

Mario's Show'n'Tell

How to make a bOOmbox

Influenzer aber warum?



90s Sony



@YT: Die Wahrheit über die LP

Ach die 90er
Coole VFDs überall



Technics CH7



AIWA irgnwas

EQs weil LSPs meist :(

Spektrumanalyser weil man es kann.

EQ=Equalizer, VFD=ValuumFloureszensdisplay, LSP=Lautsprecher

VFD

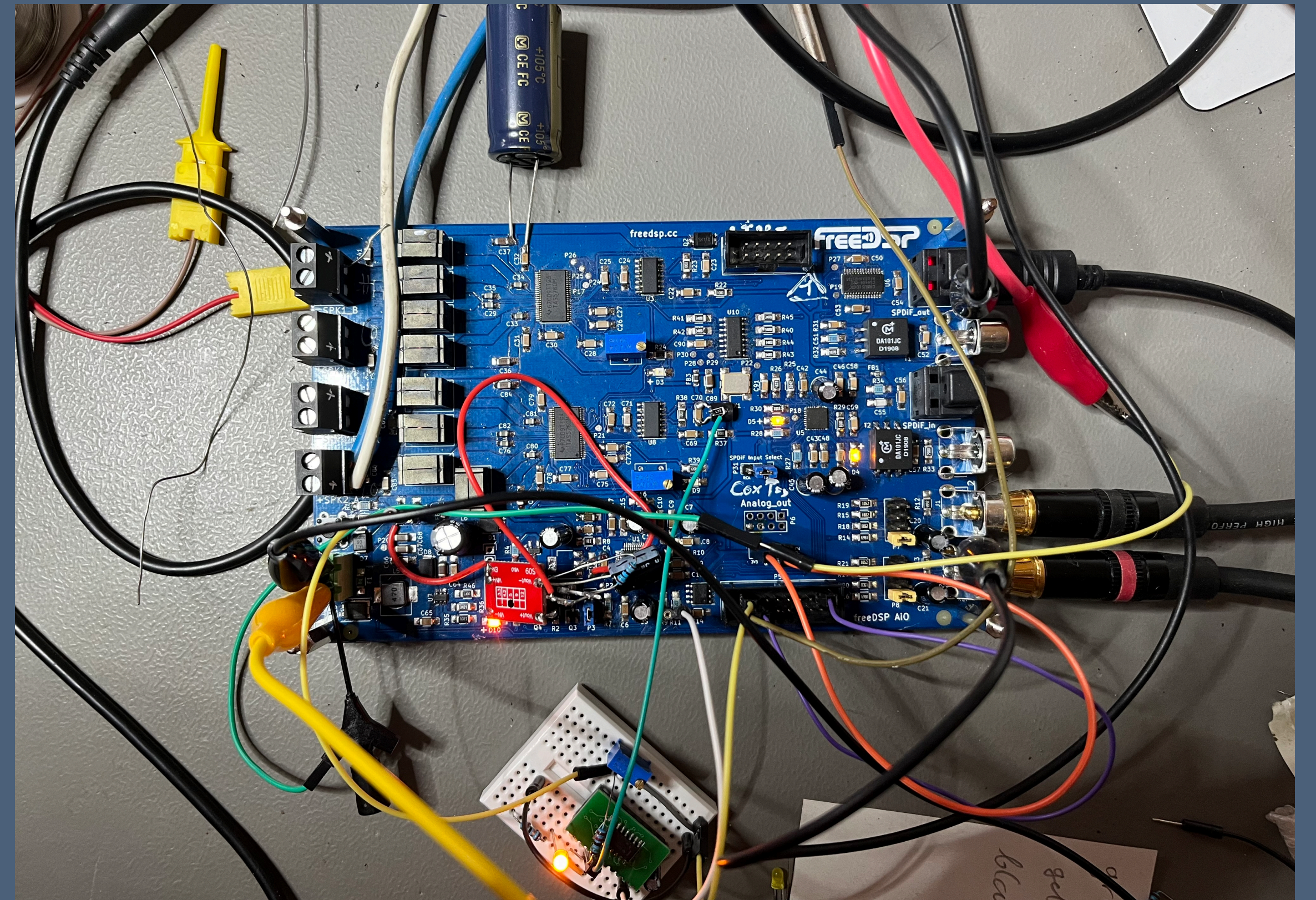
Sooo Vintage

- Die Ikonen...
- VFDs und EQs und SpecAnalyser :)



The Journey

- Lautsprecher gebaut
 - FreqWeiche -> DSP
- Amp gebastel mehr oder weniger erfolgreich.
- FreeDSP - freedsp.github.io
 - Sammlung von DSP/Amp Projekten.
 - Uniprojekt, Seminarstyle Dokumentation, Hat aber Kinderkrankheiten
- VFD (Vakuum Fluoreszenz Display) Experimente



Wo anfangen ?

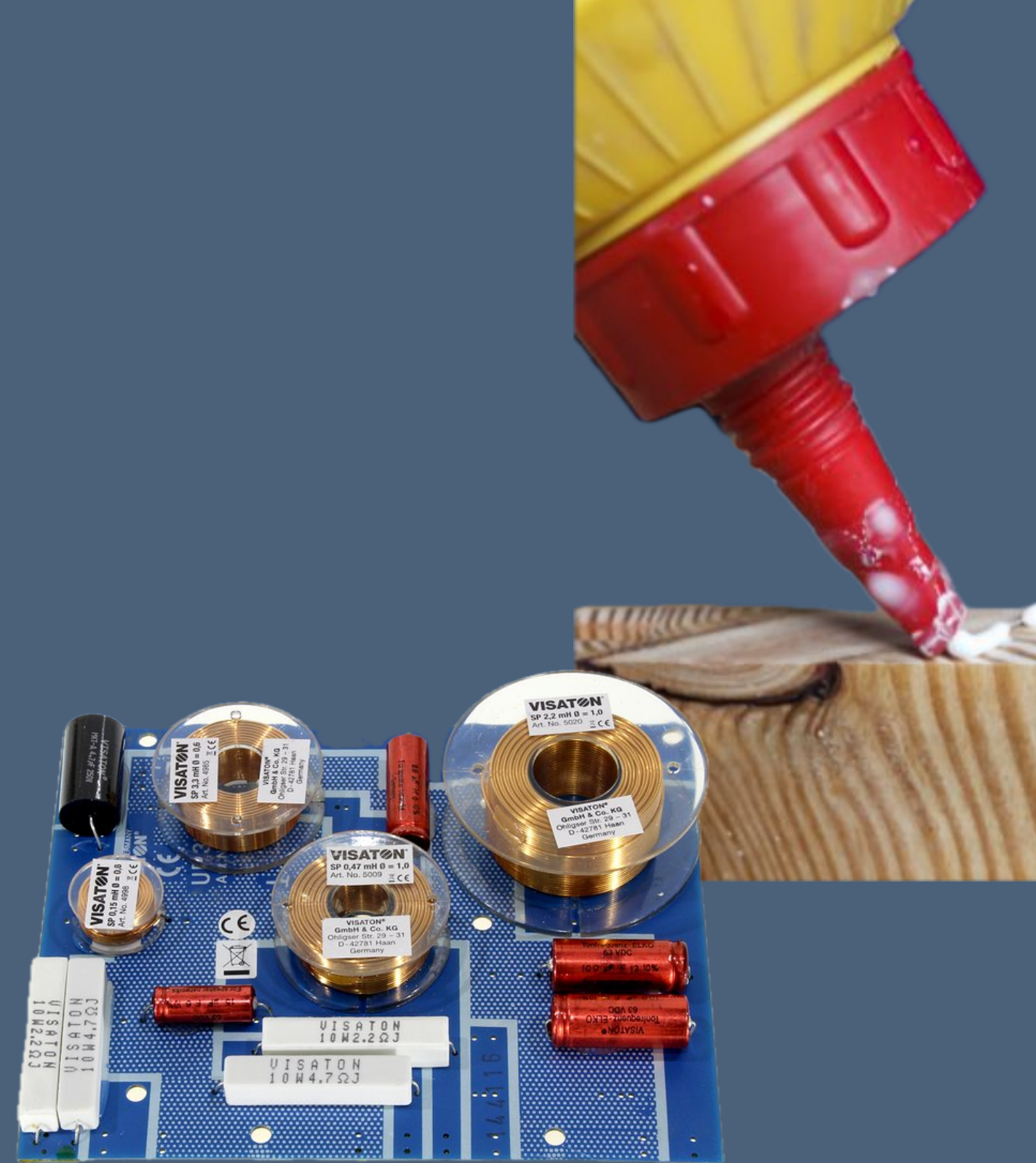
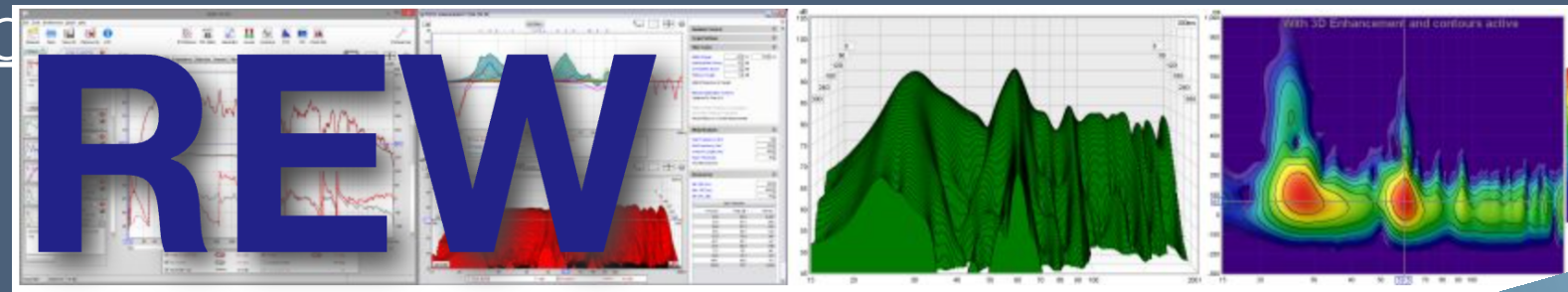
Hier!

:)

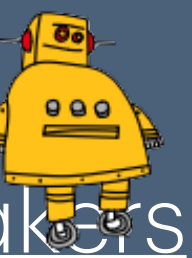


Lautsprecher nur so viel...

- Macht die Kiste wenigstens DICHT !
- Simuliert die Frequenzweiche !
 - speakerboxlite.com ???
 - AJHorn, Boxsim, WinISD, XSim?,
 - Geht besser mit [Datenblättern](#)
- Oder nehmt'n DSP
- Miss nach ! REW <https://www.roomeqwizard.com/>
- Oder guck in die HH/KT, steht da hinten im Regal !!!
- Oder Foren check'n visaton forum, diy-audio, etc...



