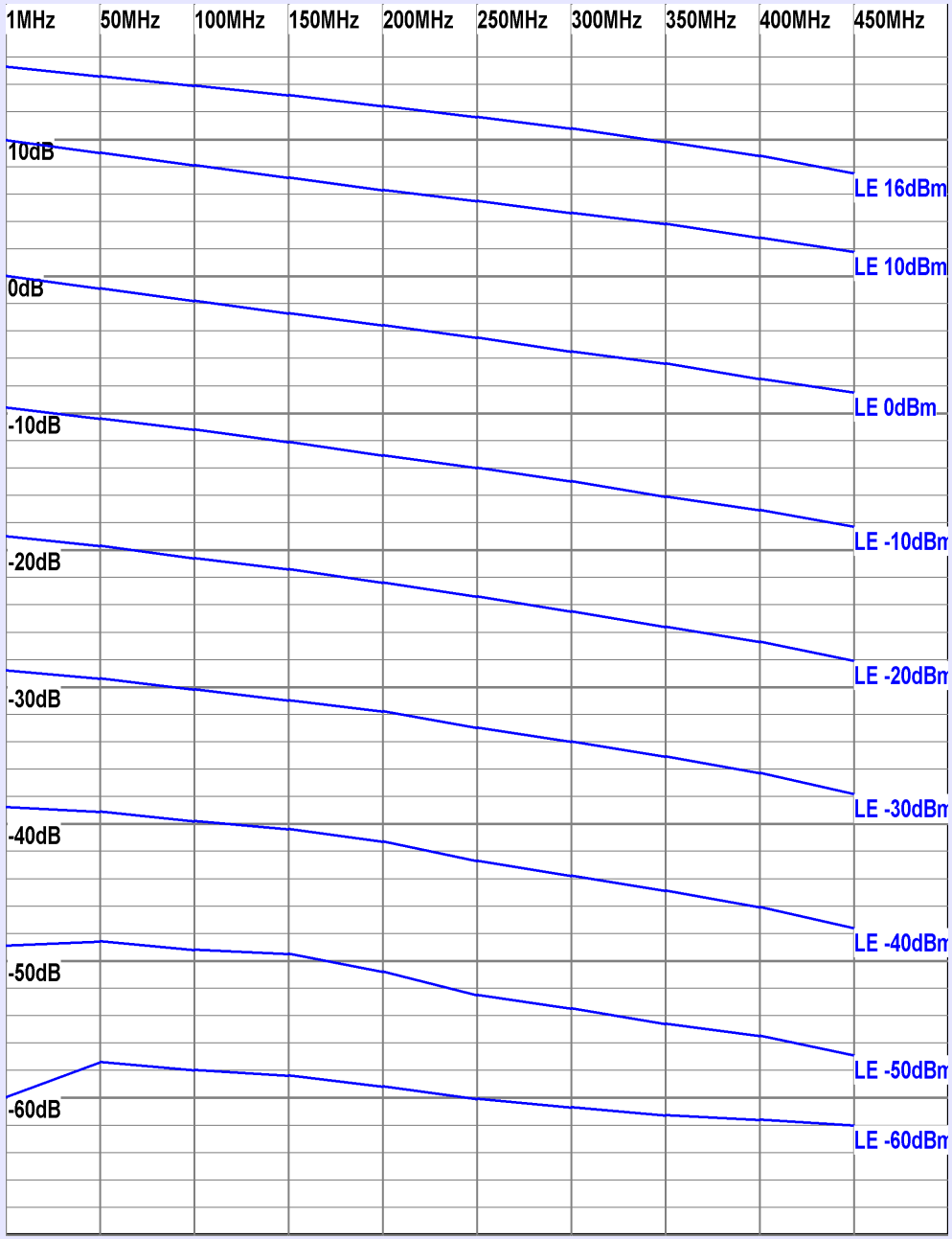


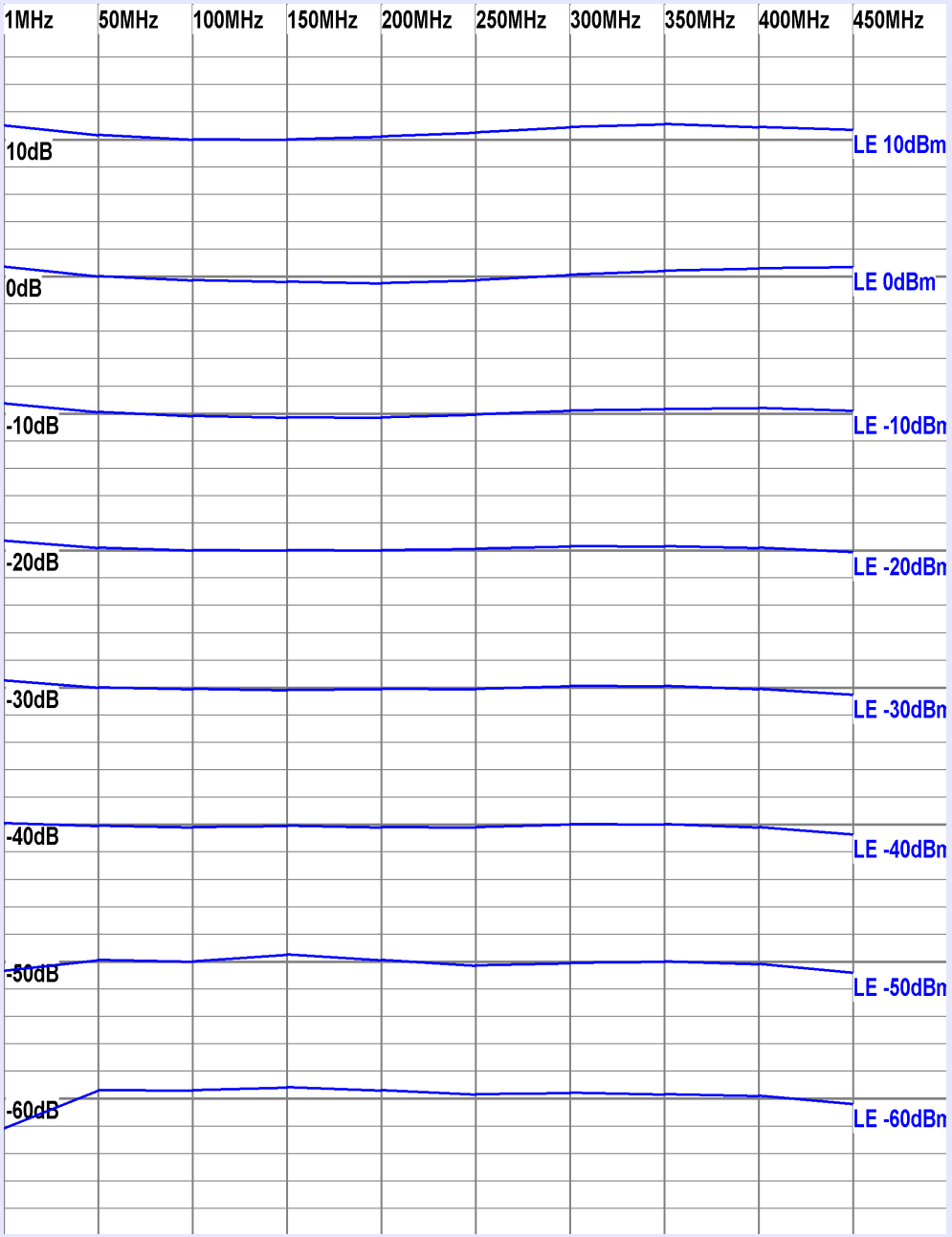
6dB			14dB		
R1	R2	R3	R4	R5	R6
150,5	37,3	150,5	74,9	120,3	74,9
150	39	150	75	120	75

Simulation mit rfsim

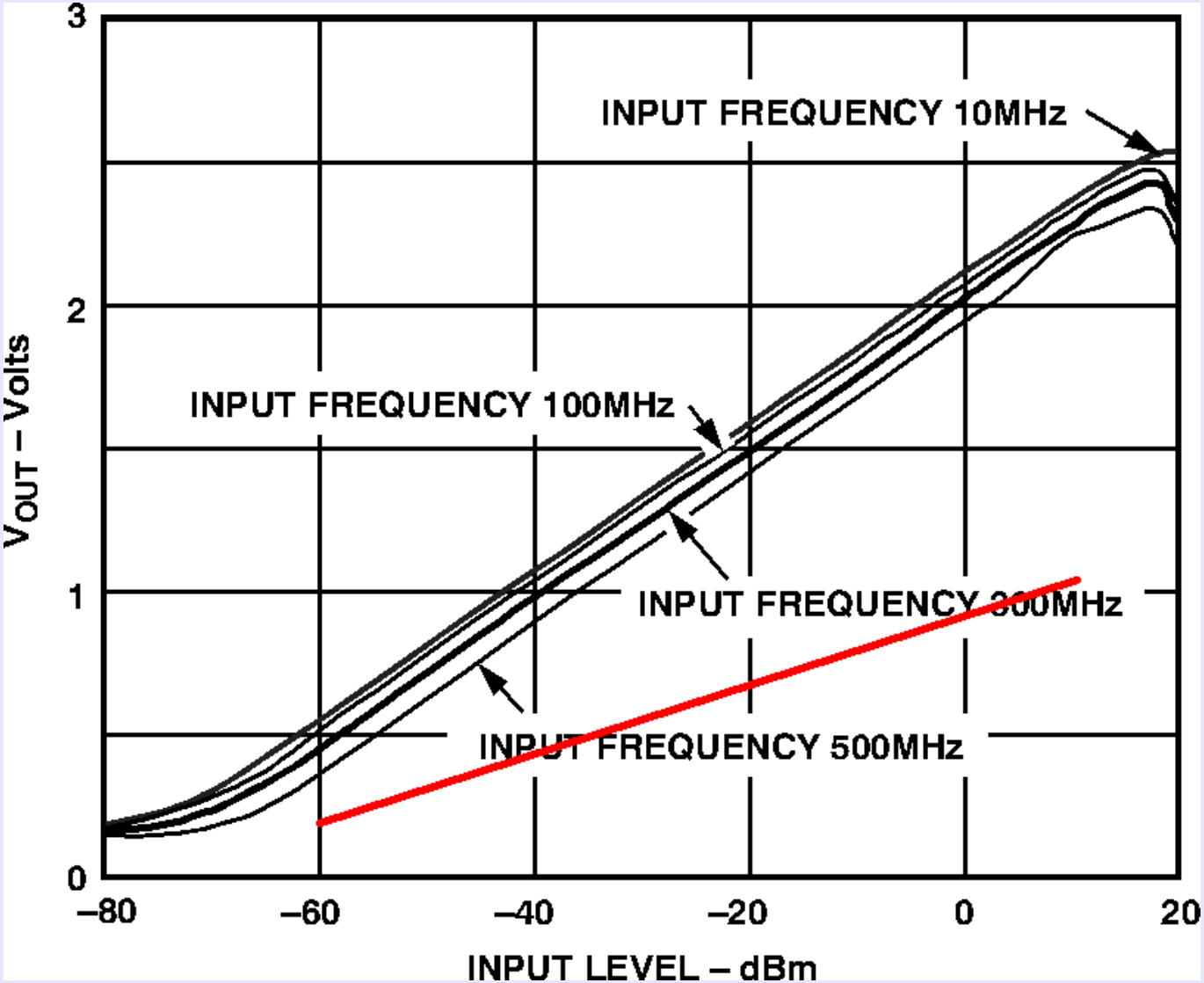


Schräglage nach Kompensation

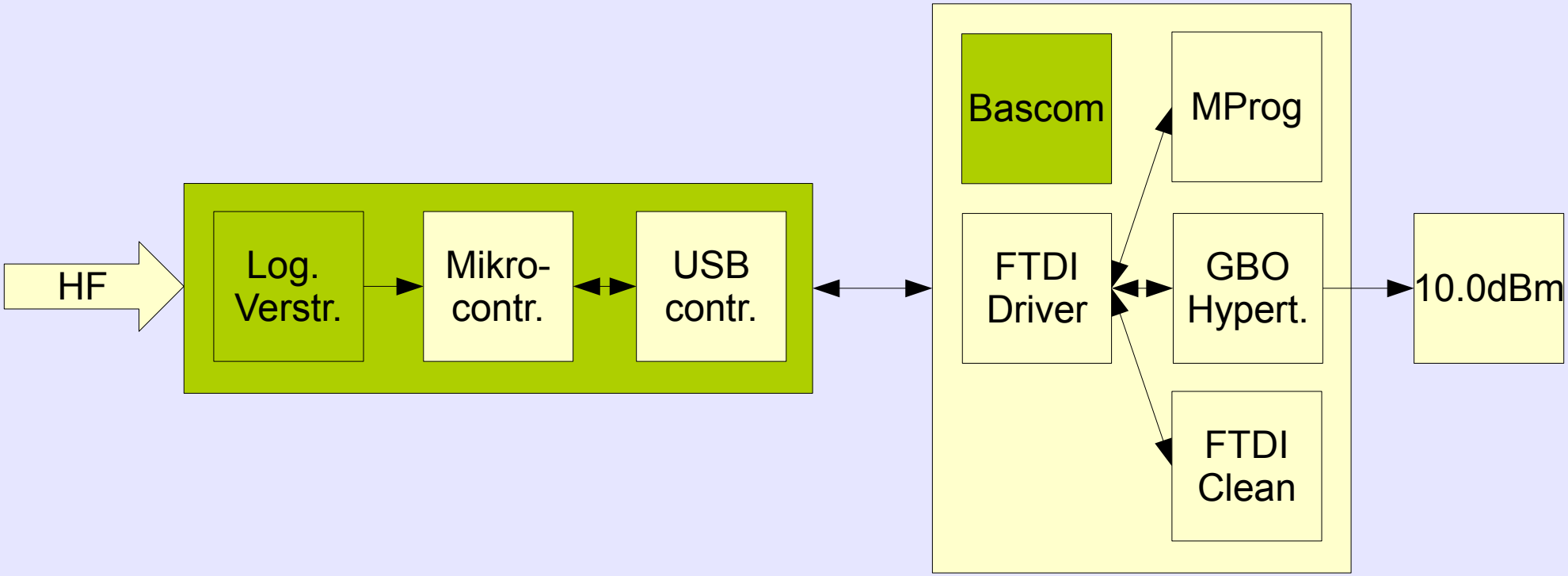

1MHz
50MHz
100MHz
150MHz
200MHz
250MHz
300MHz
350MHz
400MHz
450MHz
10dB
LE 16dBm
LE 10dBm
0dB
LE 0dBm
-10dB
LE -10dBm
-20dB
LE -20dBm
-30dB
LE -30dBm
-40dB
LE -40dBm
-50dB
LE -50dBm
-60dB
LE -60dBm


1MHz
50MHz
100MHz
150MHz
200MHz
250MHz
300MHz
350MHz
400MHz
450MHz
10dB
LE 10dBm
0dB
LE 0dBm
-10dB
LE -10dBm
-20dB
LE -20dBm
-30dB
LE -30dBm
-40dB
LE -40dBm
-50dB
LE -50dBm
-60dB
LE -60dBm

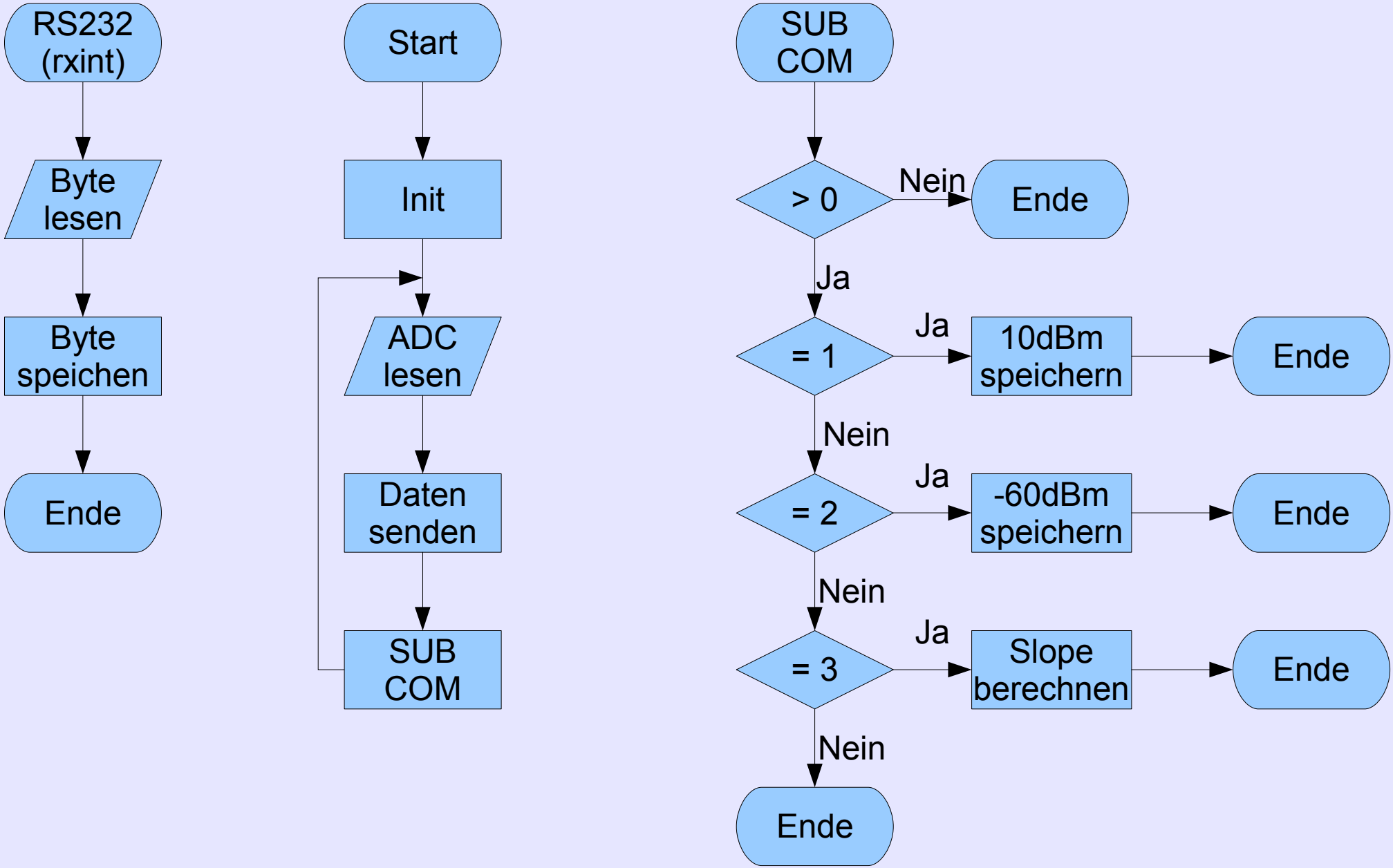
Kennlinie Netzwerk + AD8307



Softwareentwicklung Mikrocontroller



Programmablaufplan



Berechnungsformel

$$Pegel = \frac{U_{10dBm} - U_{ADW}}{Slope} + 10$$

Beispiel:

$$-7{,}2dBm = \frac{1050mV - 856mV}{-11{,}32mV/dB} + 10$$

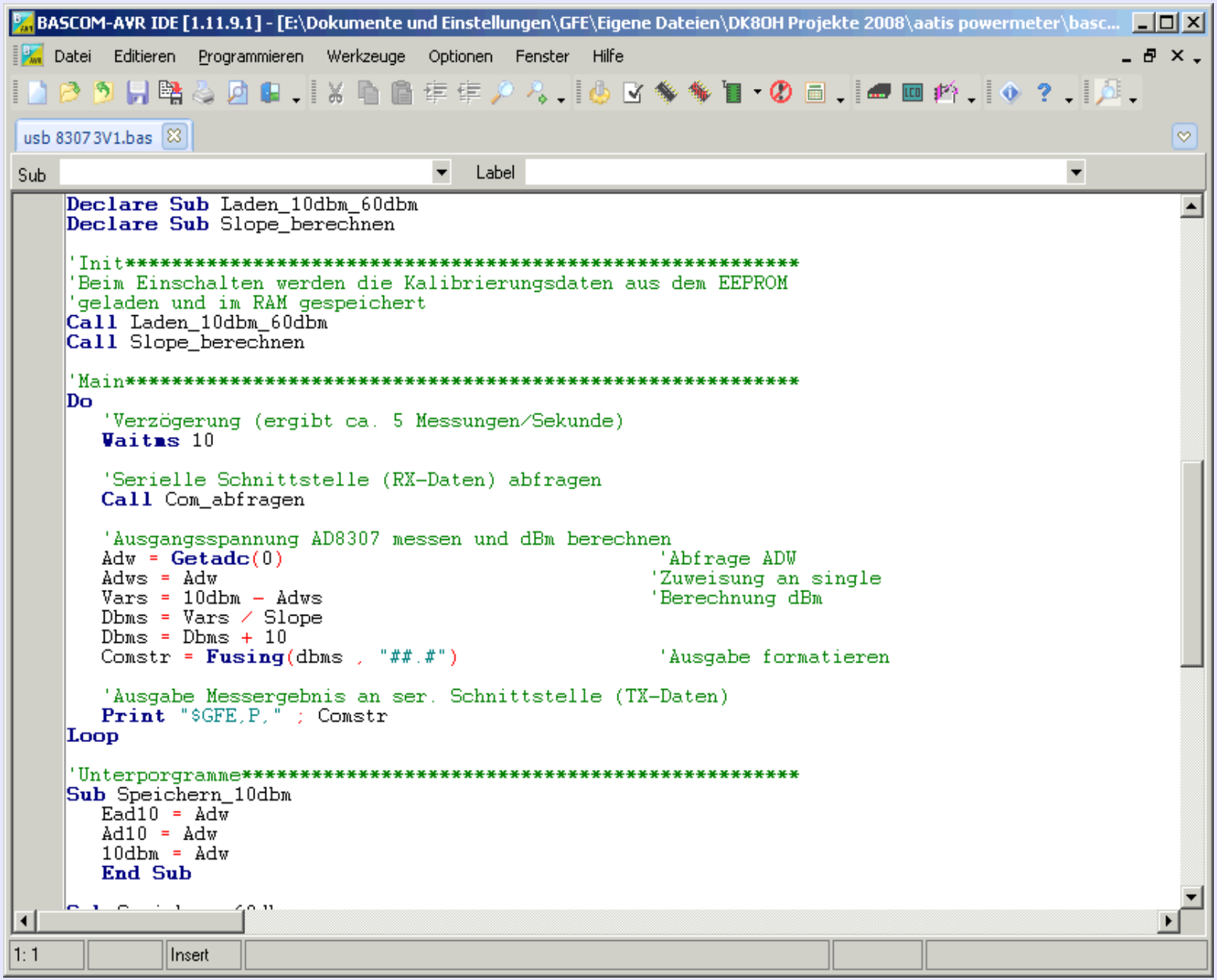
Baud Error Rate

Baudrate	Taktfrequenz														
	1000000	1843200	2000000	3686400	4000000	7372800	8000000	11059200	10000000	12000000	14745600	16000000	18432000	20000000
1200	0,1634	0	0,16181	0	0,16103	0	0,16064	0	0,160565	0	0	0,040064	0	0,064103
2400	0,16667	0	0,1634	0	0,16181	0	0,16103	0	0,160875	0,160772	0	0,160643	0	0,160565
4800	0,17361	0	0,16667	0	0,1634	0	0,16181	0	0,161499	0,16129	0	0,161031	0	0,160875
9600	10,2083	0	0,17361	0	0,16667	0	0,1634	0	0,16276	0,162338	0	0,161812	0	0,161499
14400	11,3426	0	9,72222	0	2,25694	0	2,18855	0	0,958995	0,163399	0	0,653595	0	0,947712
19200	12,7604	0	10,2083	0	0,17361	0	0,16667	0	1,780914	0,164474	0	0,163399	0	0,16276
38400		0	12,7604	0	10,2083	0	0,17361	0	1,840278	2,951389	0	0,166667	0	1,780914
57600		0	17,0139	0	11,3426	0	9,72222	0	9,45216	0,173611	0	2,256944	0	3,506944
76800				0	12,7604	0	10,2083	0	1,971726	9,570313	0	0,173611	0	1,840278
115200				0	17,0139	0	11,3426	0	10,63368	10,20833	0	9,722222	0	9,45216

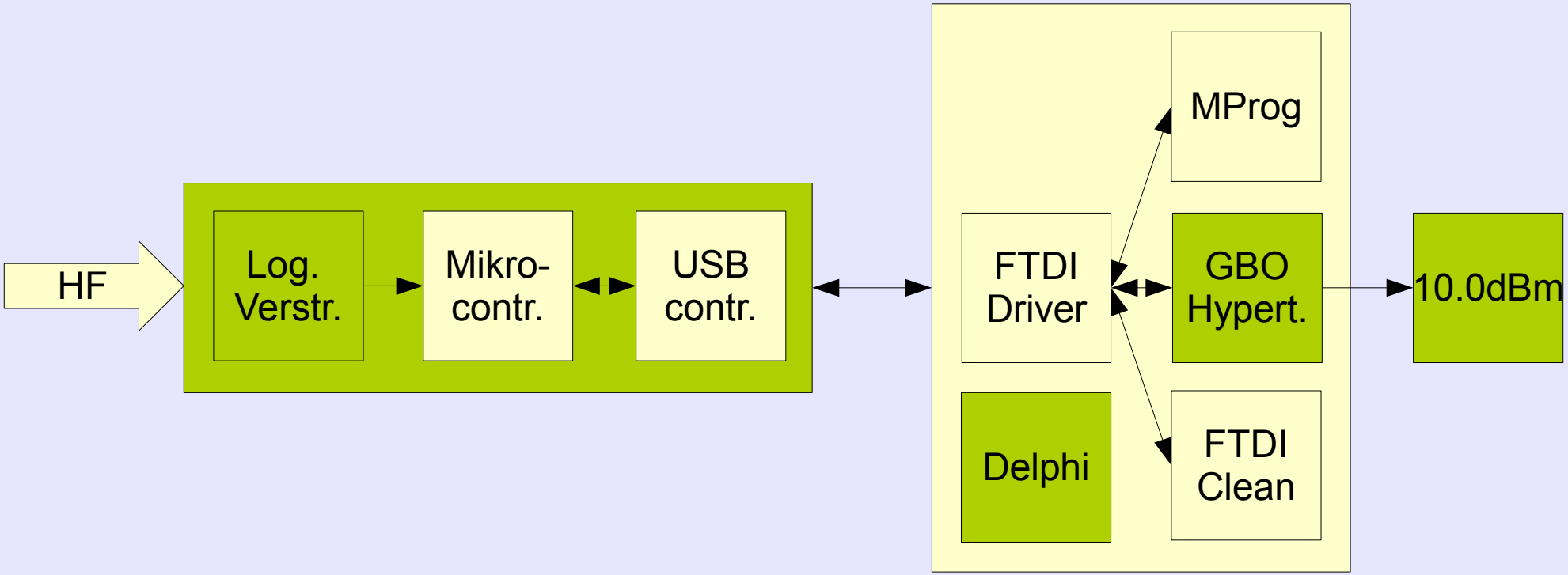
Baud = fosc/16(UBBR-1)
UBBR = fosc/16Baud - 1

57692 = 12000000/16(14-1)