abschreckendes Beispiel:
High-End-DIY-Stereo-Wooden-Speakers



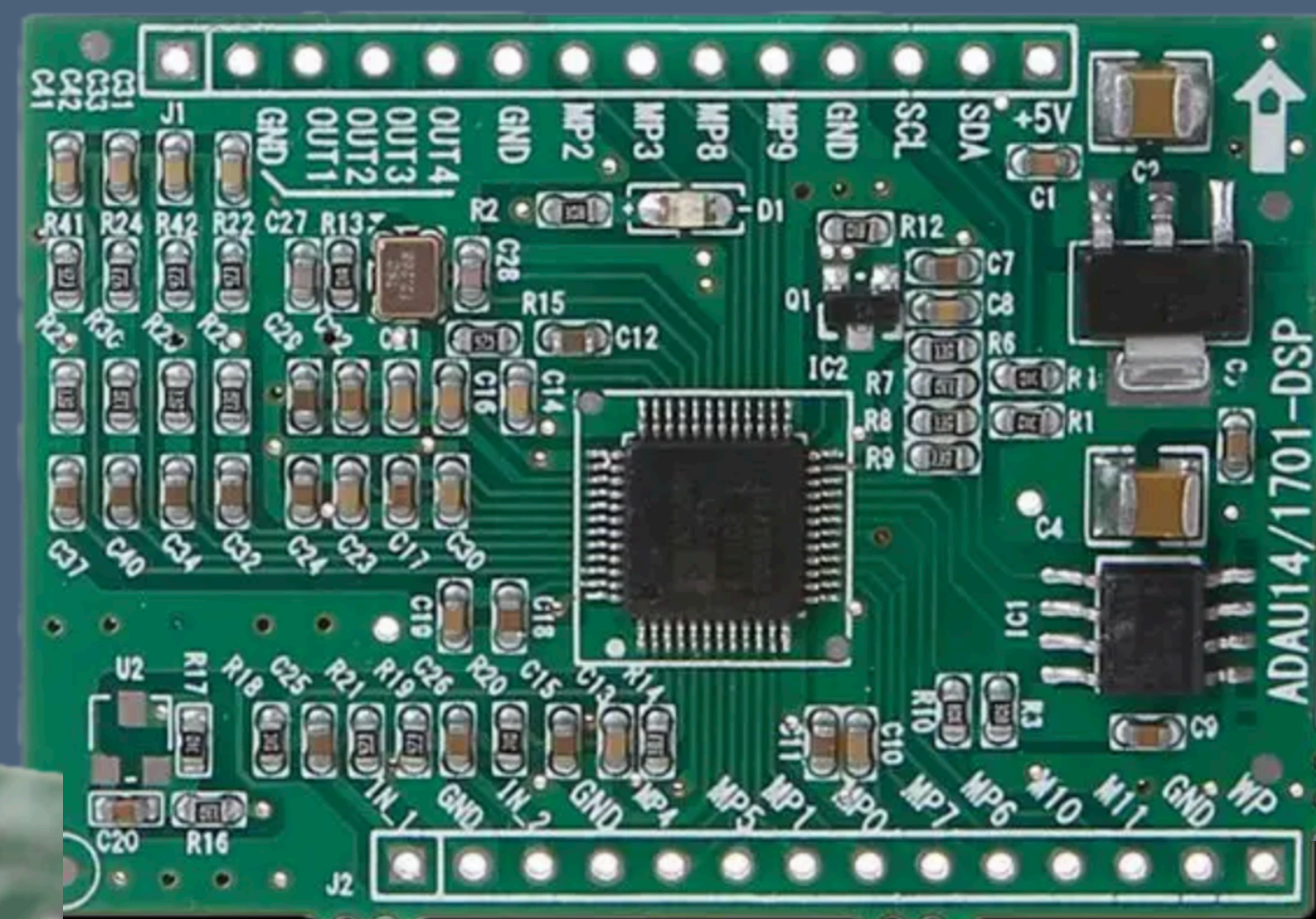
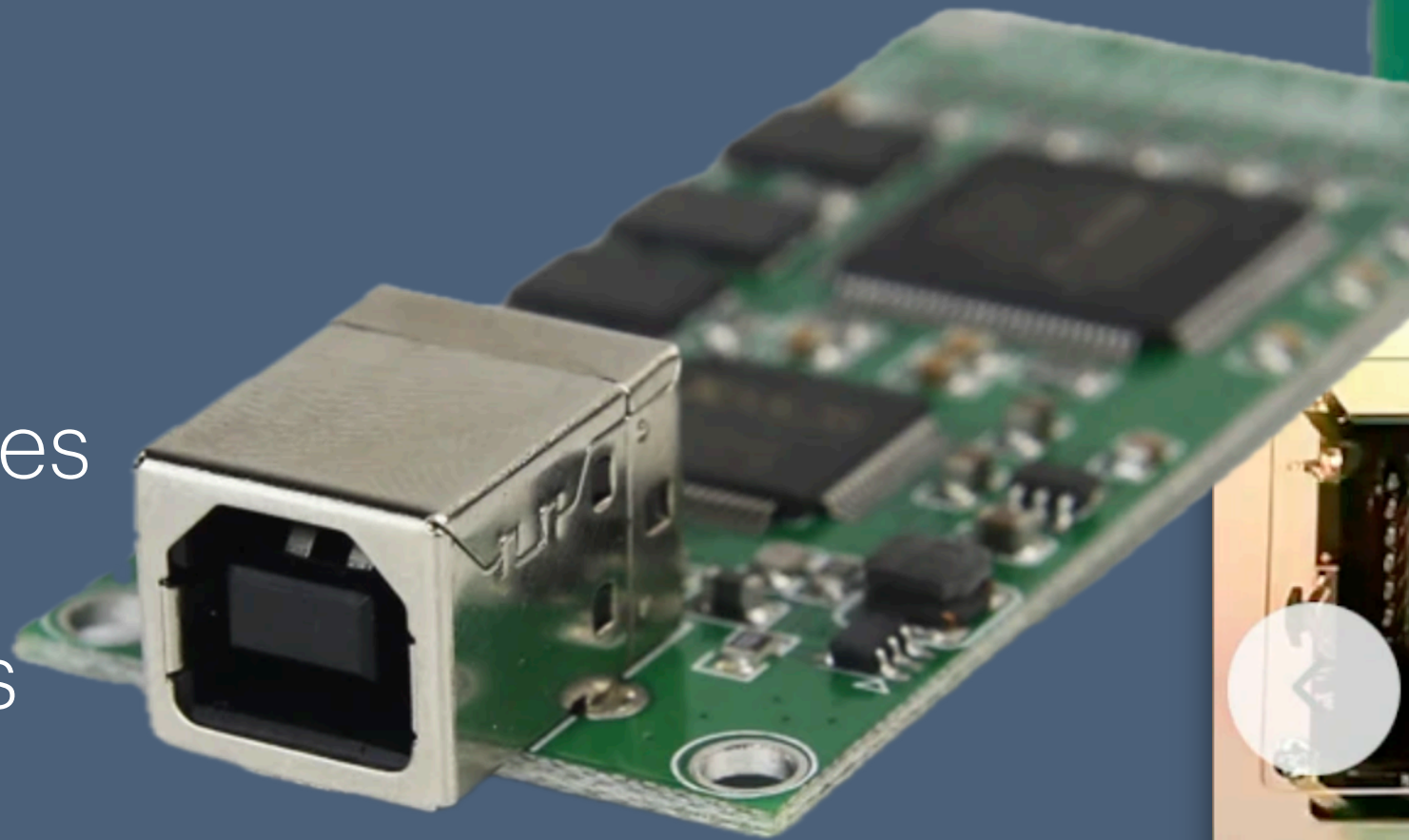
So JETZT

Elektronik

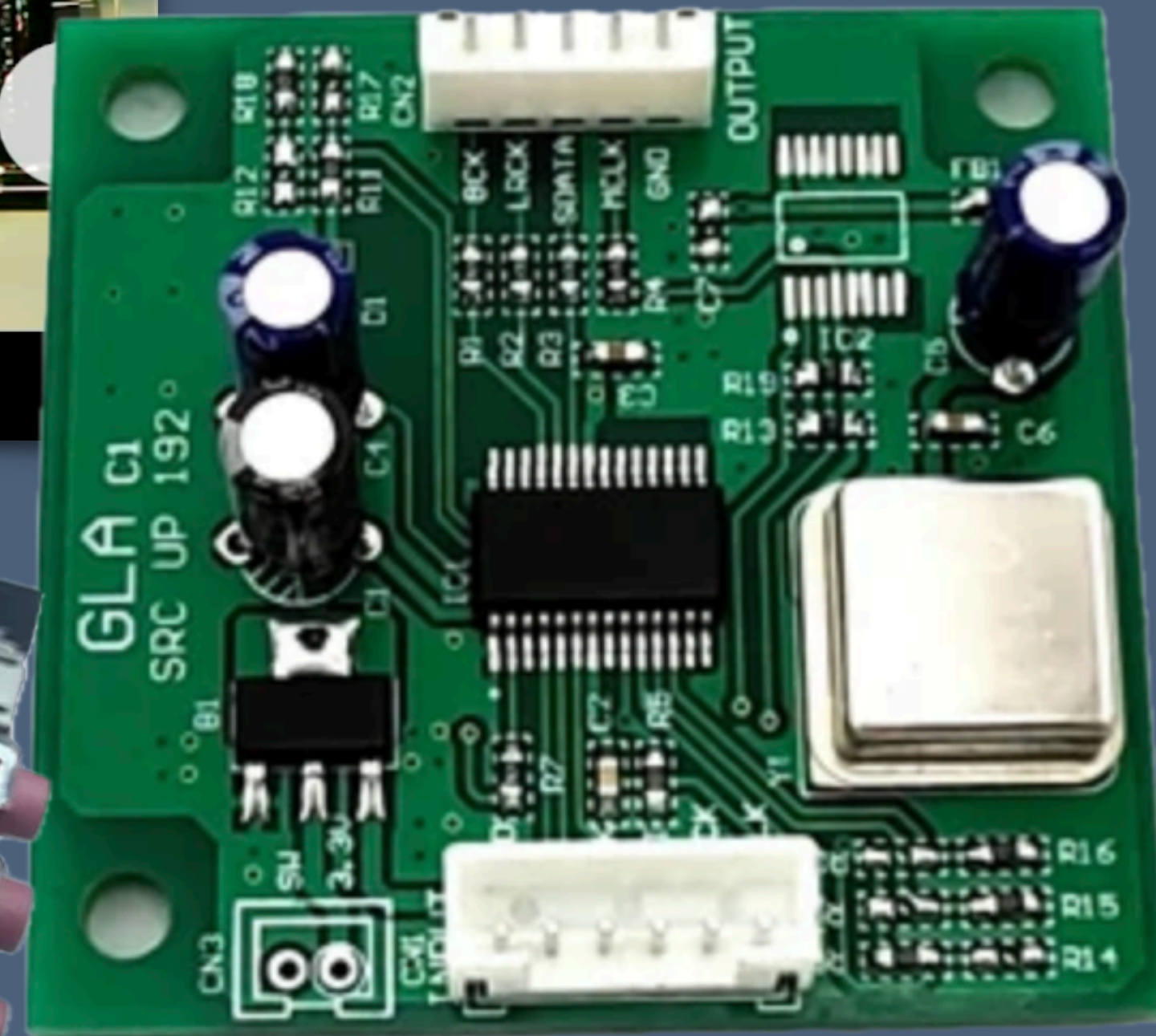
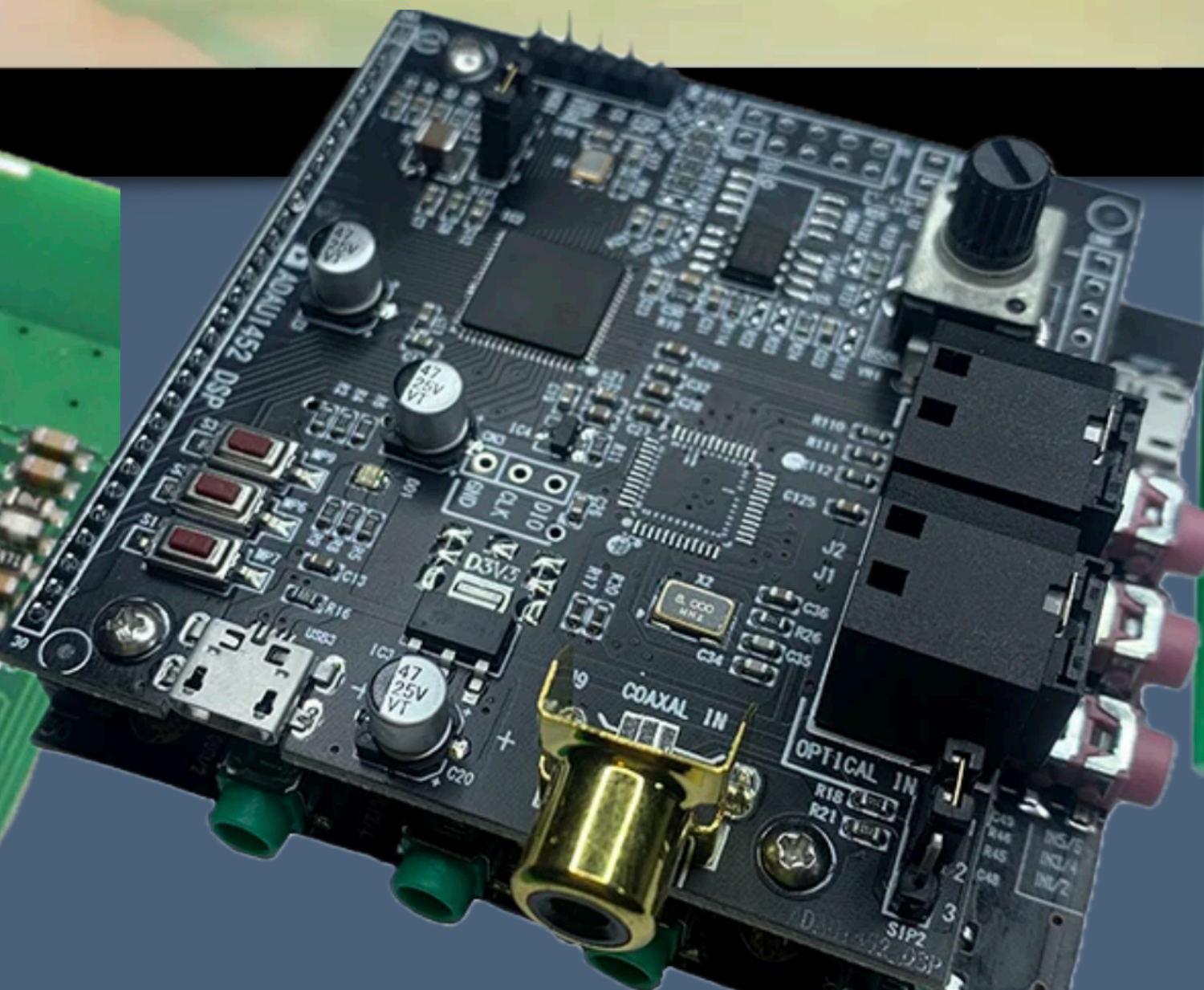
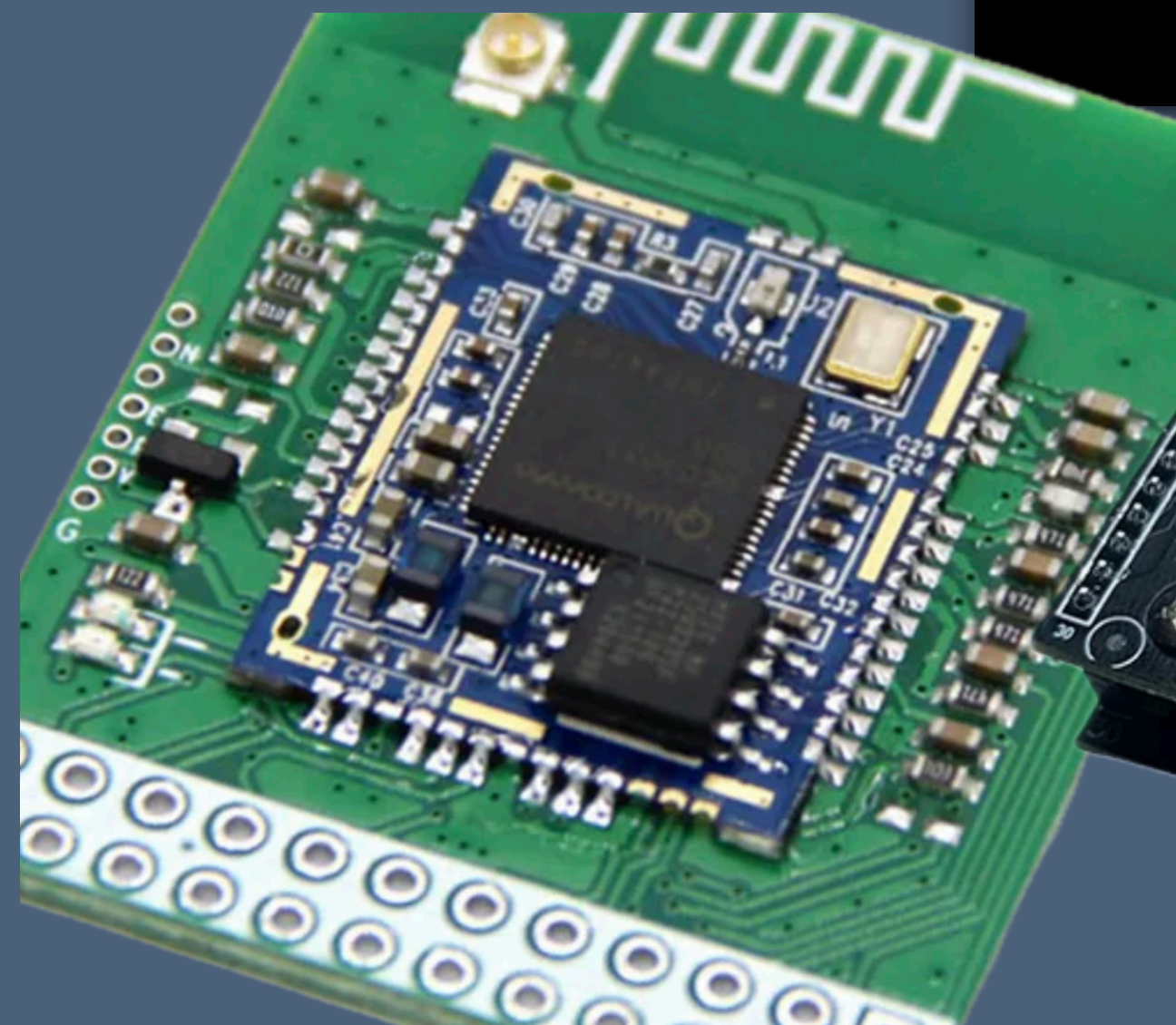
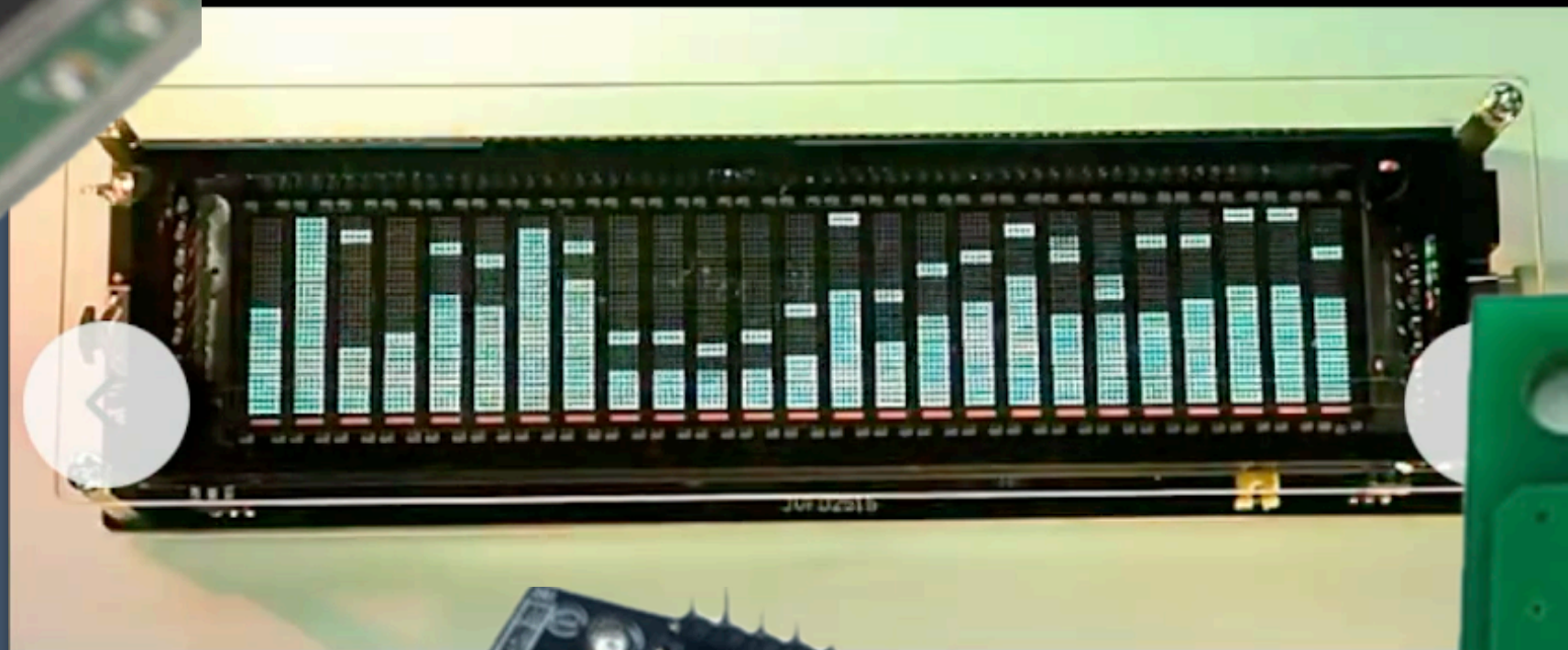
Bits'n'Pieces

China wo*man has it all..

- AliEx Breakouts..
- kricht man einiges
- wenn man weiss was man sucht
- subperfekt



digital amp board



SRC4192

Besser selber machen ?

- FreeDSP

- <https://freedsp.github.io/>

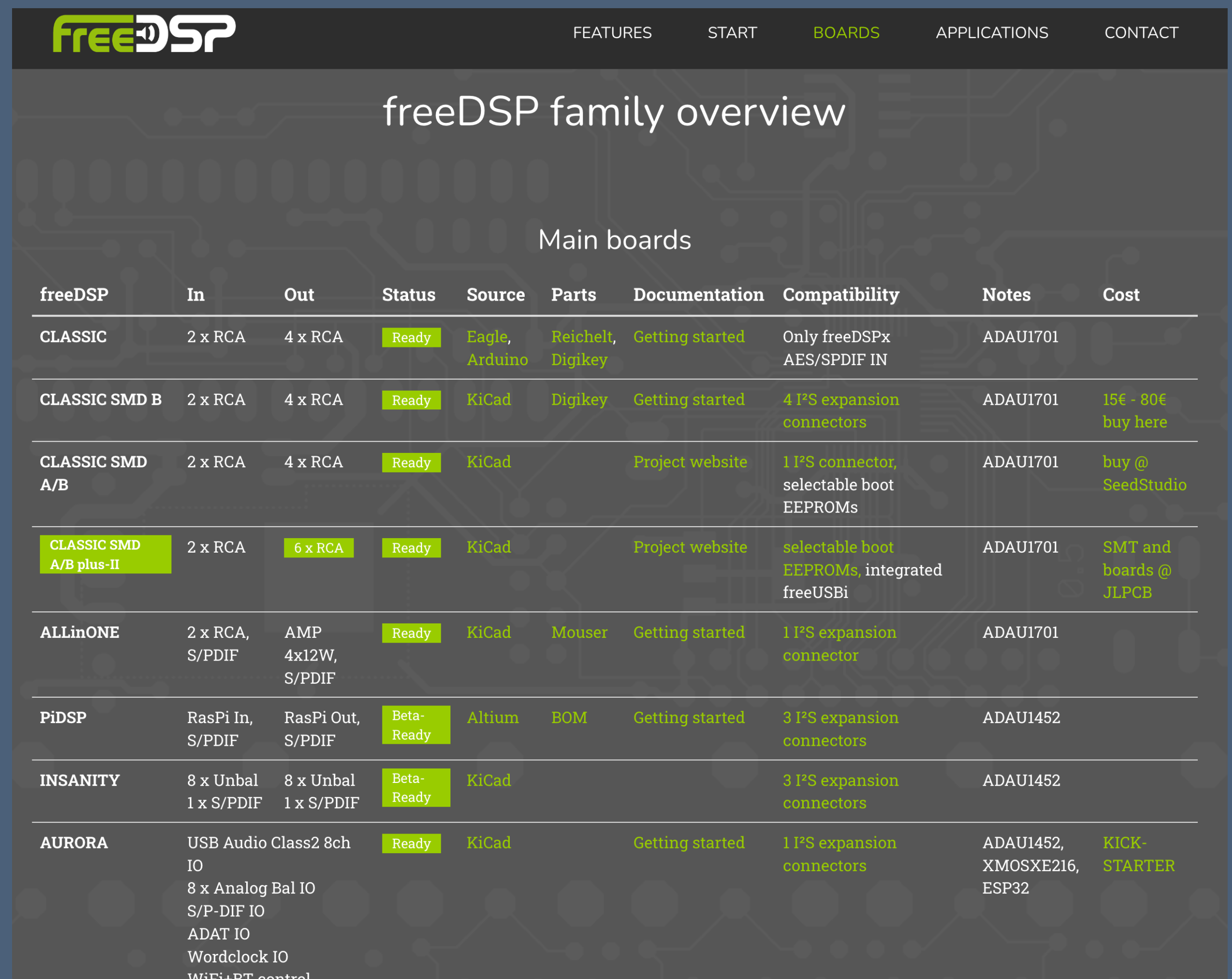
- Oder sonstwo

- Elliot Sound: sound-au.com

- Linkwitzlab linkwitzlab.com

- Instructables - bissel trashisch?

- USW.....

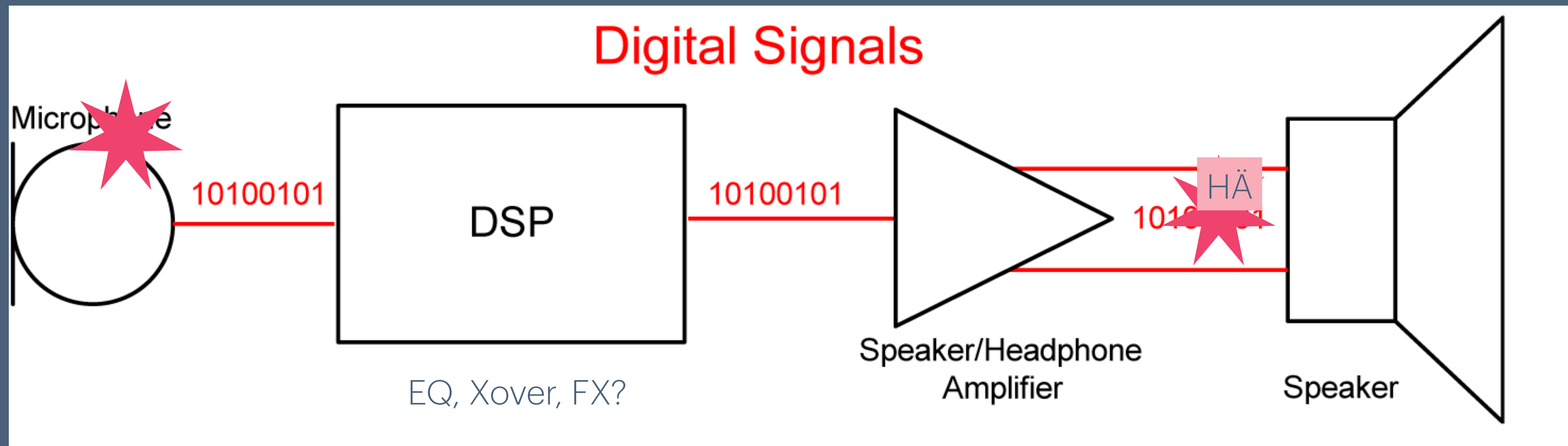


The screenshot shows the freeDSP website's 'family overview' page. At the top, there is a navigation bar with links for FEATURES, START, BOARDS, APPLICATIONS, and CONTACT. The main heading is 'freeDSP family overview'. Below this, a section titled 'Main boards' contains a table with the following columns: freeDSP, In, Out, Status, Source, Parts, Documentation, Compatibility, Notes, and Cost. The table lists several board models, including CLASSIC, CLASSIC SMD B, CLASSIC SMD A/B, CLASSIC SMD A/B plus-II, ALLinONE, PiDSP, INSANITY, and AURORA. Each row provides details on input/output options, status (Ready or Beta-Ready), source files (Eagle, KiCad, Altium), parts suppliers (Reichelt, Digikey, Mouser), documentation links, compatibility notes, and pricing information.