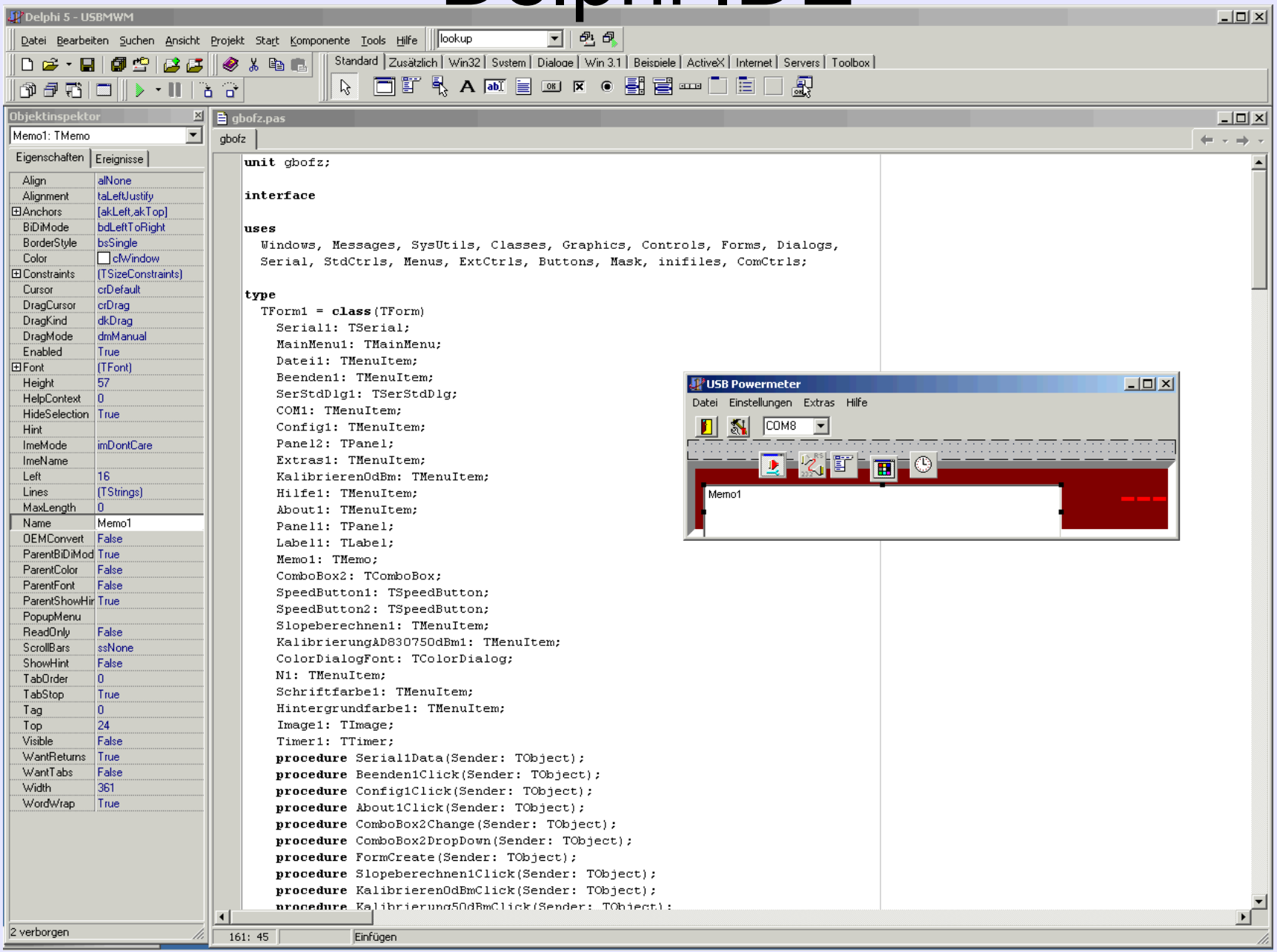
BASCOM IDE


BASCOM-AVR IDE [1.11.9.1] - [E:\Dokumente und Einstellungen\GFE\Eigene Dateien\DK8OH Projekte 2008\aatis powermeter\basc...
Datei Editieren Programmieren Werkzeuge Optionen Fenster Hilfe
usb 8307 3V1.bas
Sub
Label
Declare Sub Laden_10dbm_60dbm
Declare Sub Slope_berechnen
'Init*****
'Beim Einschalten werden die Kalibrierungsdaten aus dem EEPROM
'geladen und im RAM gespeichert
Call Laden_10dbm_60dbm
Call Slope_berechnen
'Main*****
Do
'Verzögerung (ergibt ca. 5 Messungen/Sekunde)
Waitms 10
'Serielle Schnittstelle (RX-Daten) abfragen
Call Com_abfragen
'Ausgangsspannung AD8307 messen und dBm berechnen
Adw = Getadc(0) 'Abfrage ADW
Adws = Adw 'Zuweisung an single
Vars = 10dbm - Adws 'Berechnung dBm
Dbms = Vars / Slope
Dbms = Dbms + 10
Comstr = Fusing(dbms , "##.#") 'Ausgabe formatieren
'Ausgabe Messergebnis an ser. Schnittstelle (TX-Daten)
Print "$GFE,P," ; Comstr
Loop
'Unterporgramme*****
Sub Speichern_10dbm
Ead10 = Adw
Ad10 = Adw
10dbm = Adw
End Sub
1: 1
Insert

Softwareentwicklung GBO



Delphi IDE


Delphi 5 - USBMWM
Datei Bearbeiten Suchen Ansicht Projekt Start Komponente Tools Hilfe
lookup
Standard Zusätzlich Win32 System Dialoge Win 3.1 Beispiele ActiveX Internet Servers Toolbox
Objektinspektor
Memo1: TMemo
Eigenschaften Ereignisse
Align alNone
Alignment taLeftJustify
Anchors [akLeft,akTop]
BiDiMode bdLeftToRight
BorderStyle bsSingle
Color clWindow
Constraints (TSizeConstraints)
Cursor crDefault
DragCursor crDrag
DragKind dkDrag
DragMode dmManual
Enabled True
Font (TFont)
Height 57
HelpContext 0
HideSelection True
Hint
ImeMode imDontCare
ImeName
Left 16
Lines (TStrings)
MaxLength 0
Name Memo1
OEMConvert False
ParentBiDiMod True
ParentColor False
ParentFont False
ParentShowHir True
PopupMenu
ReadOnly False
ScrollBars ssNone
ShowHint False
TabOrder 0
TabStop True
Tag 0
Top 24
Visible False
WantReturns True
WantTabs False
Width 361
WordWrap True
2 verborgen
gbofz.pas
gbofz
unit gbofz;
interface
uses
Windows, Messages, SysUtils, Classes, Graphics, Controls, Forms, Dialogs,
Serial, StdCtrls, Menus, ExtCtrls, Buttons, Mask, inifiles, ComCtrls;
type
TForm1 = class(TForm)
Serial1: TSerial;
MainMenu1: TMainMenu;
Datei1: TMenuItem;
Beenden1: TMenuItem;
SerStdDlg1: TSerStdDlg;
COM1: TMenuItem;
Config1: TMenuItem;
Panel2: TPanel;
Extras1: TMenuItem;
KalibrierenOdBm: TMenuItem;
Hilfe1: TMenuItem;
About1: TMenuItem;
Panel1: TPanel;
Label1: TLabel;
Memo1: TMemo;
ComboBox2: TComboBox;
SpeedButton1: TSpeedButton;
SpeedButton2: TSpeedButton;
Slopeberechnen1: TMenuItem;
KalibrierungAD830750dBm1: TMenuItem;
ColorDialogFont: TColorDialog;
N1: TMenuItem;
Schriftfarbe1: TMenuItem;
Hintergrundfarbe1: TMenuItem;
Image1: TImage;
Timer1: TTimer;
procedure Serial1Data(Sender: TObject);
procedure Beenden1Click(Sender: TObject);
procedure Config1Click(Sender: TObject);
procedure About1Click(Sender: TObject);
procedure ComboBox2Change(Sender: TObject);
procedure ComboBox2DropDown(Sender: TObject);
procedure FormCreate(Sender: TObject);
procedure Slopeberechnen1Click(Sender: TObject);
procedure KalibrierenOdBmClick(Sender: TObject);
USB Powermeter
Datei Einstellungen Extras Hilfe
COM8
Memo1
161: 45
Einfügen

TSerial

Inhalt

Ausgabe 1'2009

ab 7. Januar 2009

Neu: unsere Dauerbrenner TSerial, TXPrint, TXPrintSet, FreeBase und der Hintergrundkalender mit eigener Internet-Präsenz

Auf der DVD: 12 Jahre Toolbox: Online-Ausgabe 1997-2008

Themen

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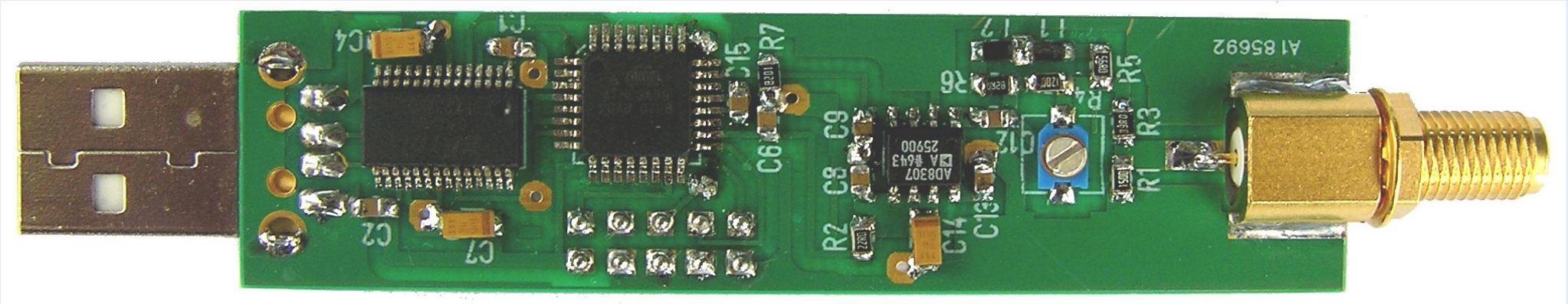
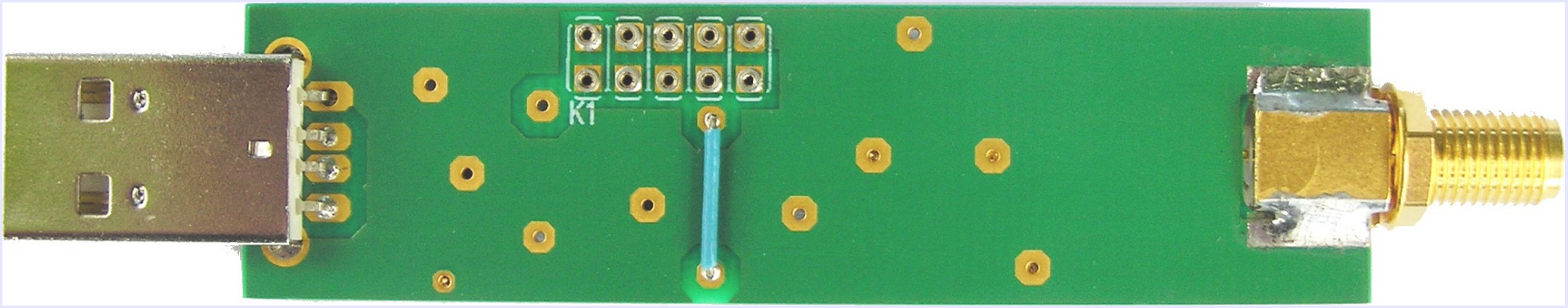
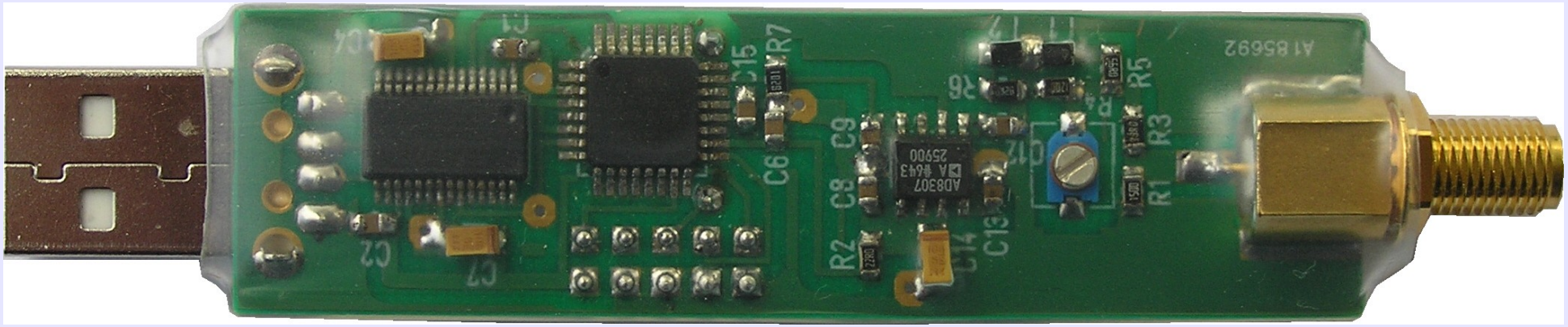
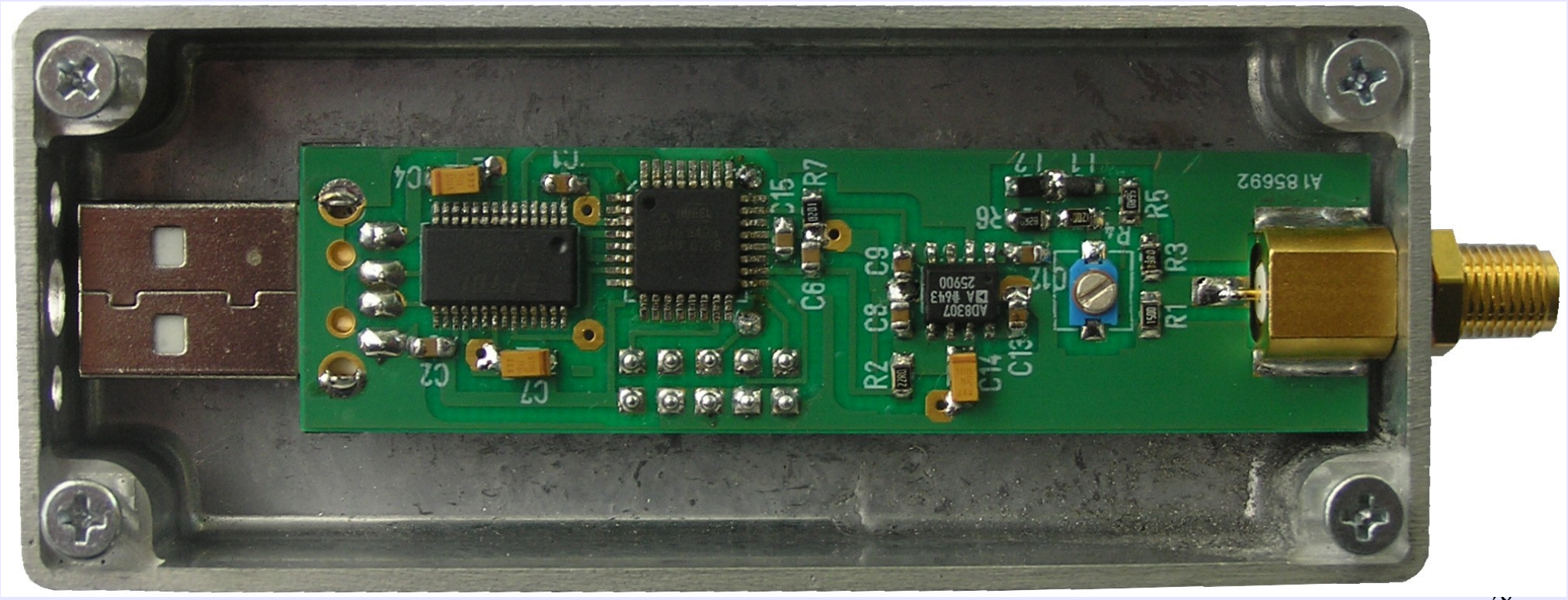
Bestückung der Leiterplatte