freeDSP	In	Out	Status	Source	Parts	Documentation	Compatibility	Notes	Cost
CLASSIC	2 x RCA	4 x RCA	Ready	Eagle, Arduino	Reichelt, Digikey	Getting started	Only freeDSPx AES/SPDIF IN	ADAU1701	
CLASSIC SMD B	2 x RCA	4 x RCA	Ready	KiCad	Digikey	Getting started	4 I ² S expansion connectors	ADAU1701	15€ - 80€ buy here
CLASSIC SMD A/B	2 x RCA	4 x RCA	Ready	KiCad		Project website	1 I ² S connector, selectable boot EEPROMs	ADAU1701	buy @ SeedStudio
CLASSIC SMD A/B plus-II	2 x RCA	6 x RCA	Ready	KiCad		Project website	selectable boot EEPROMs, integrated freeUSBi	ADAU1701	SMT and boards @ JLPCB
ALLinONE	2 x RCA, S/PDIF	AMP 4x12W, S/PDIF	Ready	KiCad	Mouser	Getting started	1 I ² S expansion connector	ADAU1701	
PiDSP	RasPi In, S/PDIF	RasPi Out, S/PDIF	Beta-Ready	Altium	BOM	Getting started	3 I ² S expansion connectors	ADAU1452	
INSANITY	8 x Unbal 1 x S/PDIF	8 x Unbal 1 x S/PDIF	Beta-Ready	KiCad			3 I ² S expansion connectors	ADAU1452	
AURORA	USB Audio Class2 8ch IO 8 x Analog Bal IO S/P-DIF IO ADAT IO Wordclock IO WiFi+BT control		Ready	KiCad		Getting started	1 I ² S expansion connectors	ADAU1452, XMOSXE216, ESP32	KICK-STARTER

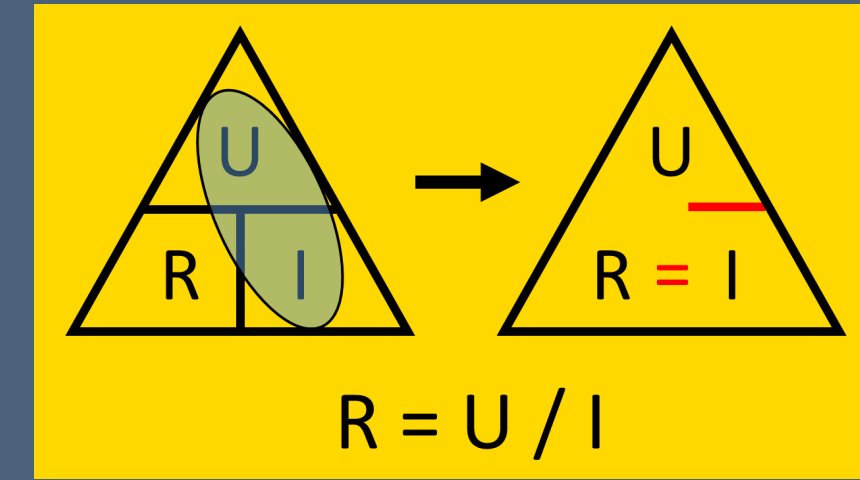
Bedarfsmeldung

Input -> DSP -> AMP -> Output



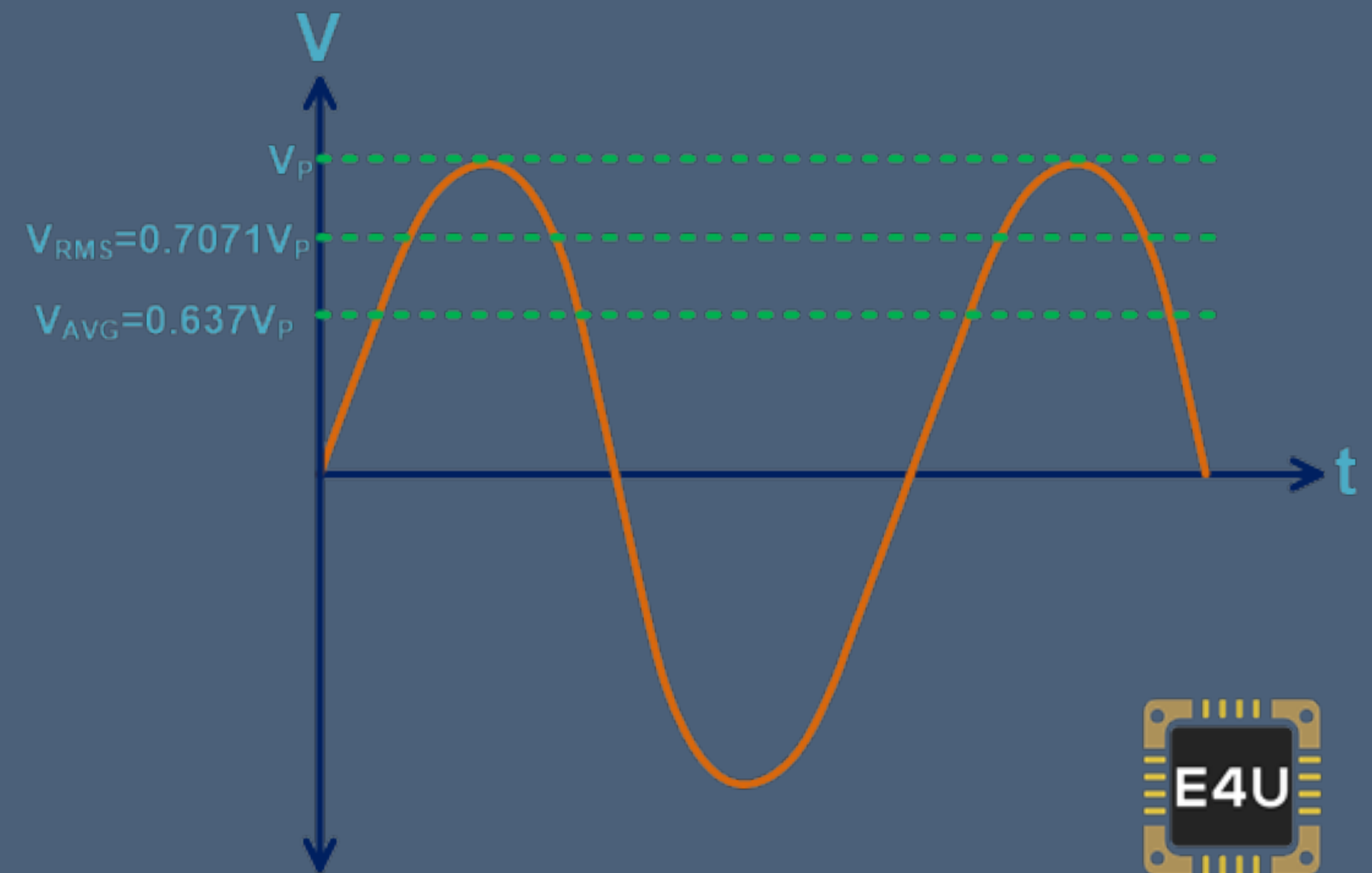
Quellen: analog / SPDIF / Bluetooth / USB / Streaming?

AMP Basics



- **$P = U \cdot I$** „Leistung is Spannung mal Strom“
- **$U = R \cdot I$** „URI“ = Ohmsches Gesetz, kennste !?
- Übung: 4ohm LSP soll 50W raus hauen... Was is mit der Versorgungsspannung ???
 - URI -> $I = U/R$... $P=U^2/R$ -> $U=\text{sqrt}(P \cdot R)$? 14.14V
RMS->Peak. *1.41 ~20V
 - An 8 ohm ? Warum dann 8ohm LSPs? > *1.41
 - Strom 50W/14.14V ~3.5A (RMS) -> 4 Kanäle ?!