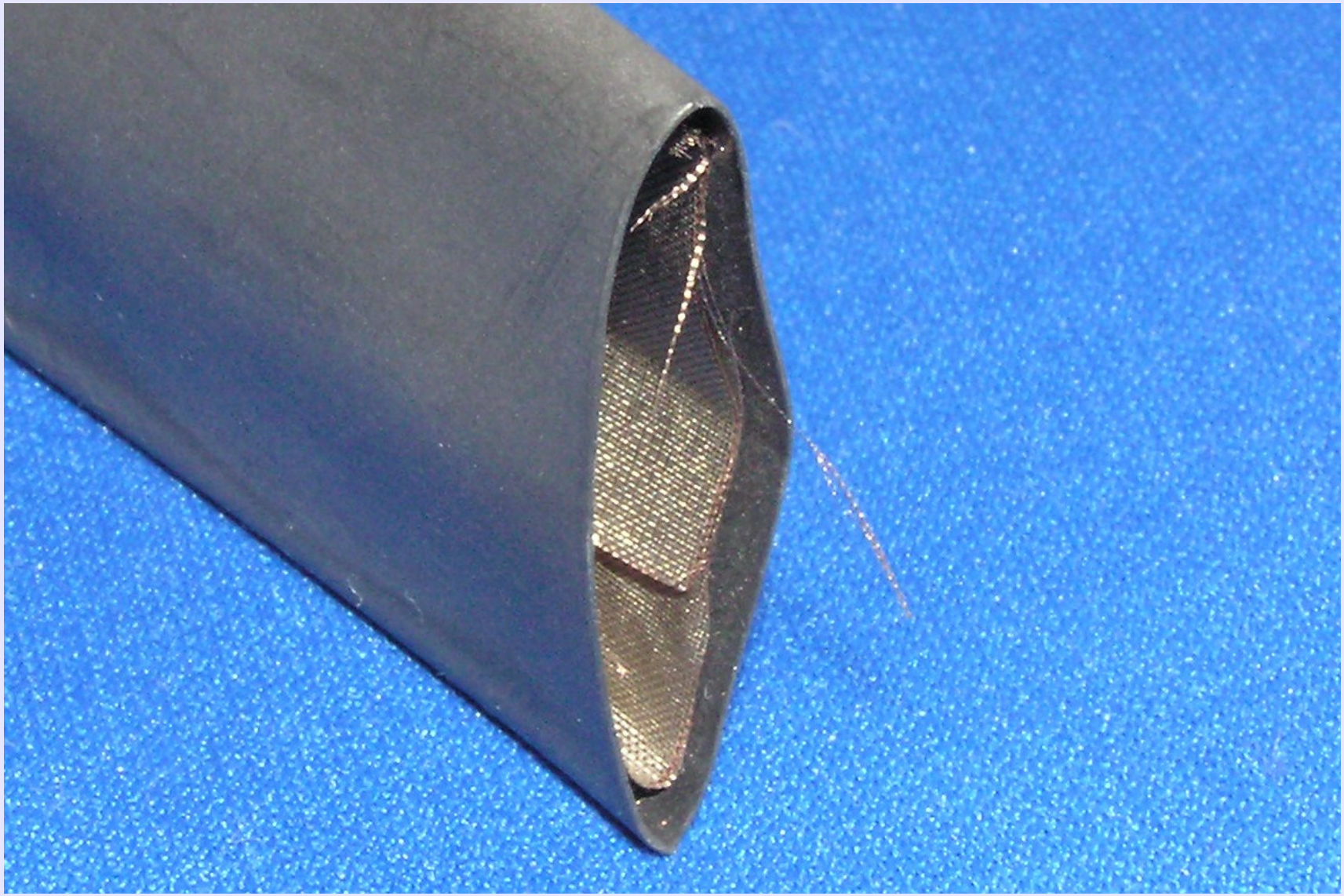


Stick oder Gehäuse

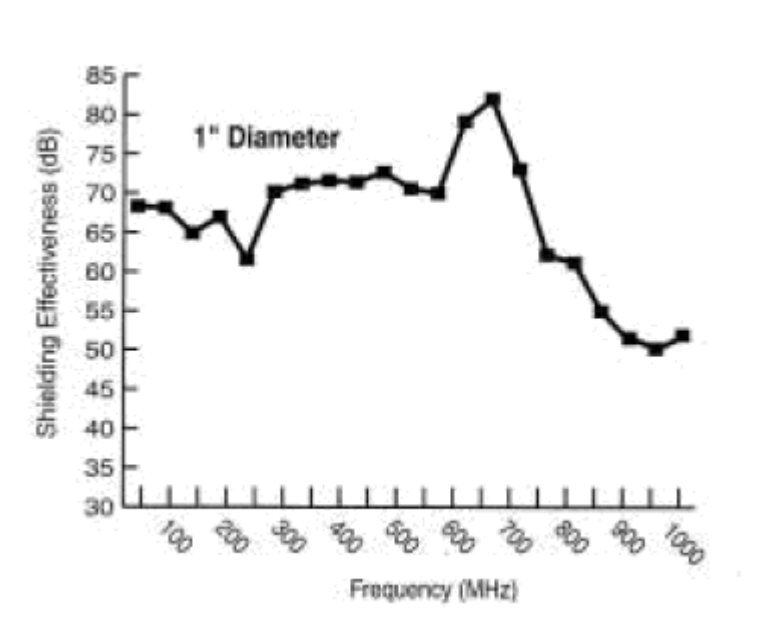


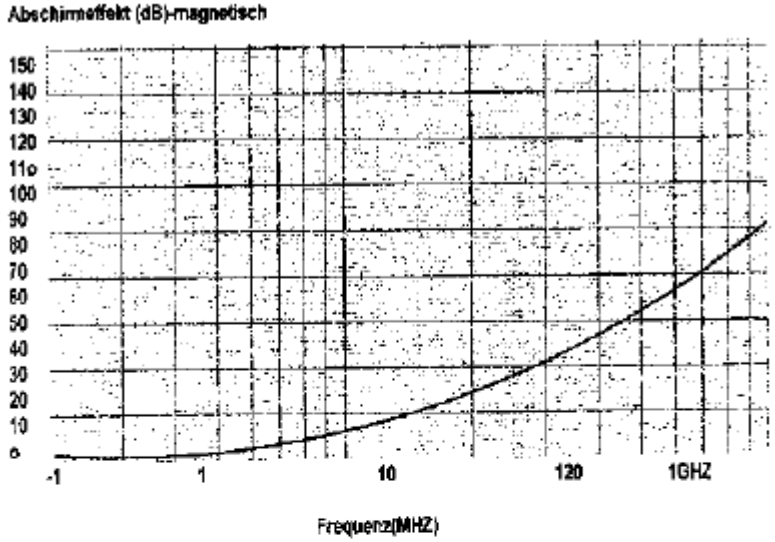


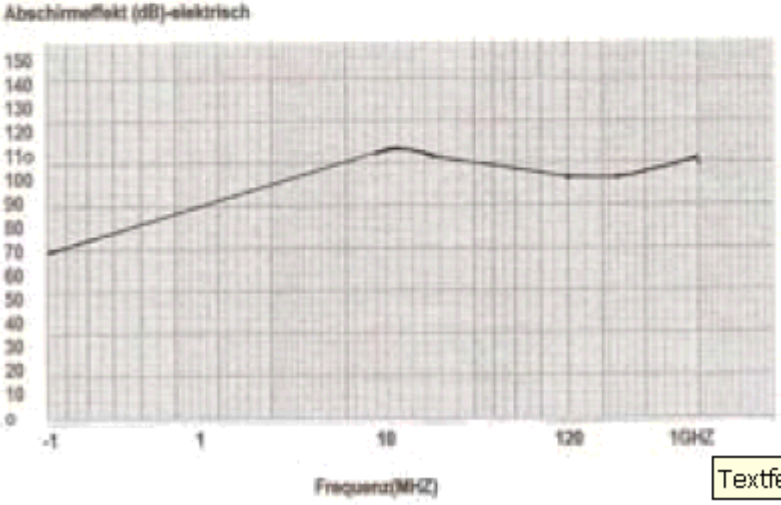
EMV Schrumpfschlauch



Schirmungsmaß







Textfeld:

Themen

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- Inbetriebnahme

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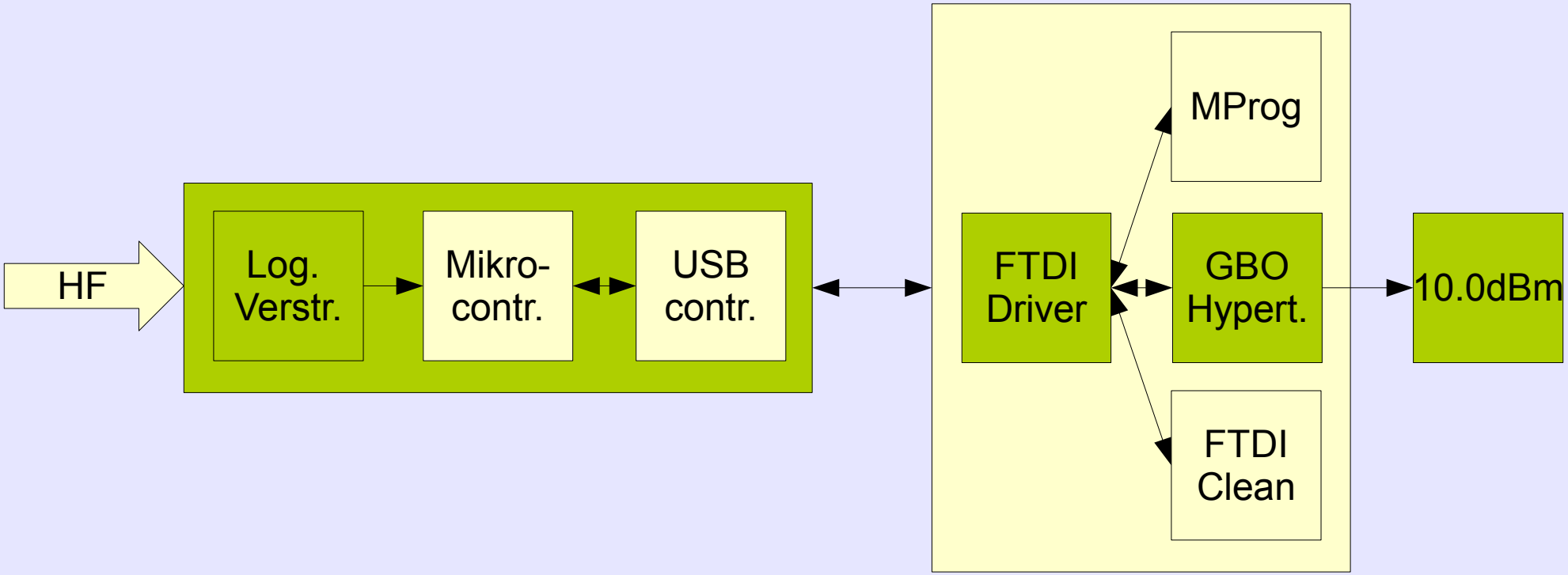
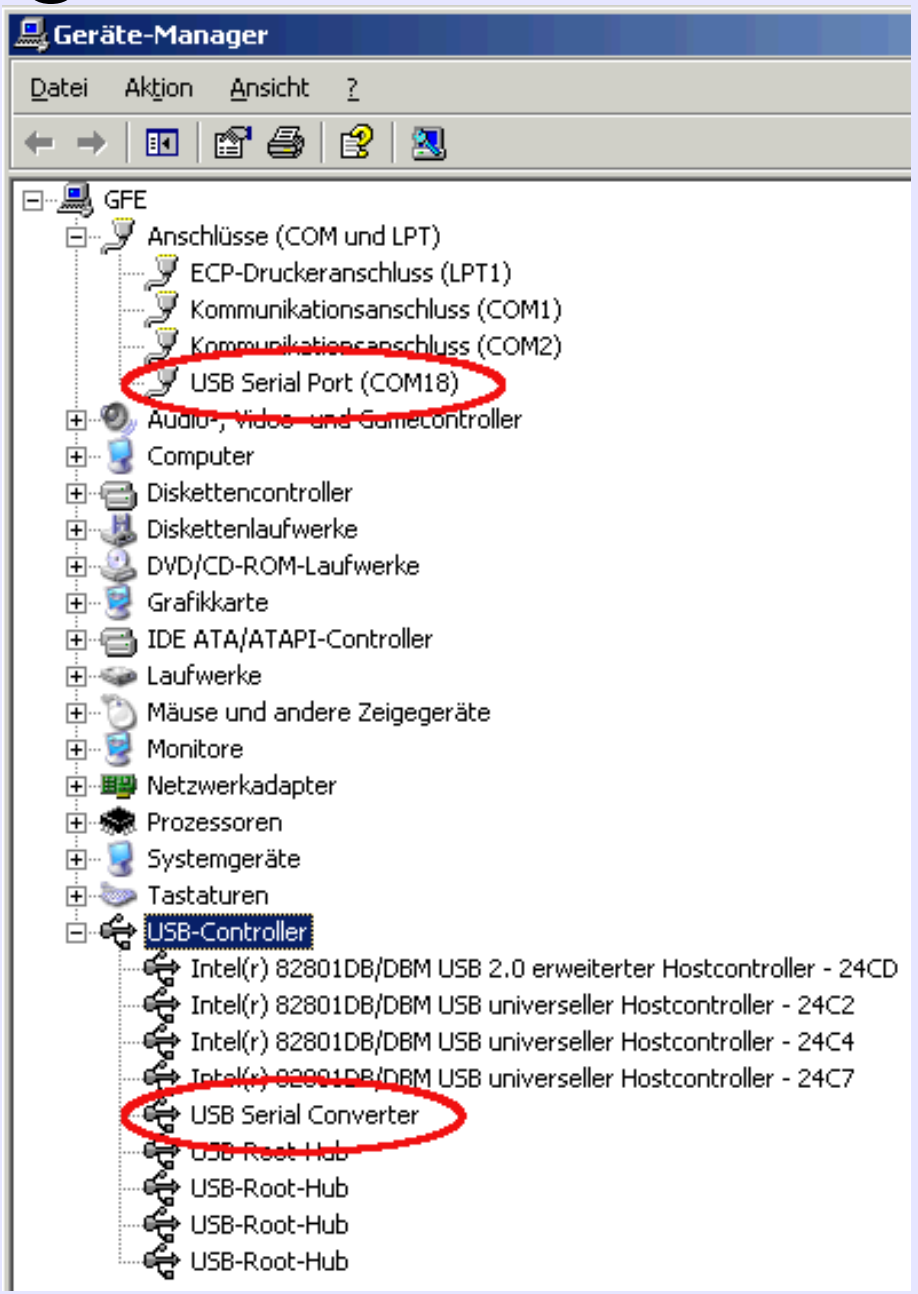
Messvorführung