$$V_{RMS} = \frac{1}{\sqrt{2}} \cdot V_{pk}$$

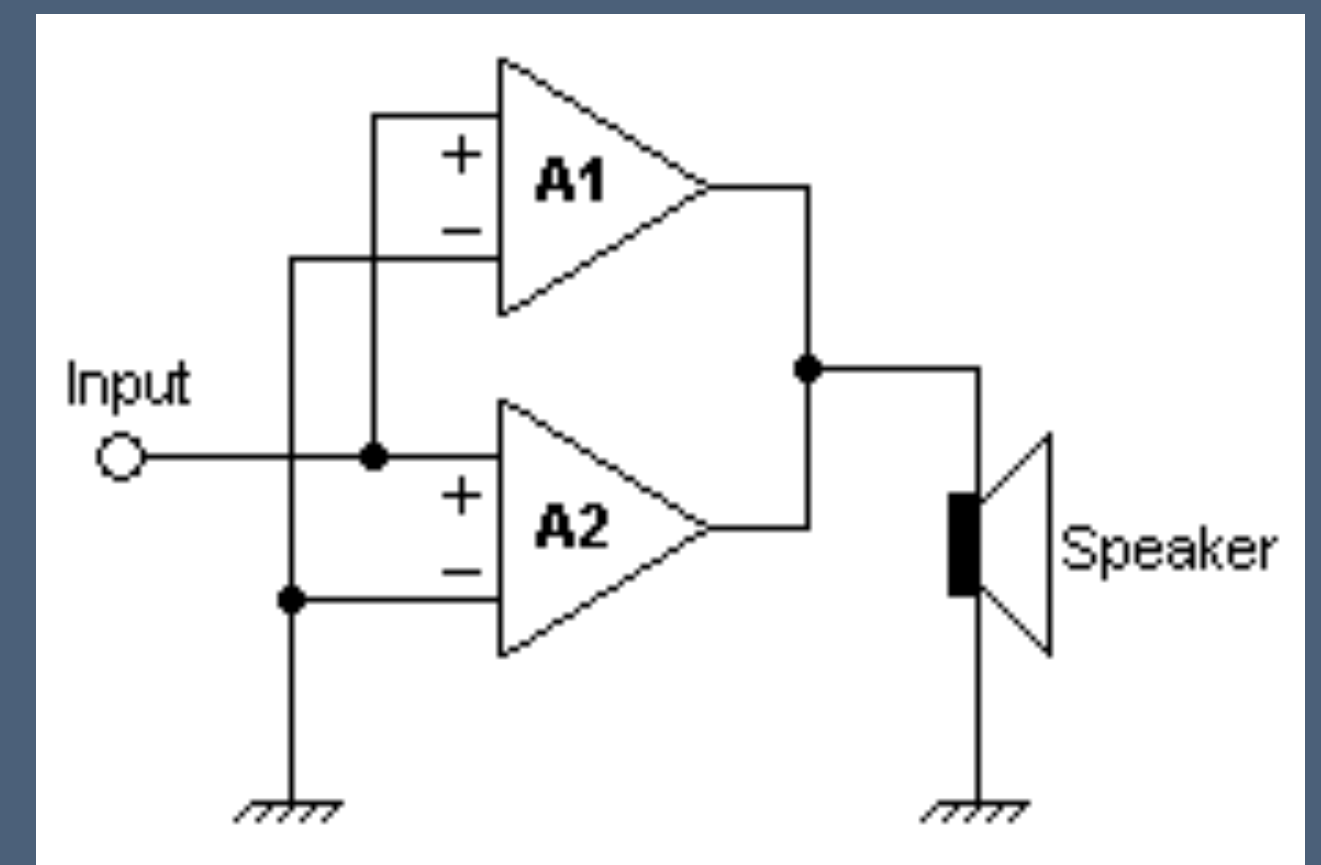
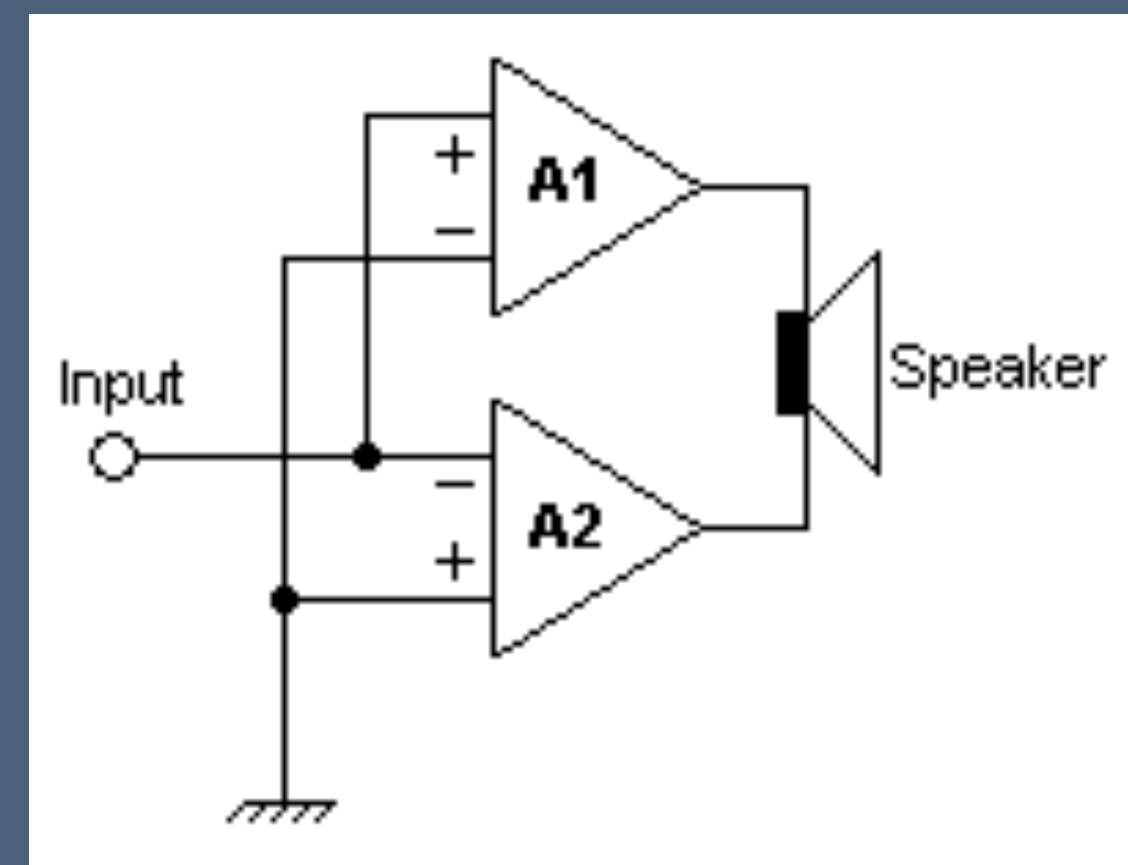
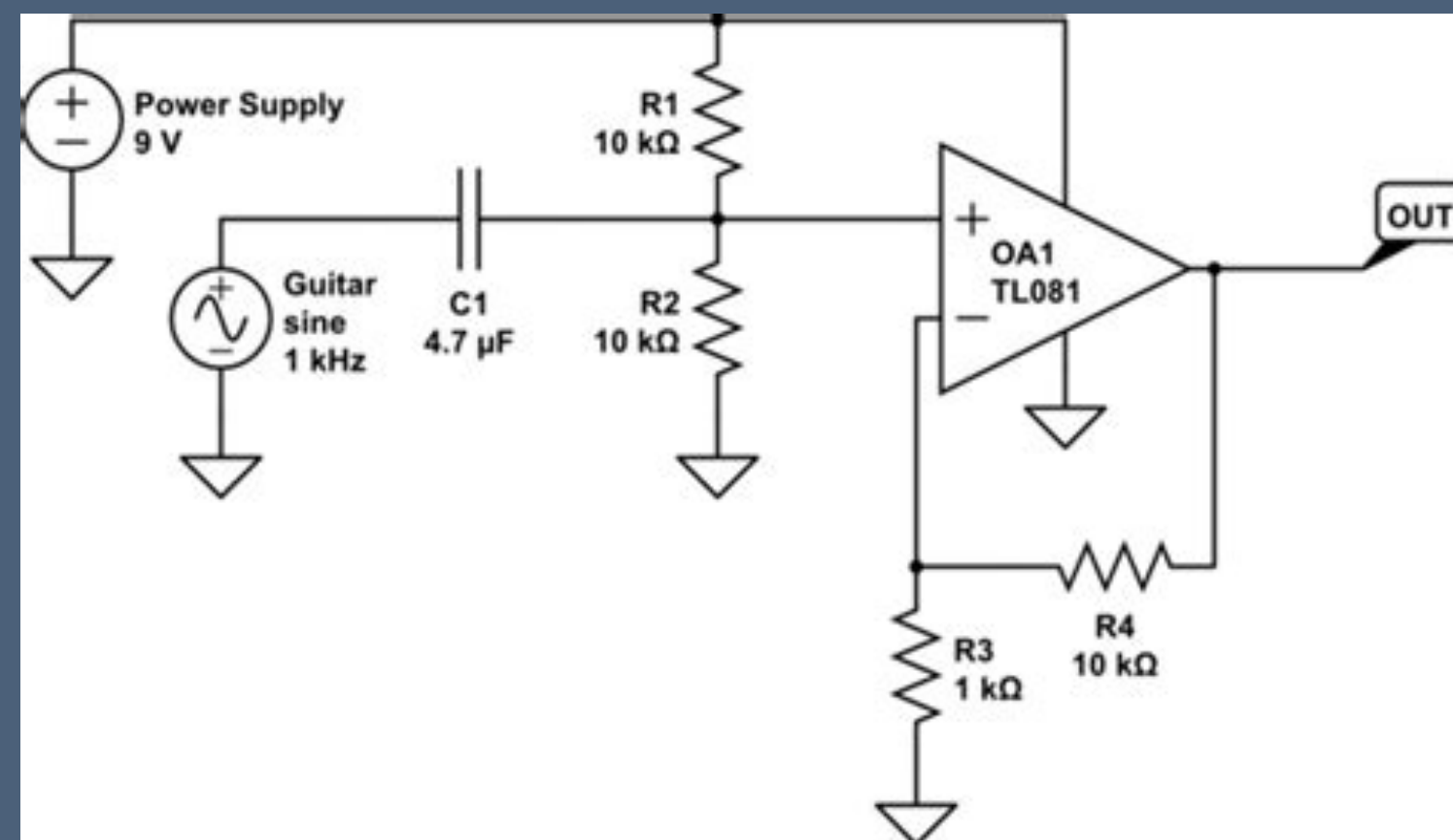
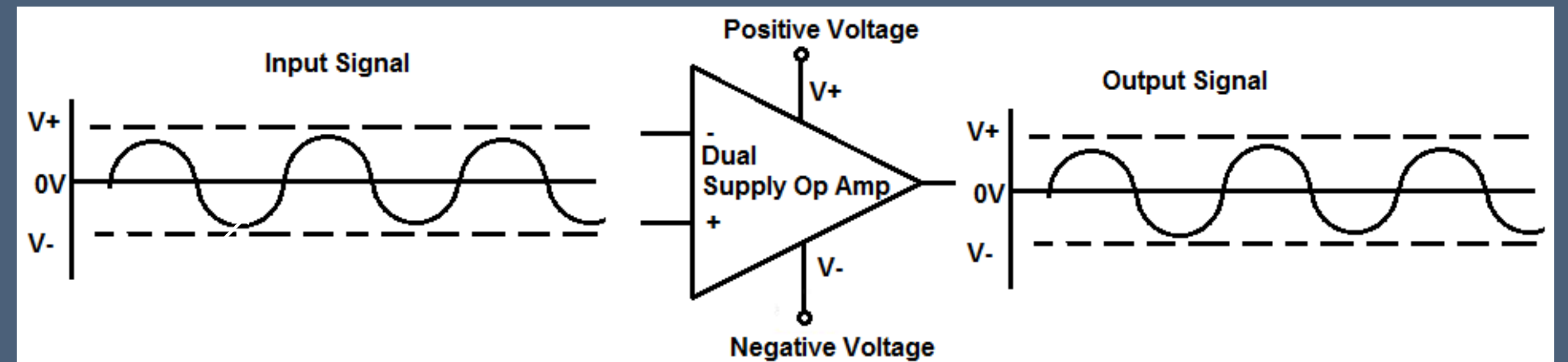
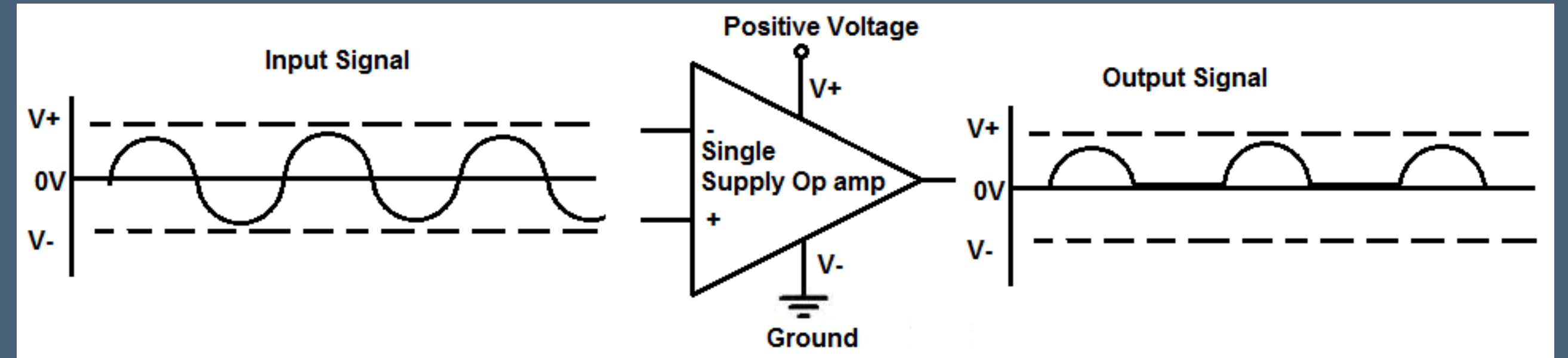