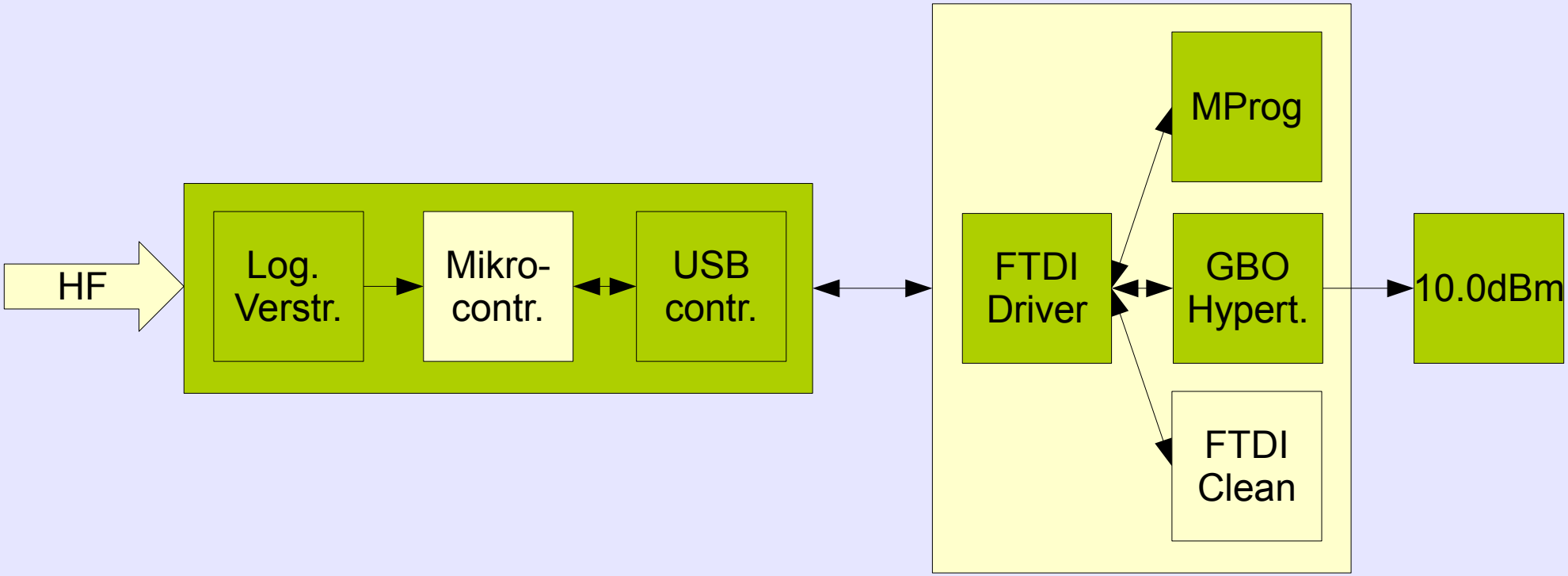
Installation Schnittstellentreiber



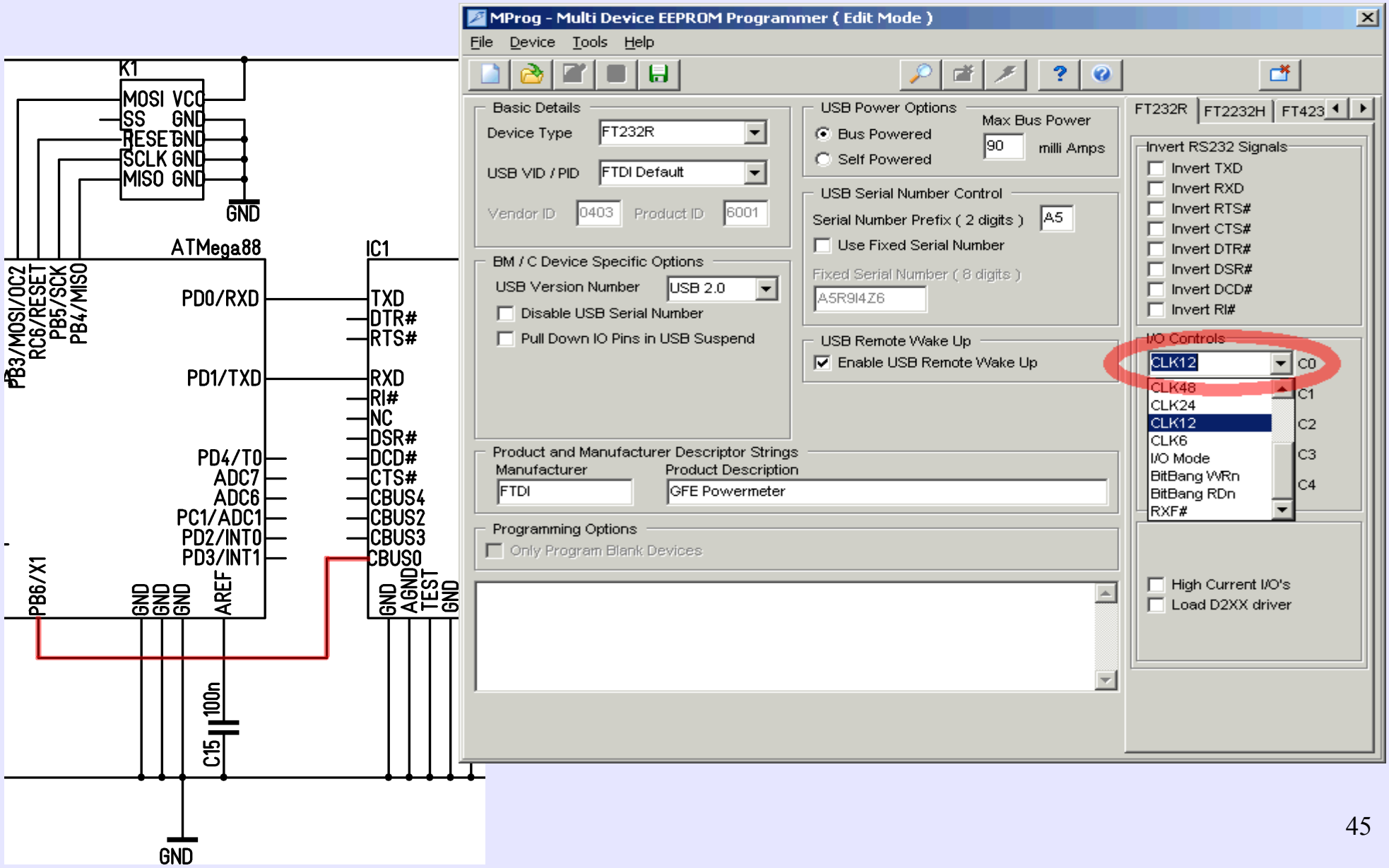
Einträge im Gerätemanager



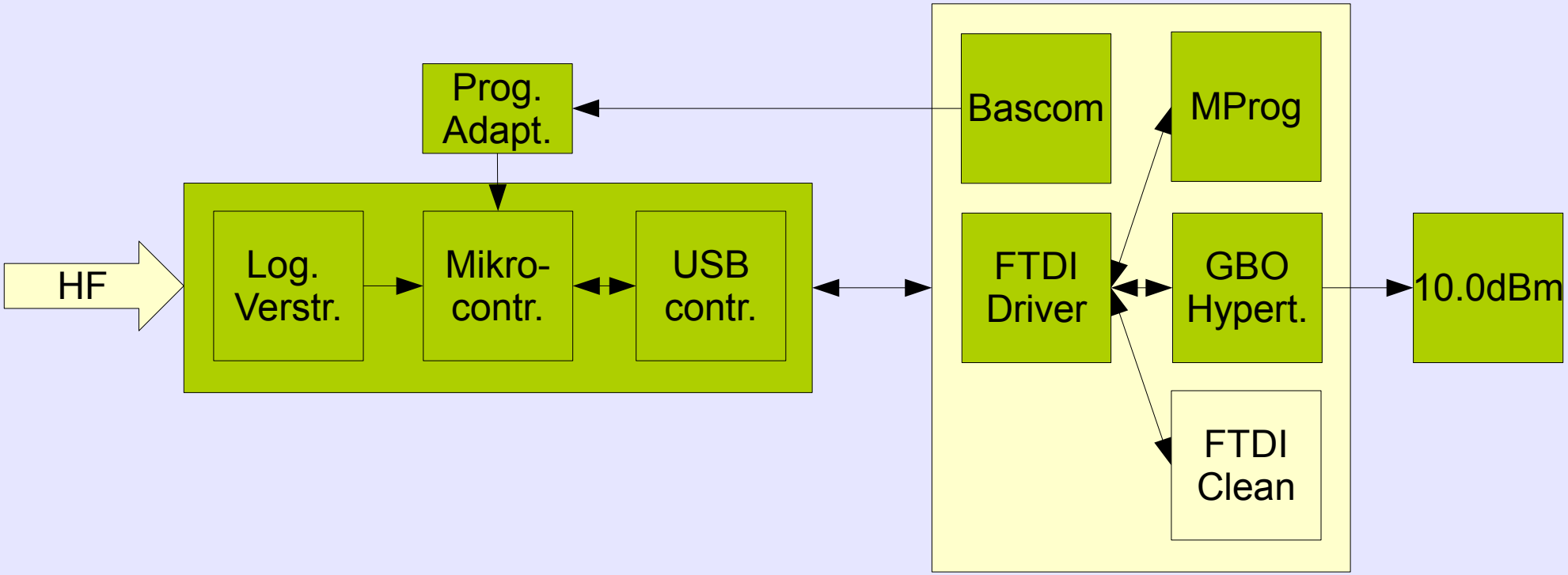
Programmierung USB-Controller



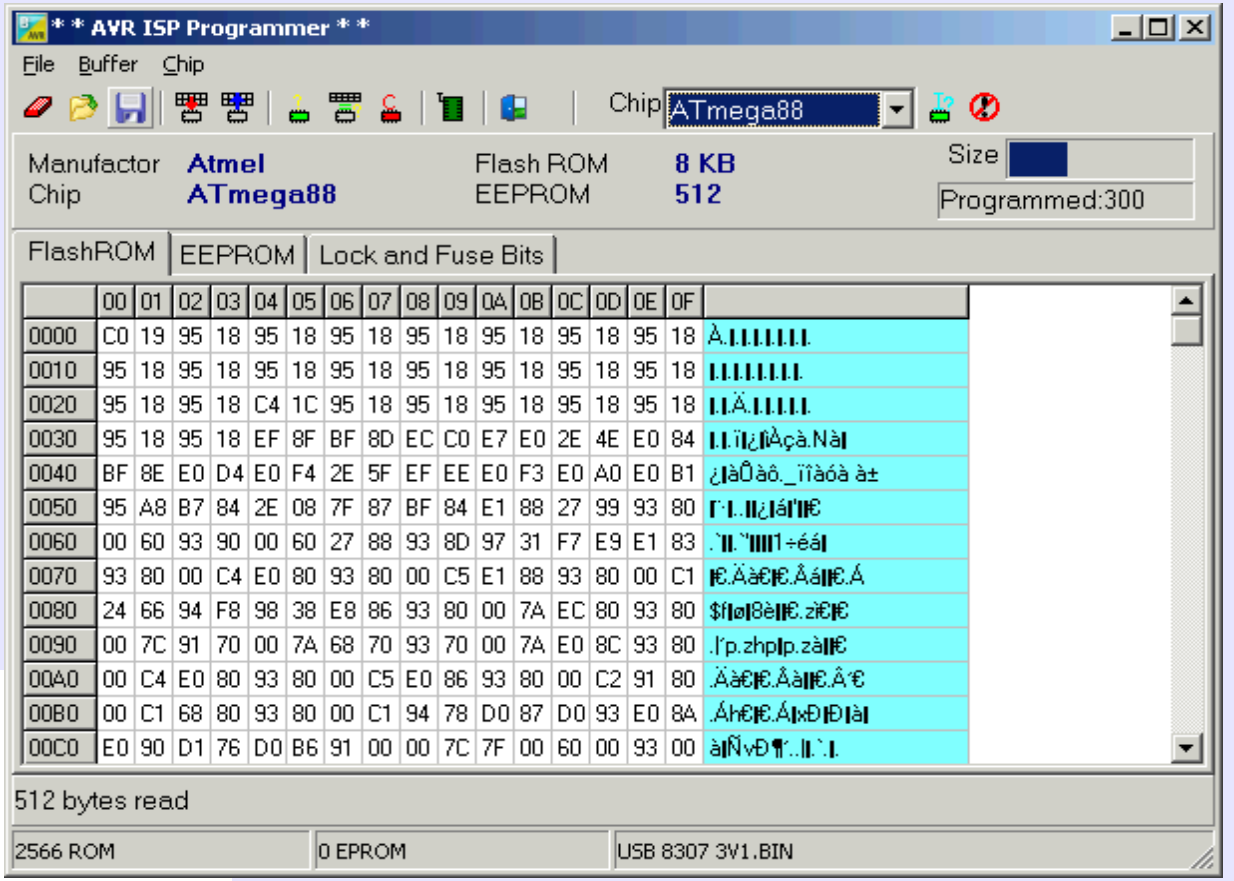
Taktleitung einschalten

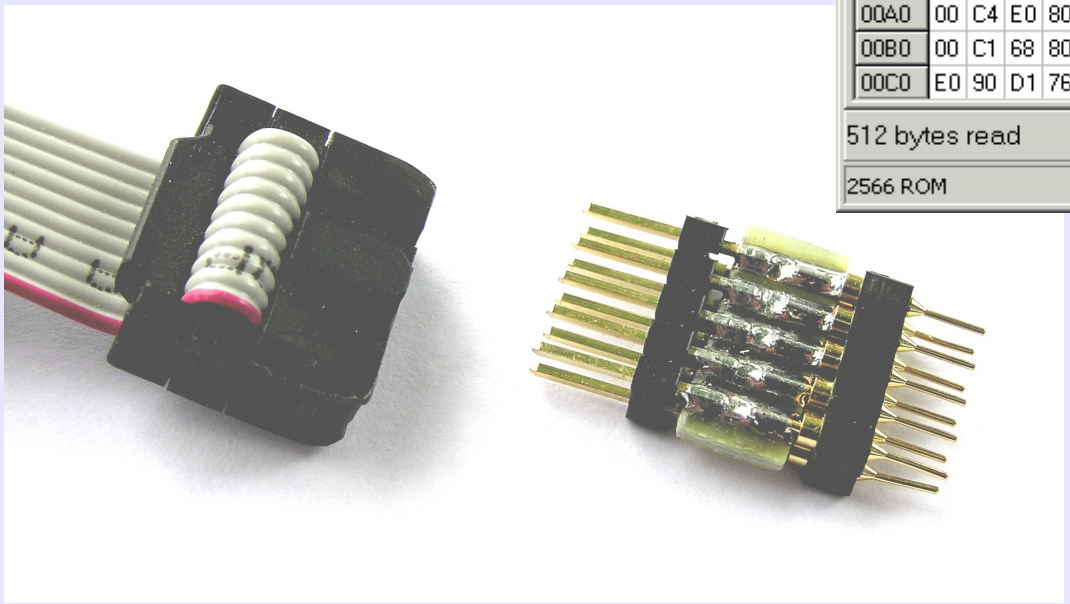


Programmierung Mikrocontroller

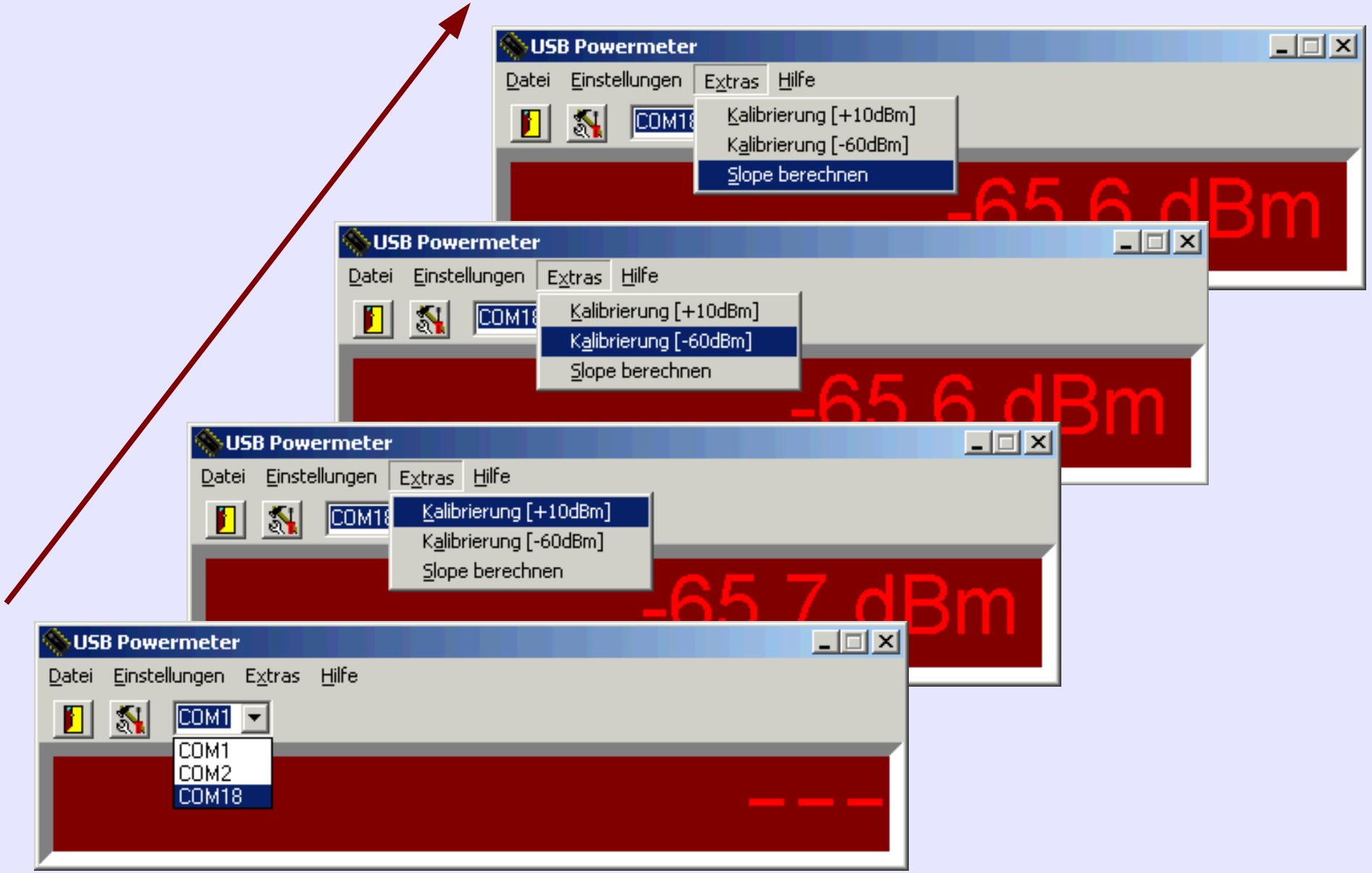


Programmierung Mikrocontroller





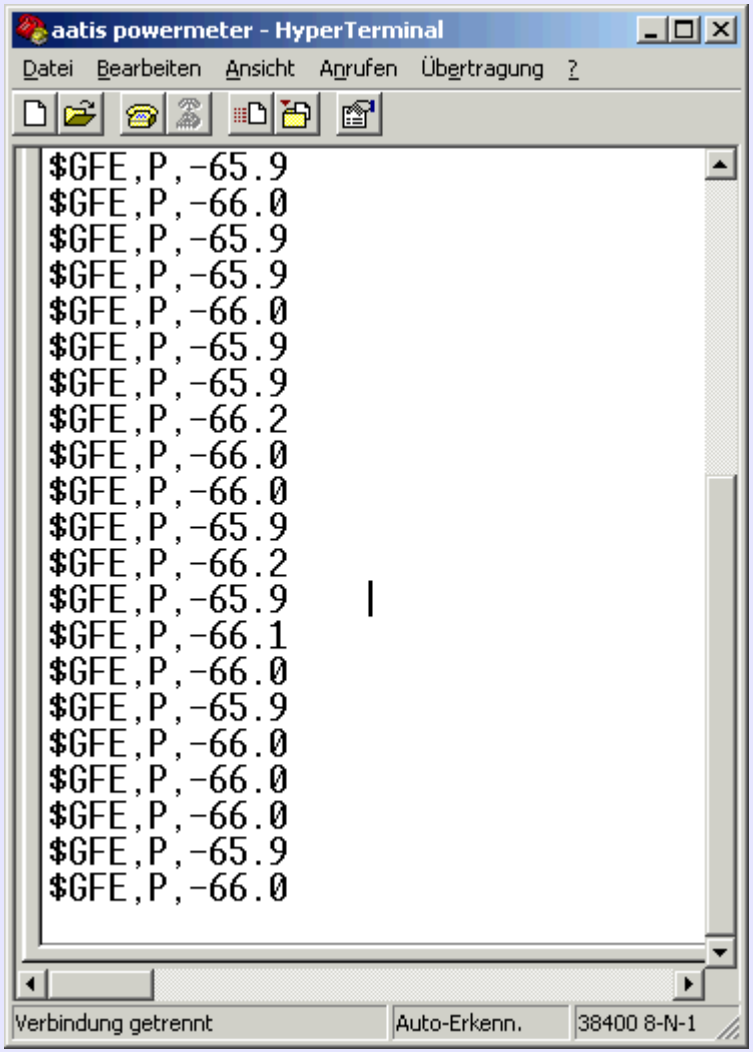
Abgleich


USB Powermeter
Datei Einstellungen Extras Hilfe
COM18
Kalibrierung [+10dBm]
Kalibrierung [-60dBm]
Slope berechnen
-65.6 dBm
USB Powermeter
Datei Einstellungen Extras Hilfe
COM18
Kalibrierung [+10dBm]
Kalibrierung [-60dBm]
Slope berechnen
-65.6 dBm
USB Powermeter
Datei Einstellungen Extras Hilfe
COM18
Kalibrierung [+10dBm]
Kalibrierung [-60dBm]
Slope berechnen
-65.7 dBm
USB Powermeter
Datei Einstellungen Extras Hilfe
COM1
COM1
COM2
COM18
- - -