List_of_SI_electro_units

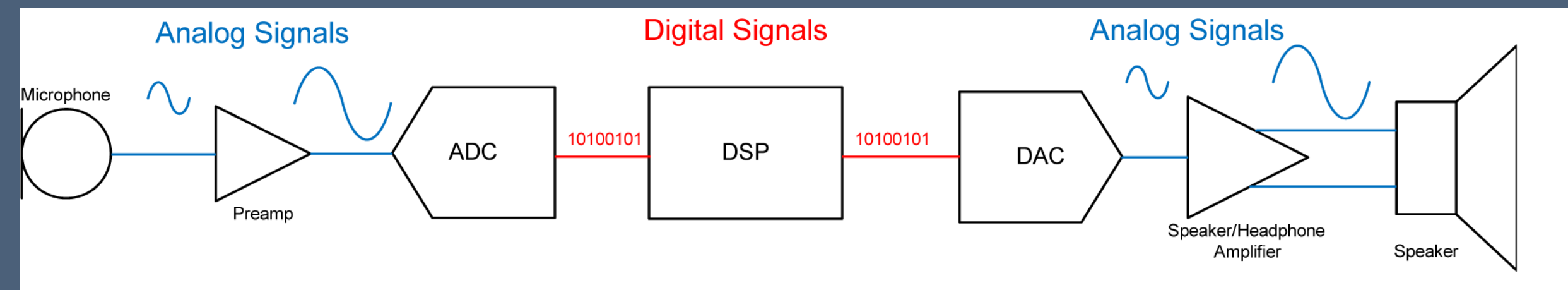
AMP++

supply types

- Single / Dual Rail
- Bias, DC decoupling, Cap = Highpass !
- BTL

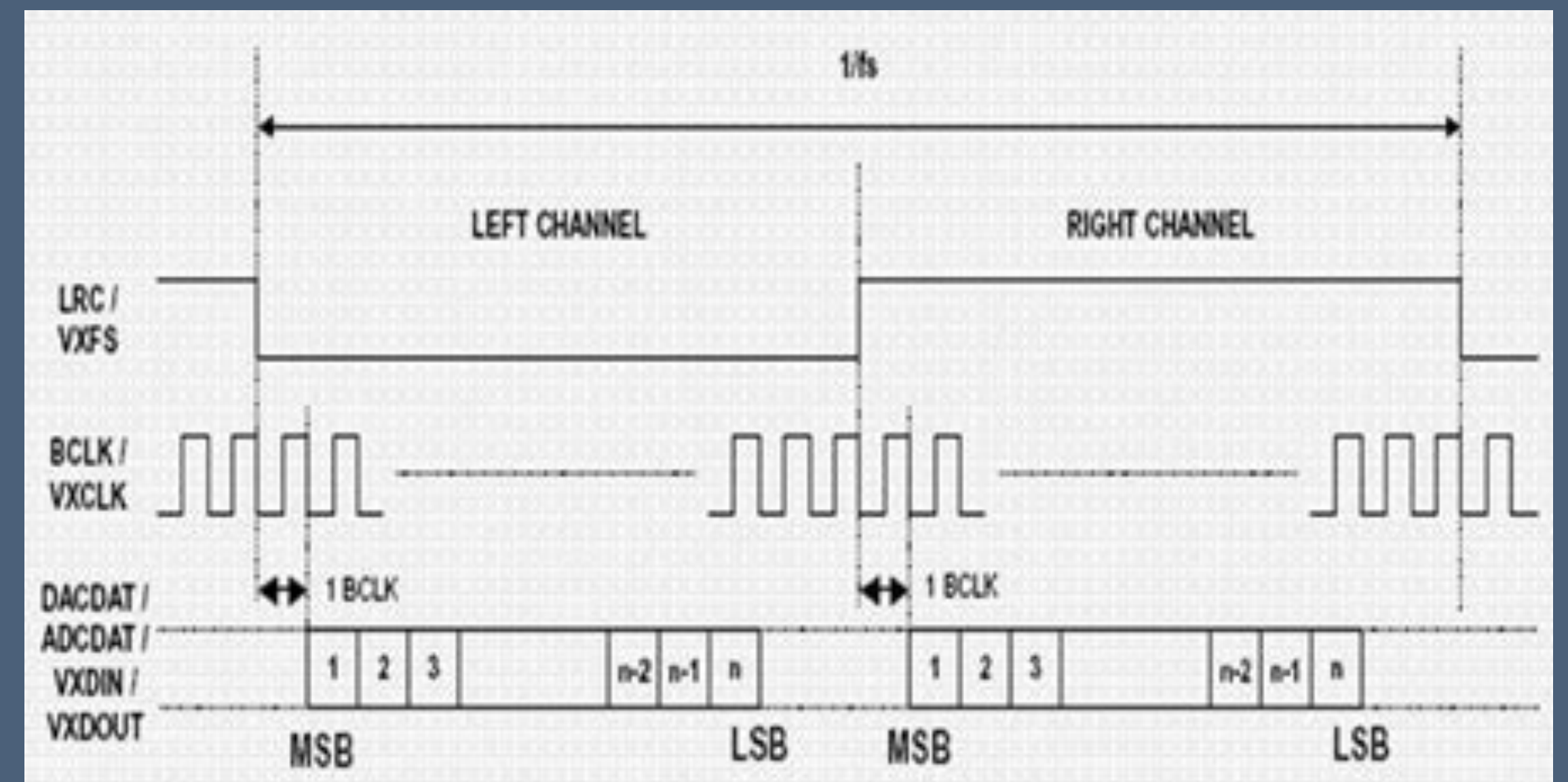
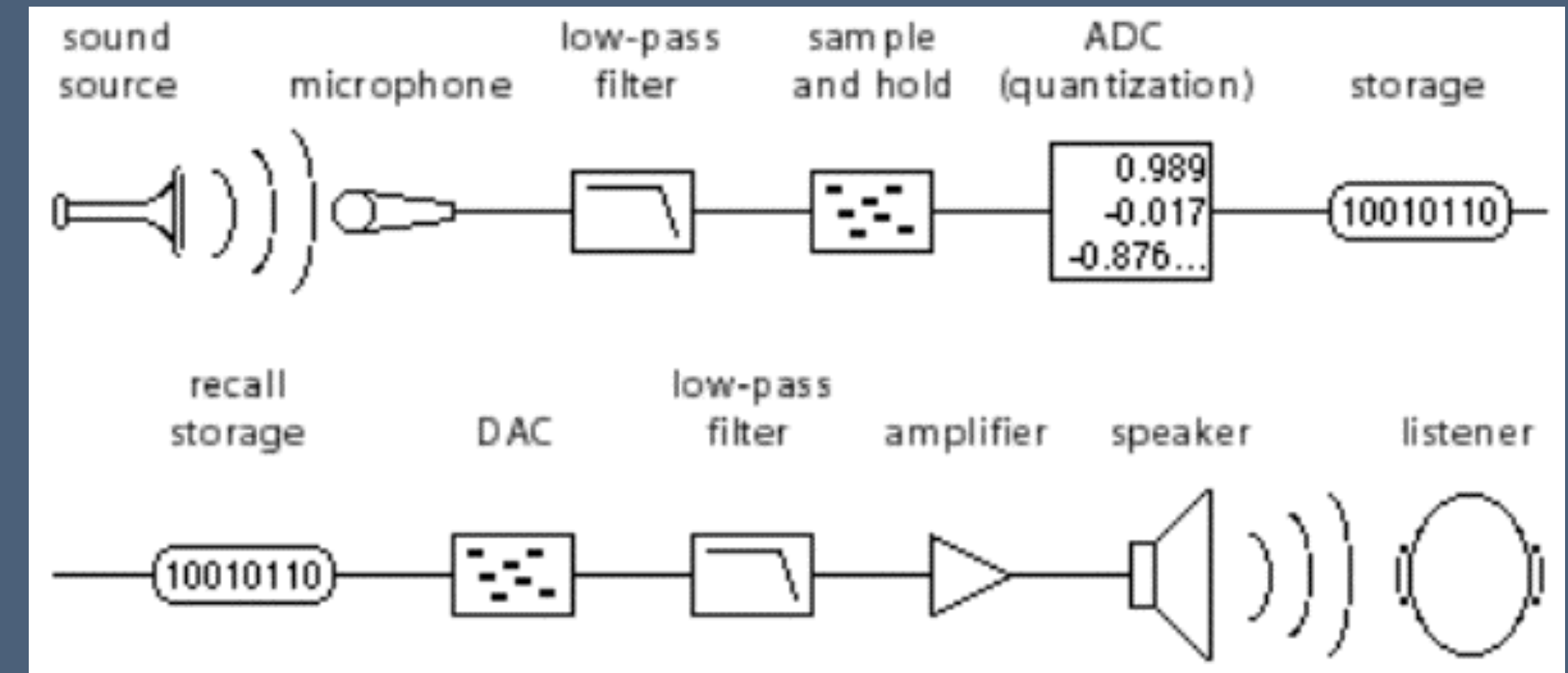


Basics of Digi Audio

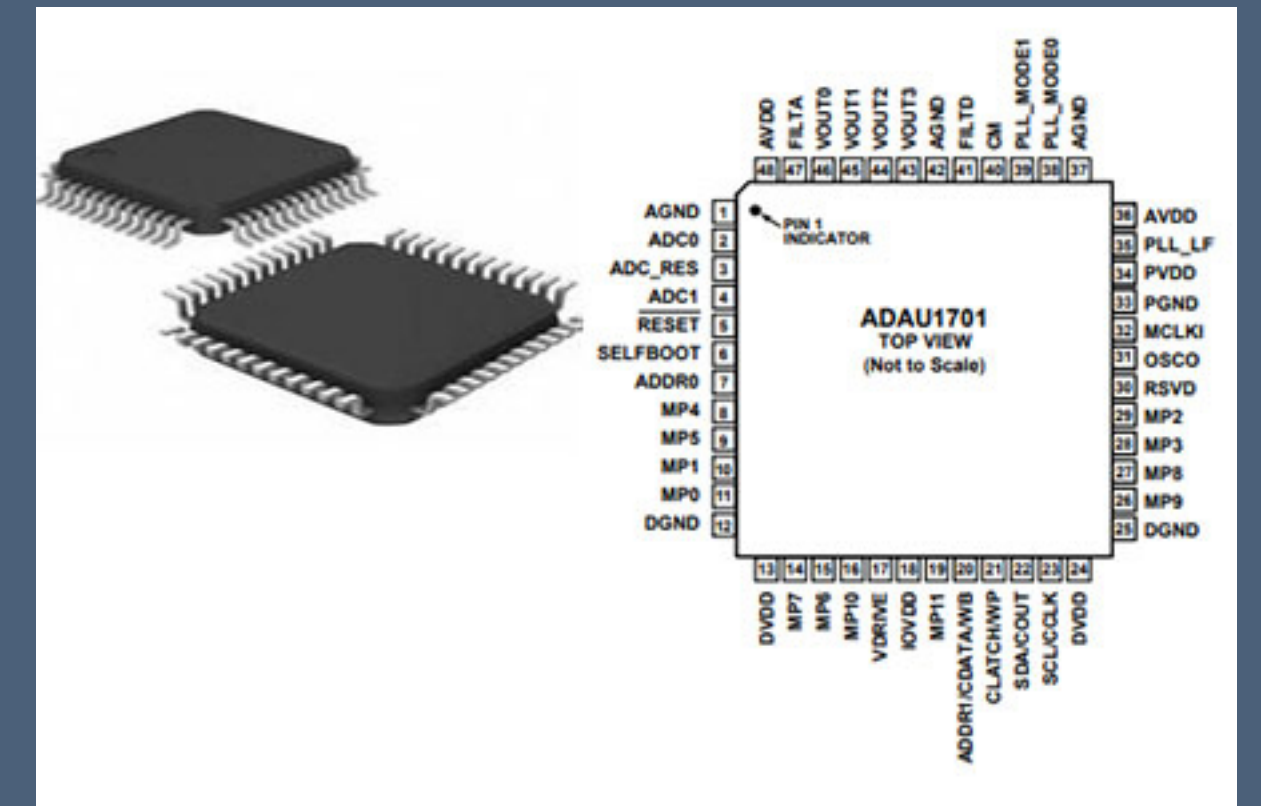


kann man alles so zusammenfuddeln mit dem...

- I2S bus (nein nicht I2C)
- Sync Serial 3-5 Wire,
- Interconnect Things...
 - AD, DA, SPDIF, Amp, DSP,
- Format 48kHz 24bit oder so
- Master Clock ! <> SRC's
- <https://hackaday.com/2019/04/18/all-you-need-to-know-about-i2s/>



DSP



- ADAU1701
 - AnalogDevices SigmaDSP Reihe - gibt einige Variationen...
 - 2 ADC 4 DAC... wie gemacht für Frequenzweichen und Aktivlautsprecher
 - Also known as „miniDSP“ „sure“ „TinySine“
 - Man klickt sich eine Processing Pipeline zusammen und kann die parameter via I²C bus umfuddeln.
 -

FreeDSPs

- CLASSIC - good
- CLASSIC SMD B - noisy analog output
- AllInOne - Power delivery bugs auf'm PCB, noisy analog input, outdated chip CS84xx
- AMPx4 - good - QFP löten für Fortgeschrittene !
- AMPx2 - ok (ground issues ?)
- Aurora - noch nicht getestet - ÜberDSP???

SigmaStudio

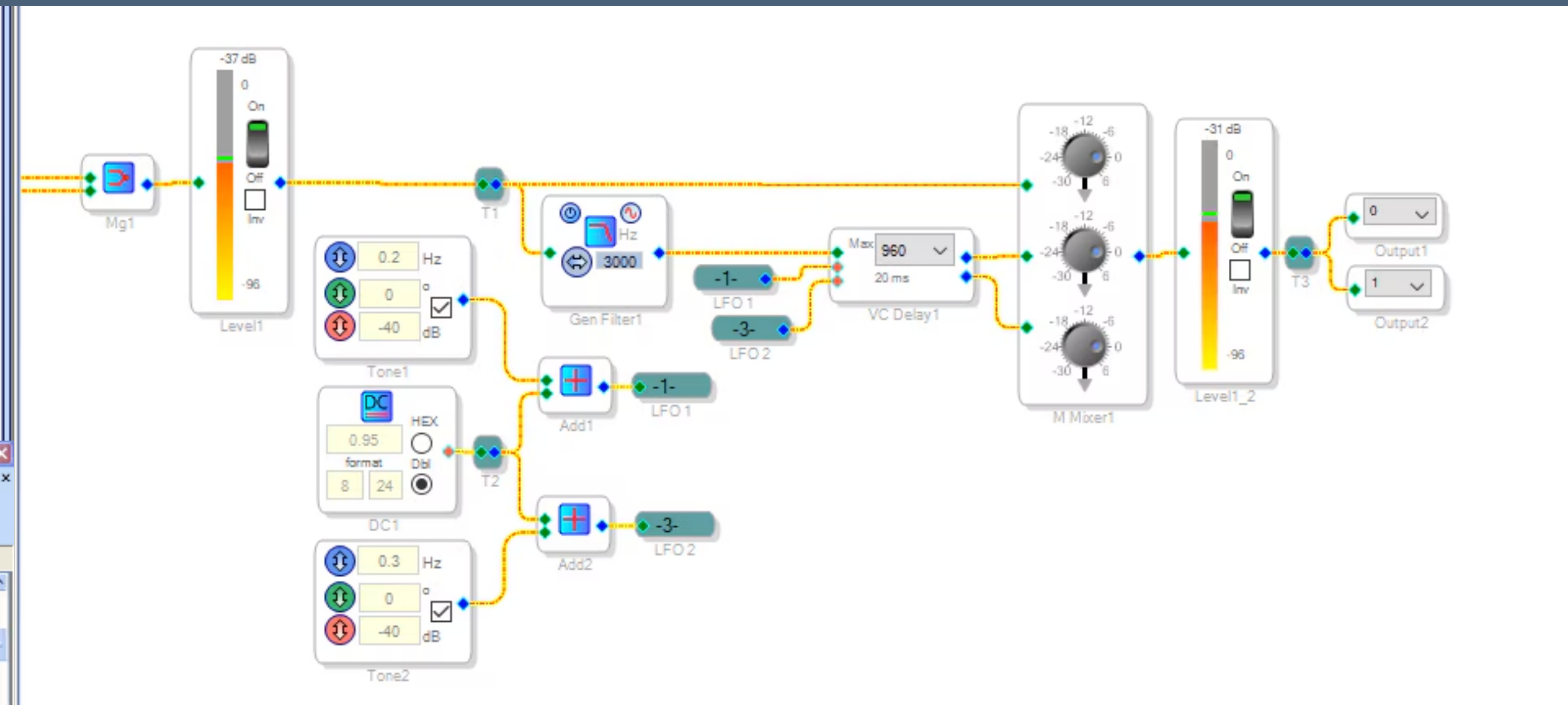
Visual Programmierwerkzeug für SigmaDSPs

- DSP konfigurieren
- Flow basteln

Simulation Probe
Simulation Stimuli
Connection
Speaker Response : MLSSA
ADAU1452
ADI Algorithms
Advanced DSP
Basic DSP
Counters
Dynamics Processors
Filter Toolbox
Filters
GPIO Conditioning
I/O
Level Detectors/Lookup Tables
Look Up Tables
Level Detectors

The screenshot shows the SigmaStudio software interface. The top menu bar includes File, Edit, View, Tools, Format, Action, Window, and Help. The main workspace displays a schematic design with various DSP blocks and signal paths. A 'Capture' window is open, showing a table of captured data.