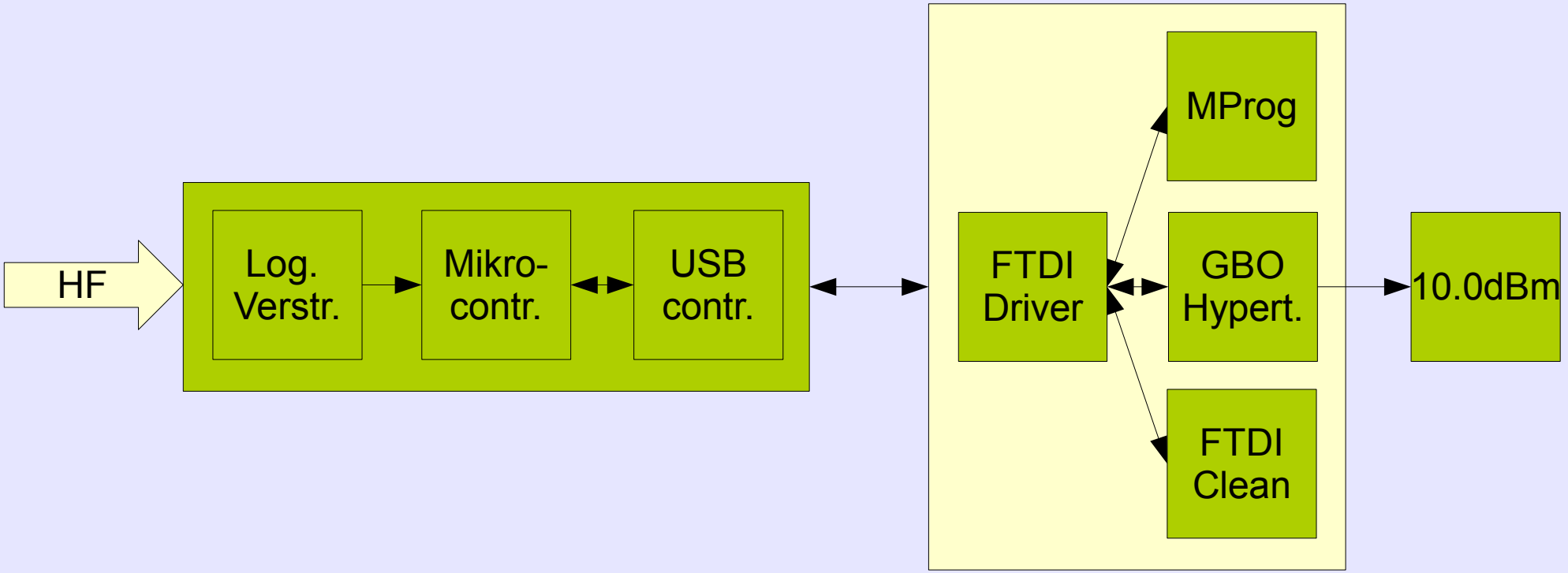
Fertig


USB Powermeter
Datei
Einstellungen
Extras
Hilfe
COM6
-60.6 dBm

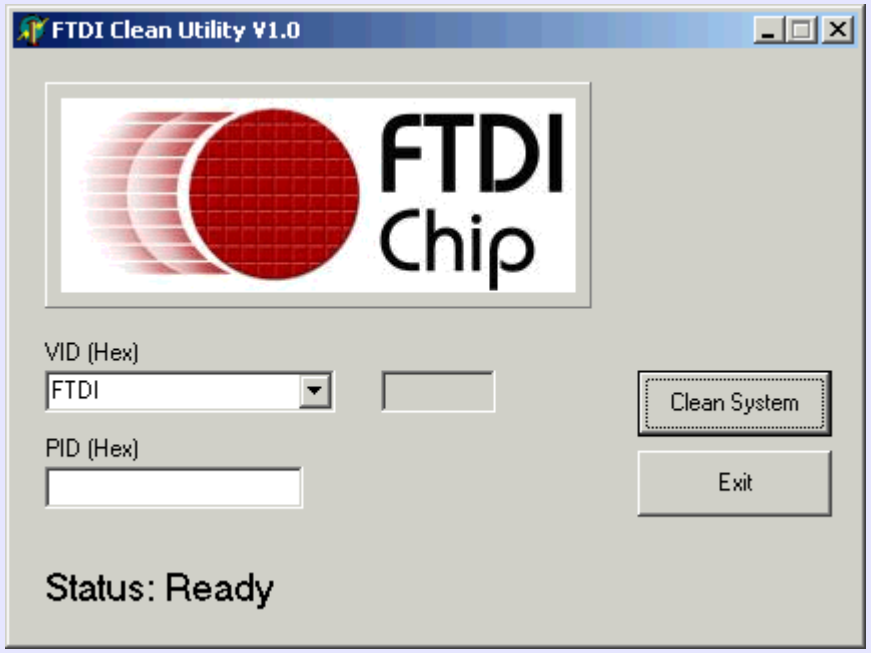
Datentelegramme in Hyperterminal



Treiber löschen mit FTDI Clean



Deinstallation FTDI-Treiber



Themen

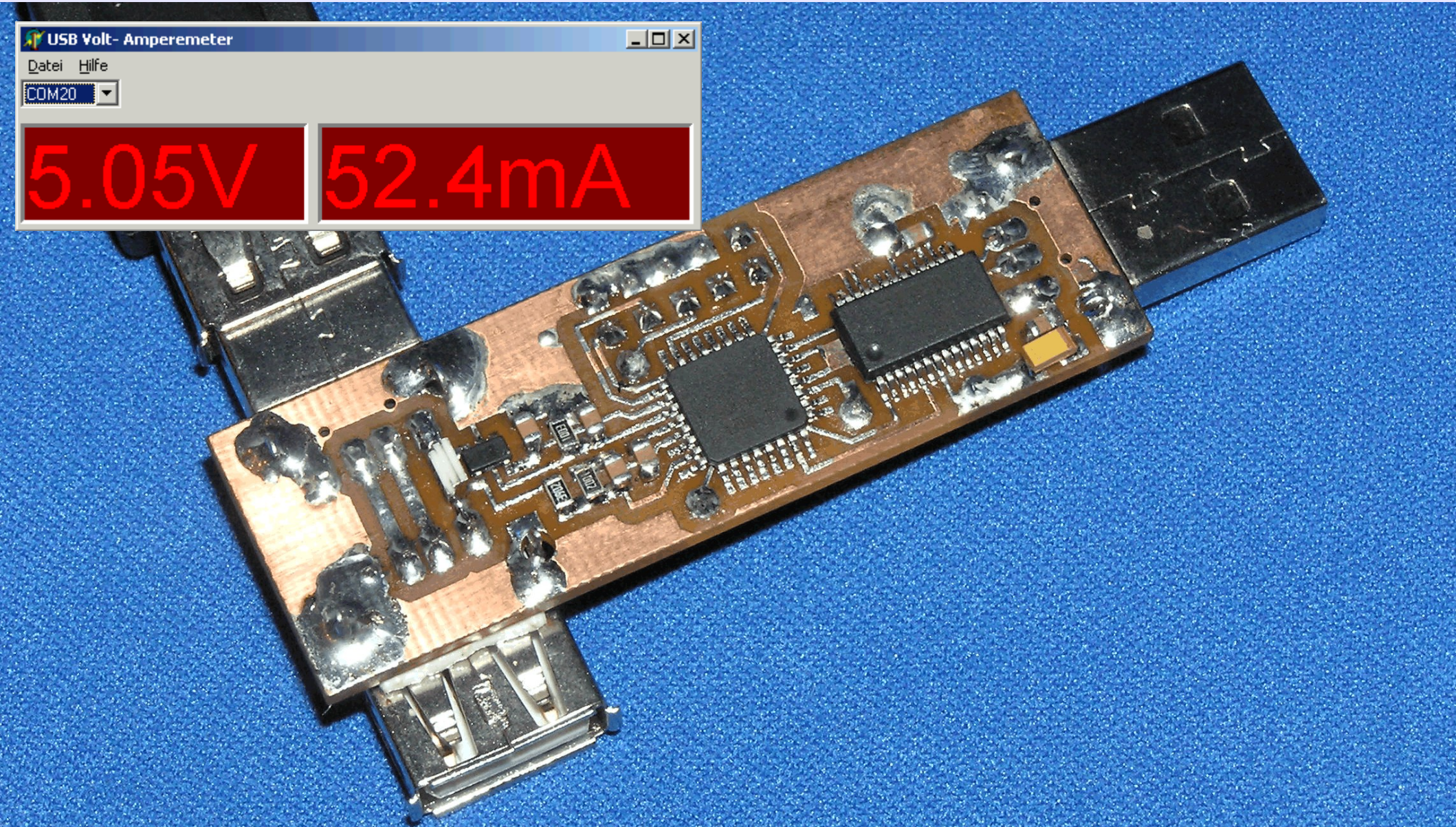
Allgemeines

Leistungsmesser
- Entwicklung
- Aufbau
- Inbetriebnahme

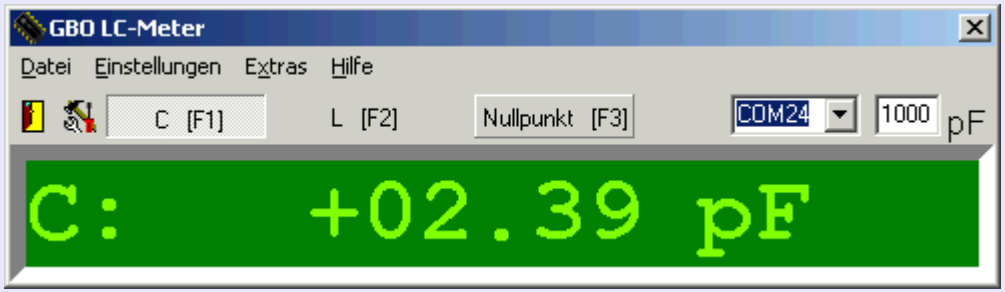
Messgeräte, Messplatz

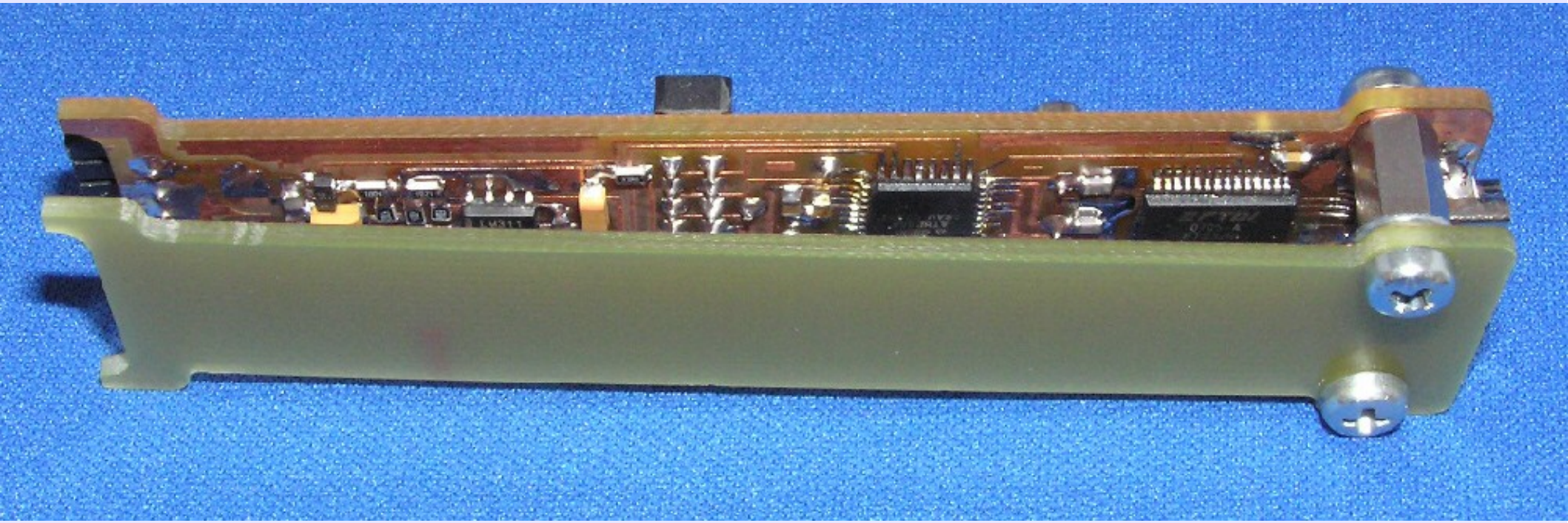
Messvorführung

VA Meter

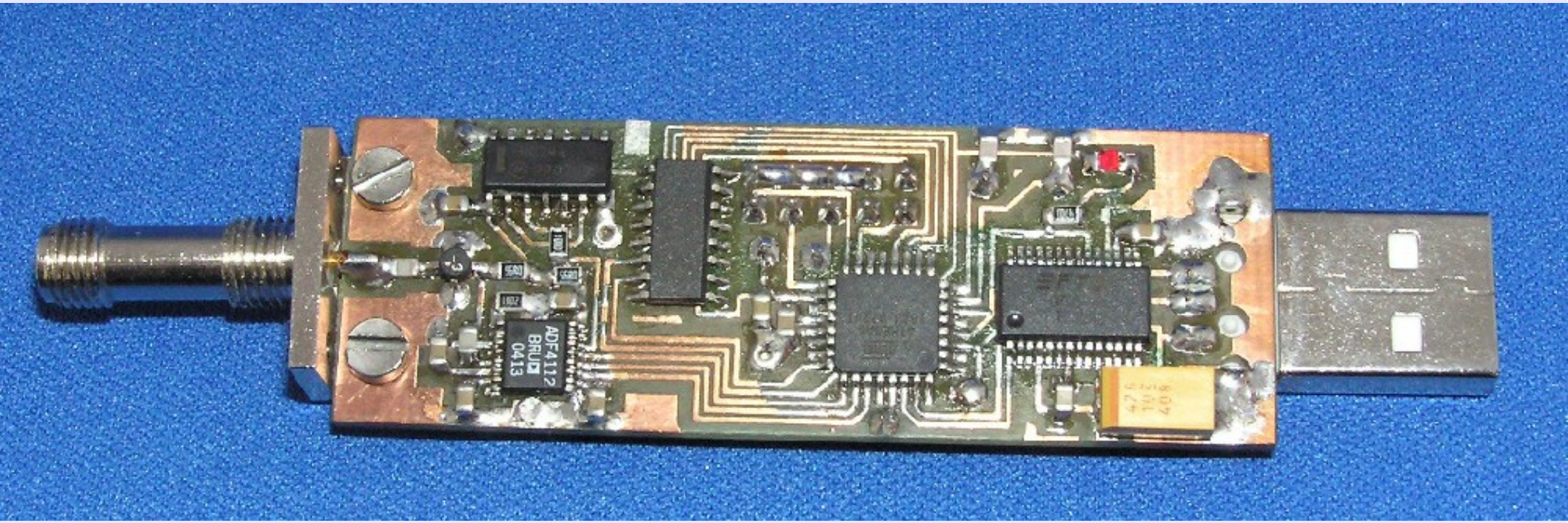


LC-Meter

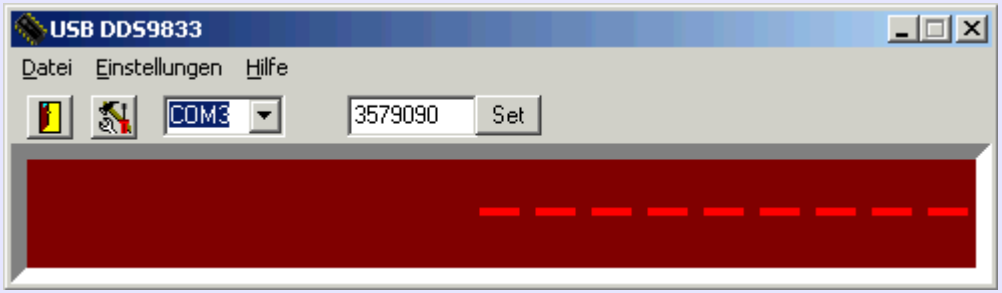

GBO LC-Meter
Datei Einstellungen Extras Hilfe
C [F1]
L [F2]
Nullpunkt [F3]
COM24
1000
pF
C: +02.39 pF