Mode	Time	Cell Name	Parameter Name	Address	Value	Data	Bytes
SafeRead Write	18:48:19 - 226ms	JAZZ	EQ1940Dual51	0x0076	1.00051	0x00, 0x80, 0x10, 0x80	4
SafeRead Write	18:48:19 - 226ms	JAZZ	EQ1940Dual51	0x0077	-1.9974	0xFF, 0x00, 0x52, 0x61	4
SafeRead Write	18:48:19 - 226ms	JAZZ	EQ1940Dual51	0x0078	0.99698	0x00, 0x7F, 0x9D, 0x52	4
SafeRead Write	18:48:19 - 226ms	JAZZ	EQ1940Dual51	0x0079	1.99748	0x00, 0xFF, 0xA0, 0x9F	4
SafeRead Write	18:48:19 - 226ms	JAZZ	EQ1940Dual51	0x007A	-0.9975	0xFF, 0x80, 0x51, 0xCE	4
SafeRead Write	18:48:19 - 226ms	JAZZ	EQ1940Dual51	0x0076	1.00051	0x00, 0x80, 0x10, 0x80	4
SafeRead Write	18:48:19 - 226ms	JAZZ	EQ1940Dual51	0x0077	-1.9974	0xFF, 0x00, 0x52, 0x61	4
SafeRead Write	18:48:19 - 226ms	JAZZ	EQ1940Dual51	0x0078	0.99698	0x00, 0x7F, 0x9D, 0x52	4
SafeRead Write	18:48:19 - 226ms	JAZZ	EQ1940Dual51	0x0079	1.99748	0x00, 0xFF, 0xA0, 0x9F	4
SafeRead Write	18:48:19 - 226ms	JAZZ	EQ1940Dual51	0x007A	-0.9975	0xFF, 0x80, 0x51, 0xCE	4

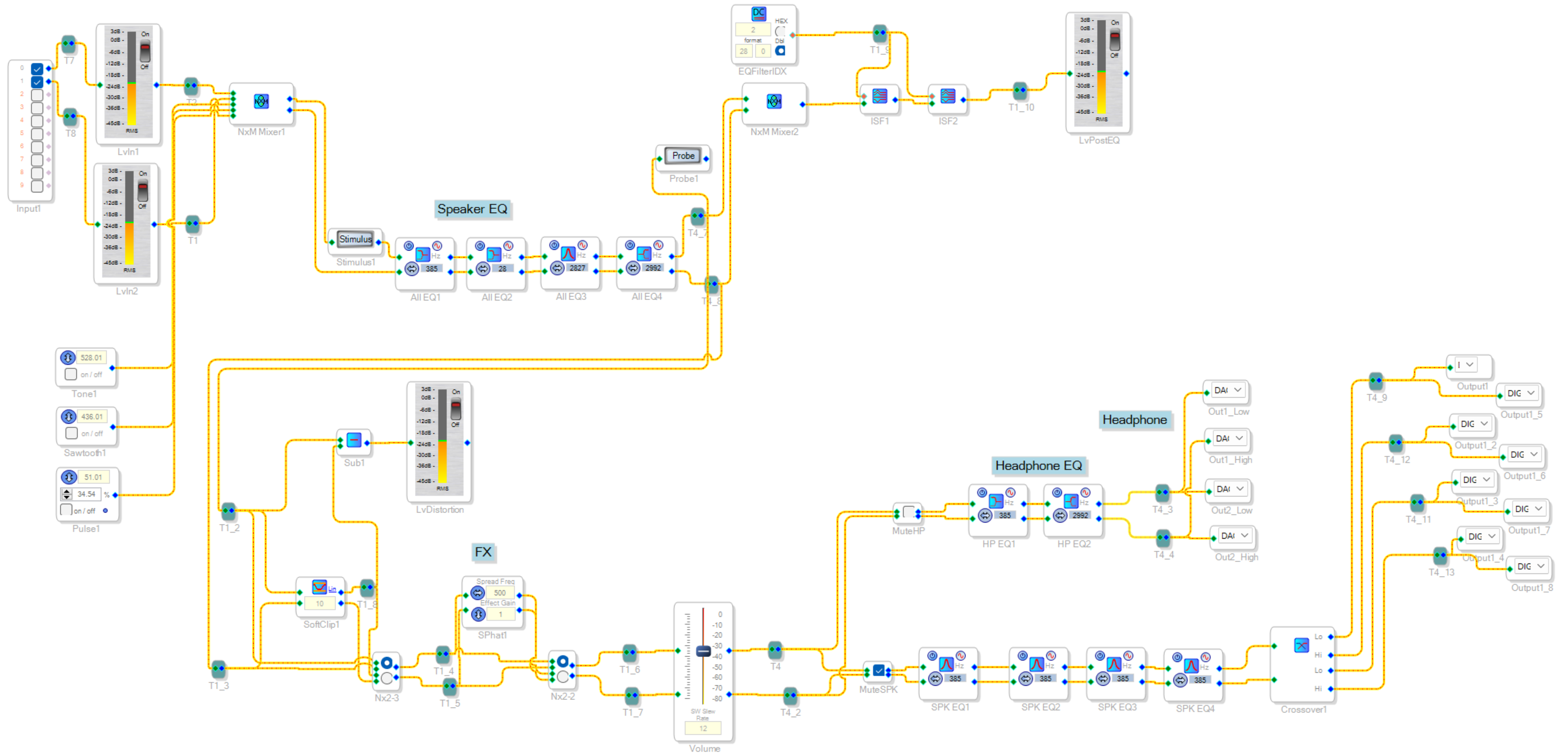


[Link analog.com...](http://analog.com)

[Toolbox Wiki](#)