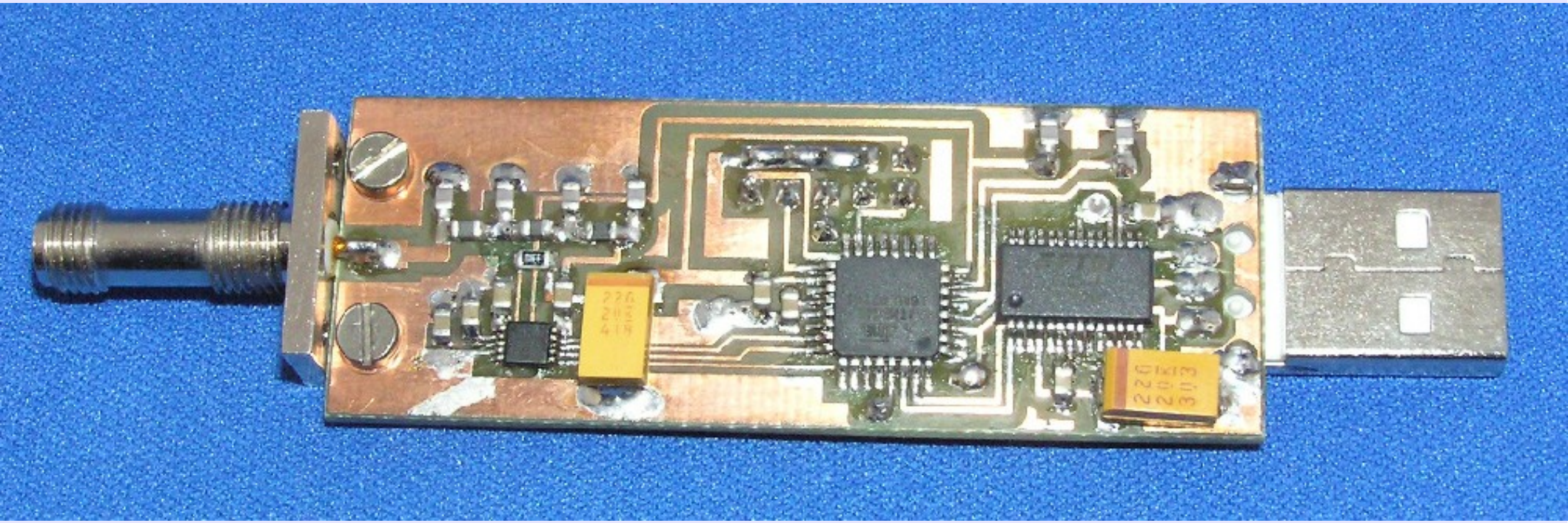


Frequenzzähler 3GHz

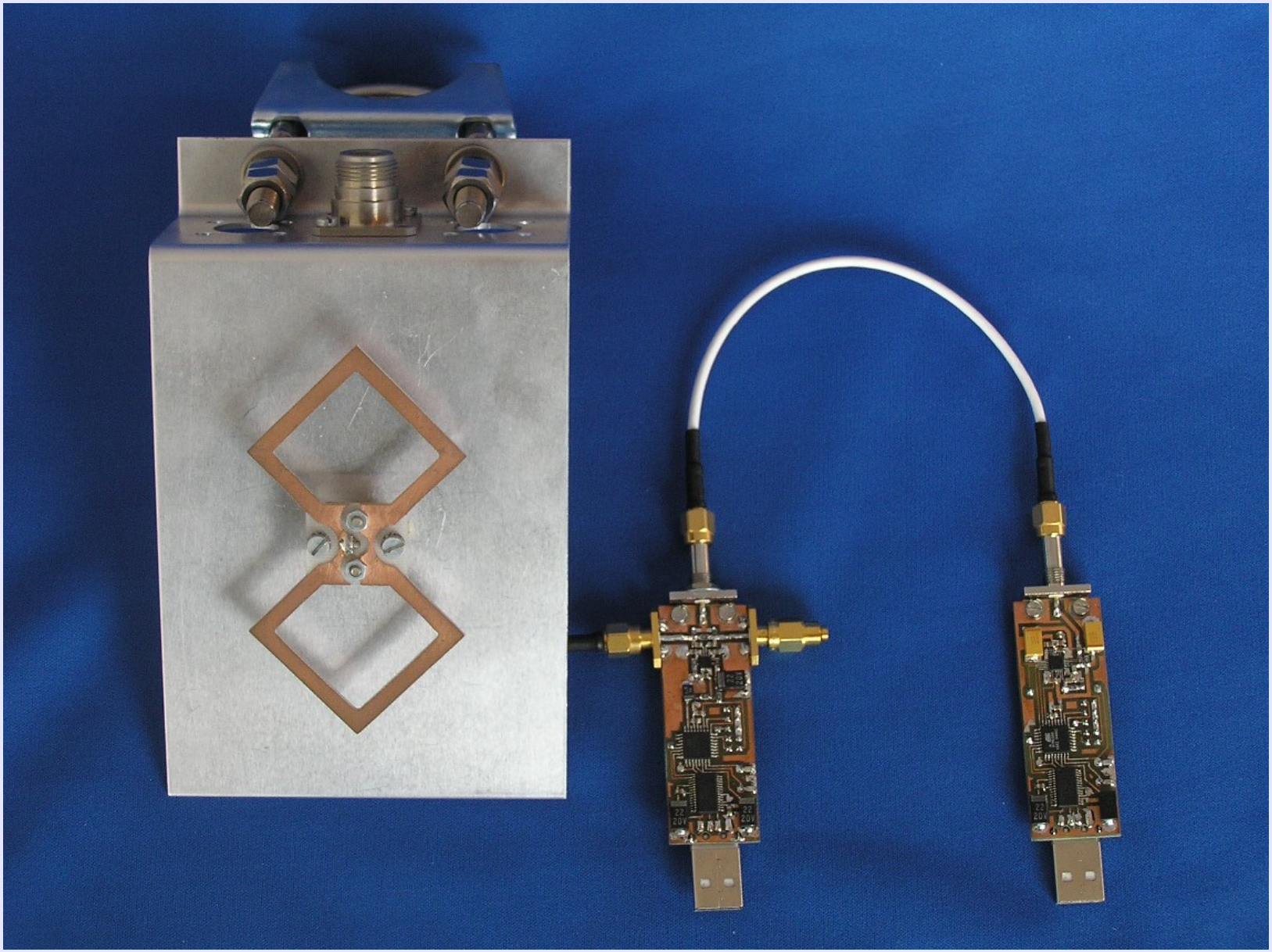


DDS-Signalgenerator

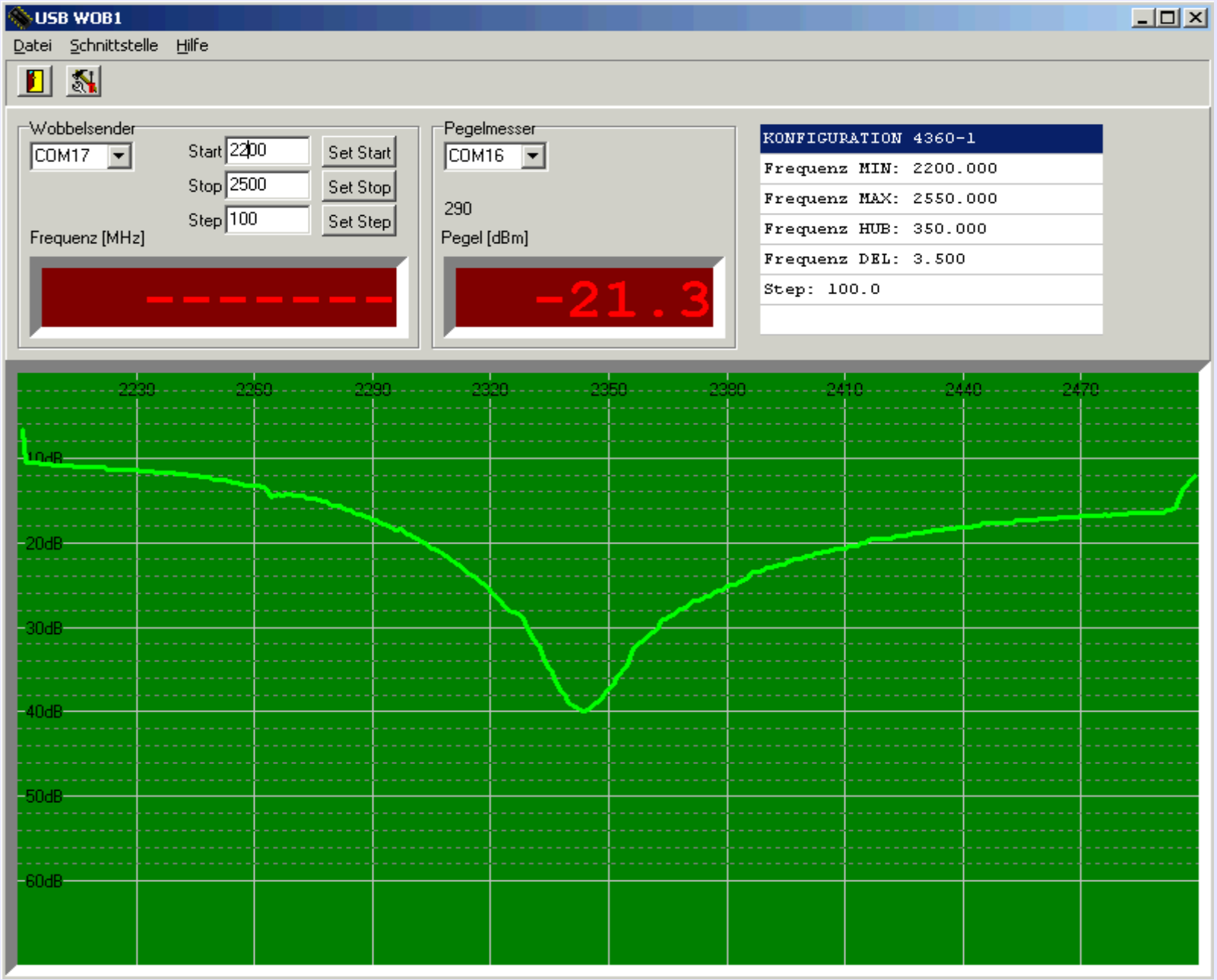




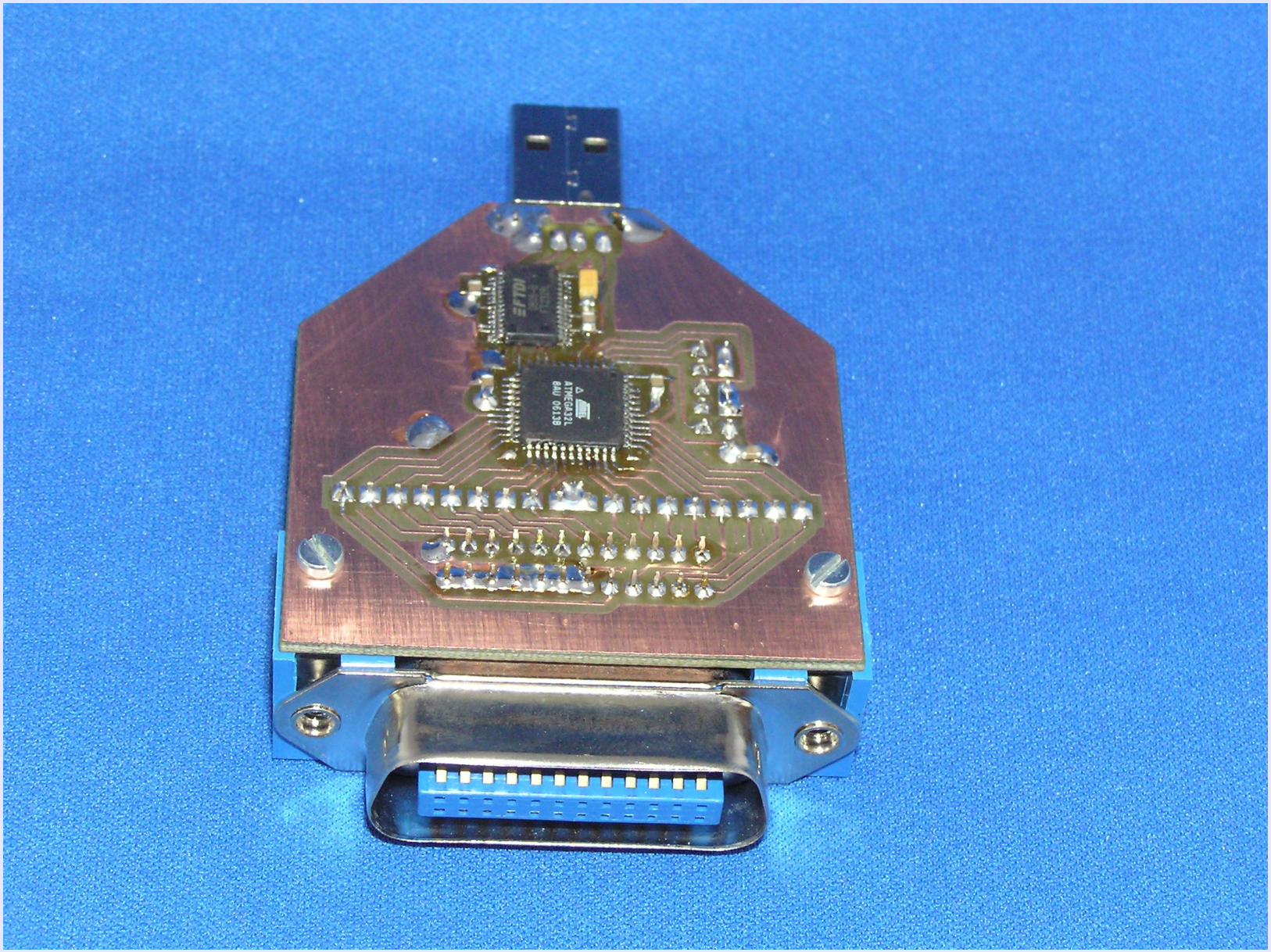
13cm Wobbler



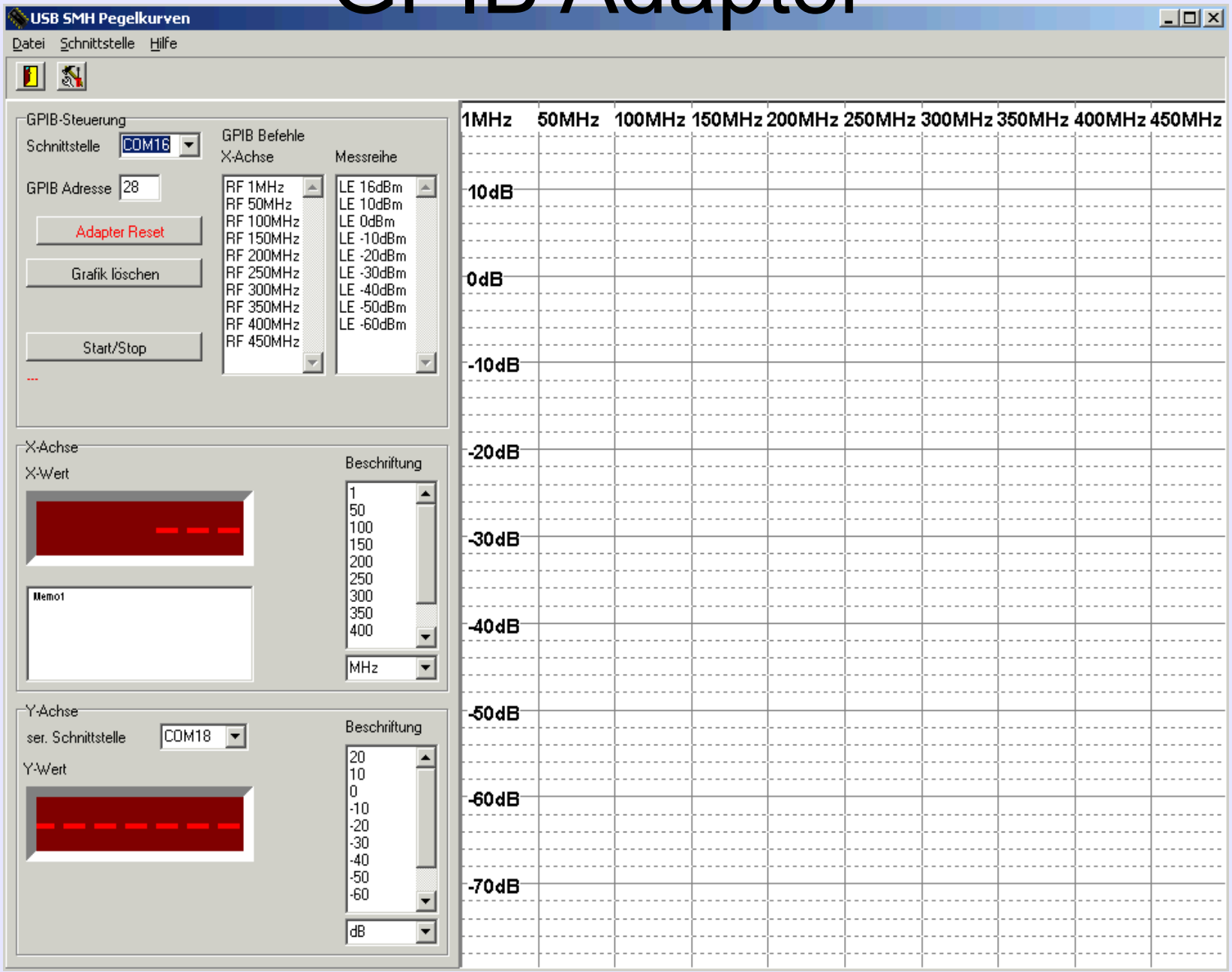
13cm Wobbler



GPIB Adapter



GPIB Adapter



Themen

Allgemeines

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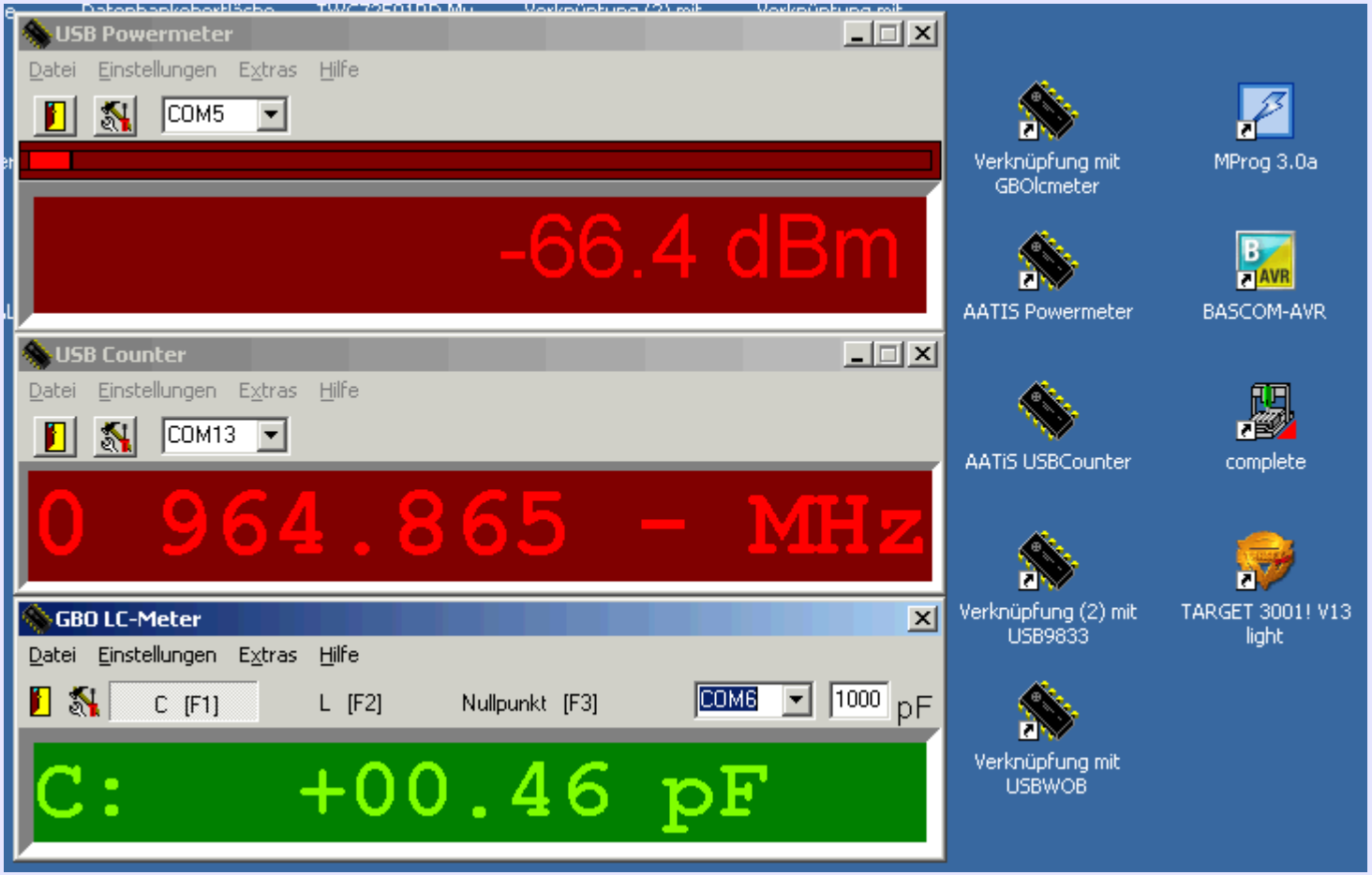
Bildschirmkopie



Experimentieren, Programmieren

- Schaltung, Layout, Firmware, Treiber, Schnittstellenbefehle, Windowssoftware sind offen, lizenzfrei

  USB-Stick: Hardware ändern
- Firmware: Software BASCOM erweitern
- Windowsprogramm: Software DELPHI erweitern
- AATiS Praxisheft 19