Leicht antiquiert und nur Windoof.. aber ~\(\ツ)/~

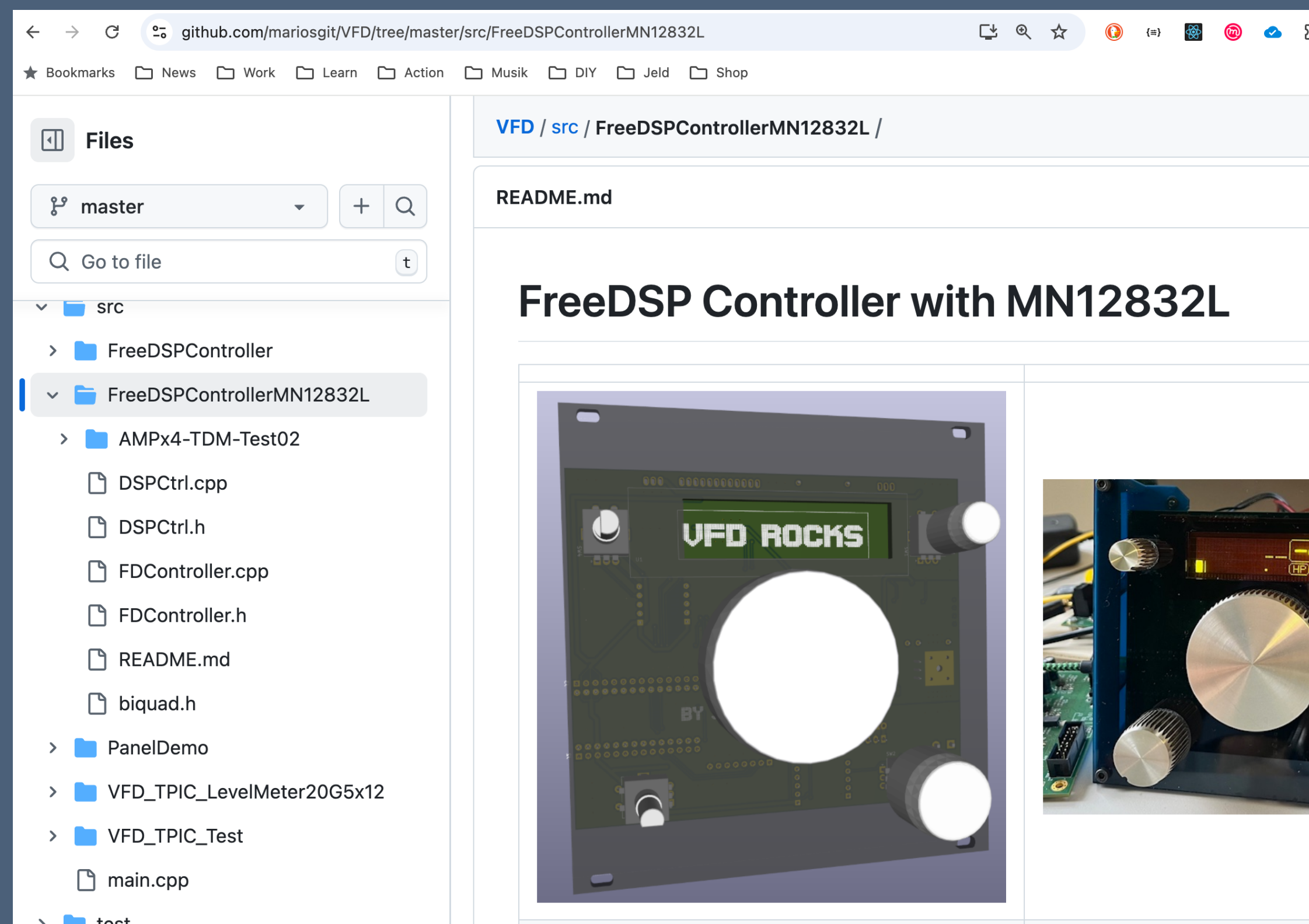
Mein Flow



DSP-Controller

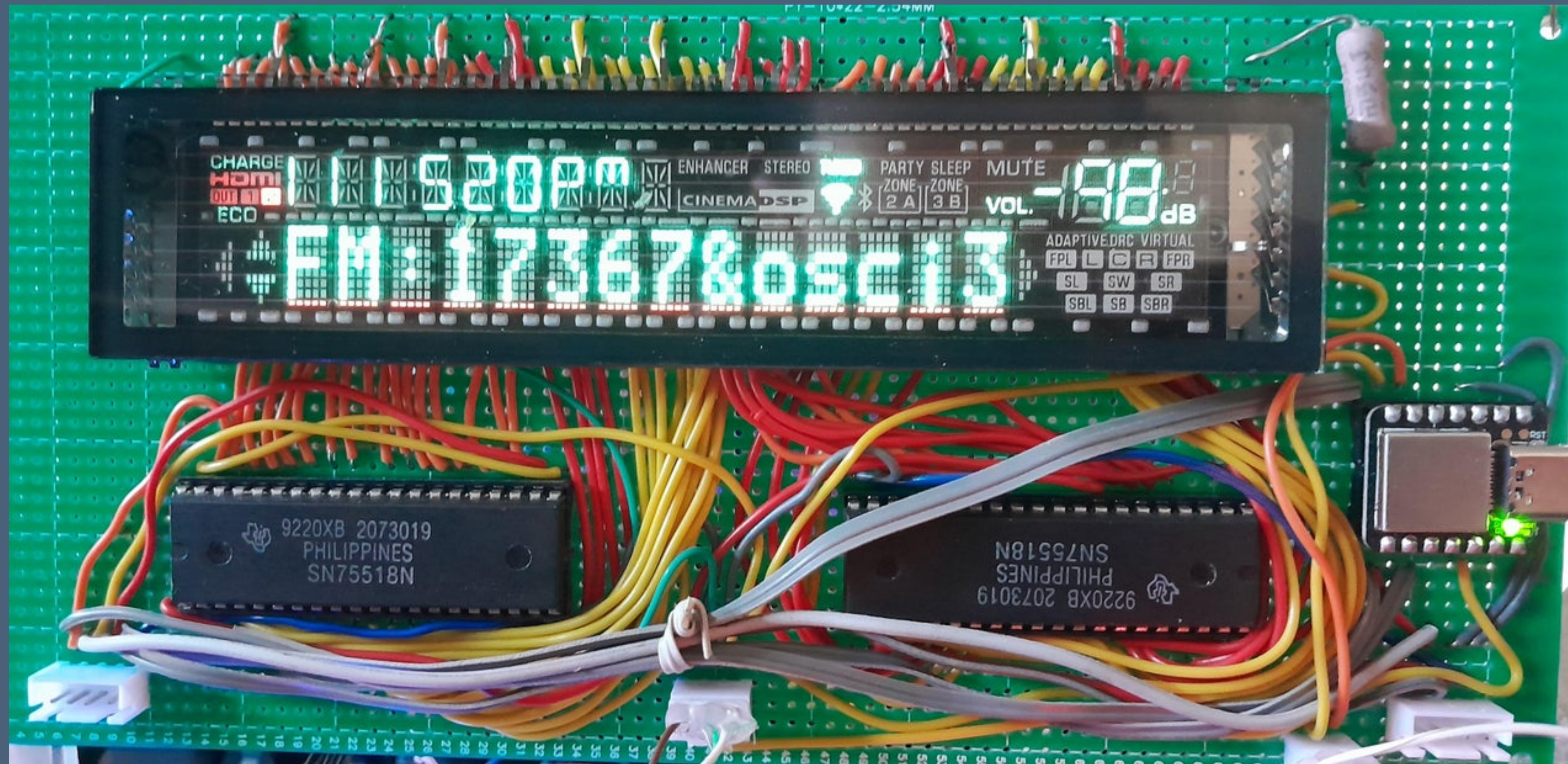
Is eingecheckt

- <https://github.com/mariosgit/VFD/tree/master/src/FreeDSPControllerMN12832L>



VFD basics

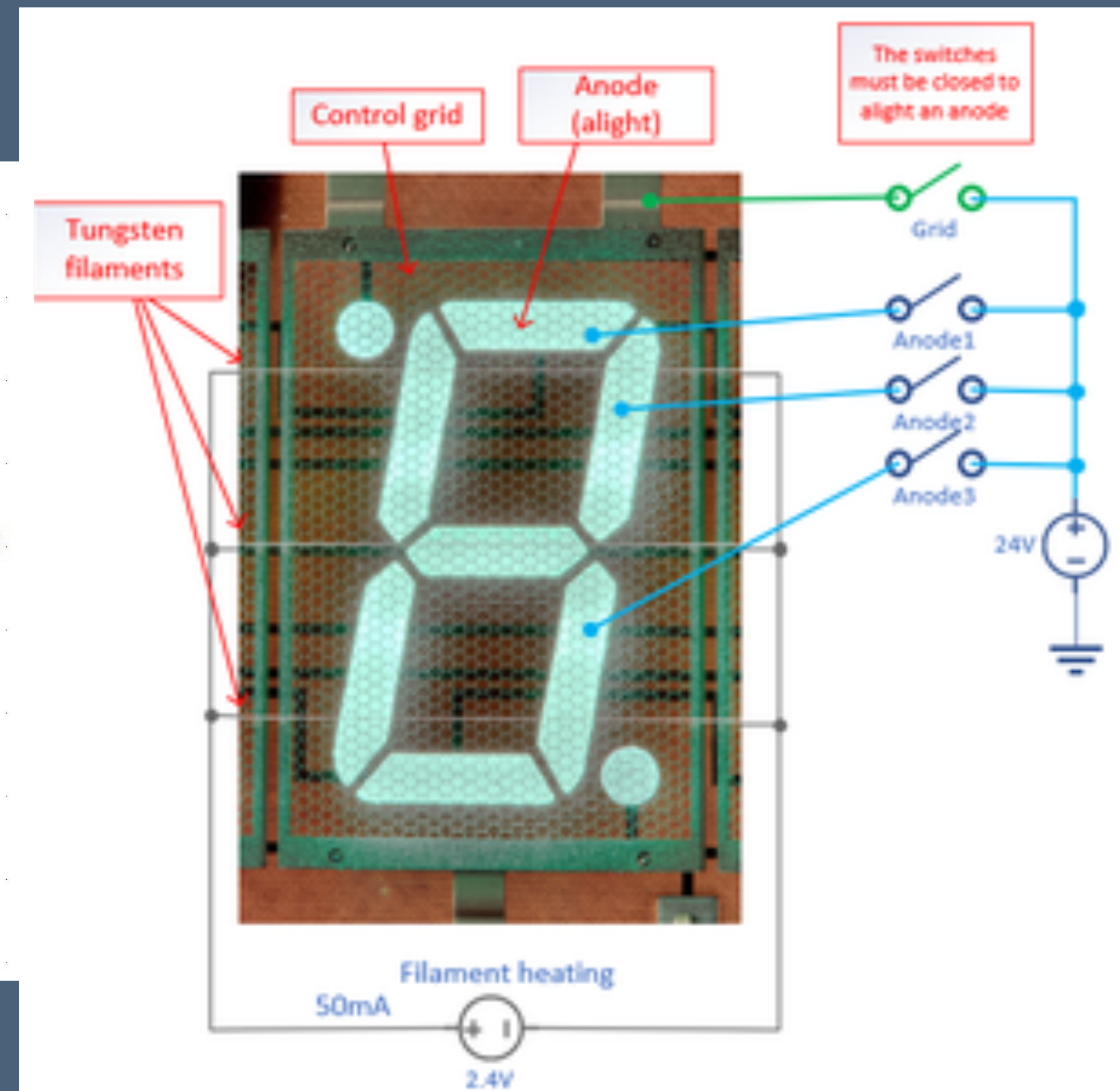
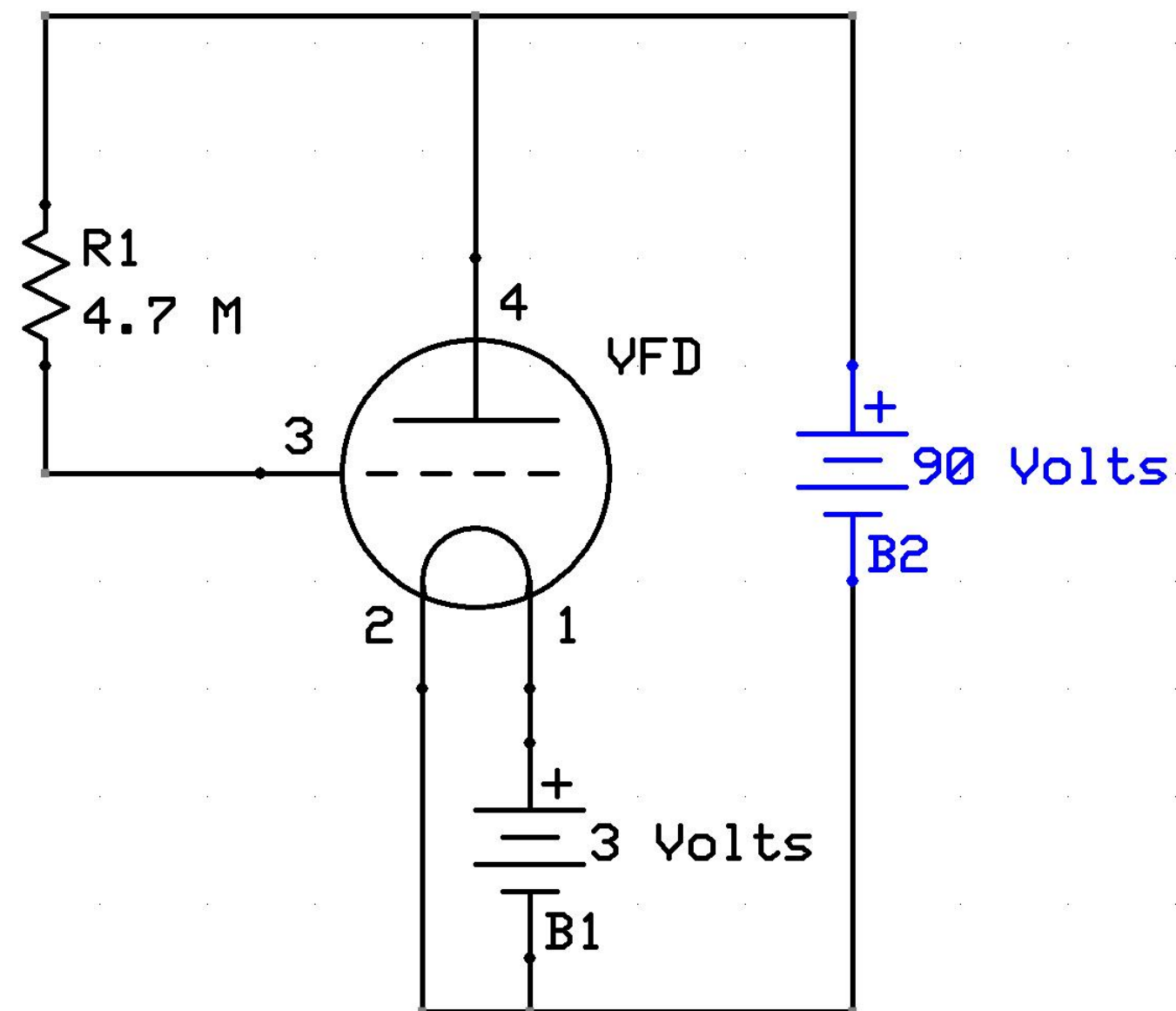
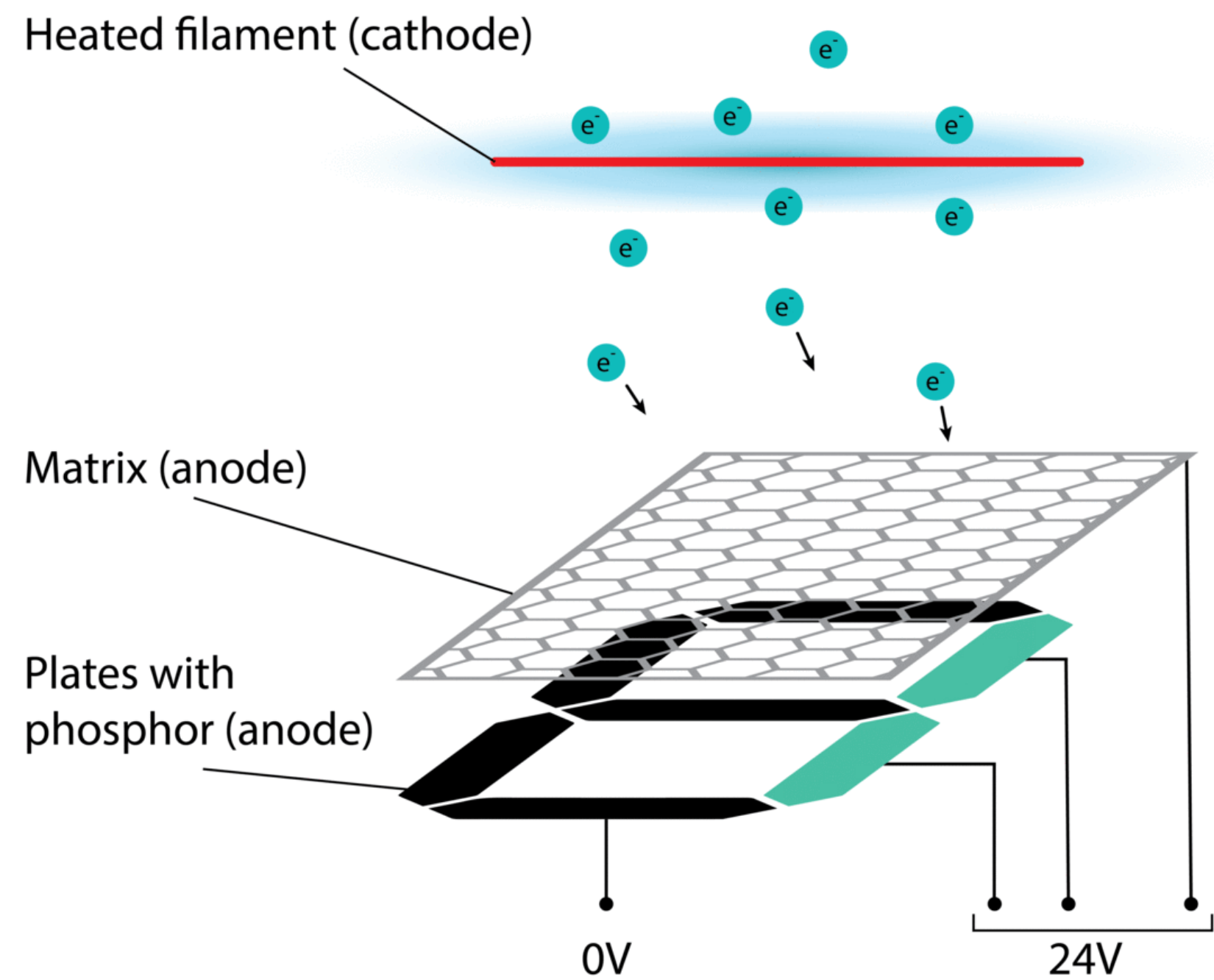
einfach so anschließen :P



VFD basics

Vakuum Fluoreszenz Display

- <https://www.instructables.com/Audio-Level-Meter-From-an-Upcycled-VFD/>
- <https://github.com/mariosgit/VFD/>



Rabbit hole



- <https://github.com/schreibfaul1/ESP32-audioI2S>. ESP32 Web Radio / MP3 player ...
- <https://www.pjrc.com/teensy/gui/> Teensy Audio Lib/GUI
- XMOS - USB2 Audio - 24bit, ADAT, Multi Channel, ...
- <https://www.falstad.com/circuit/circuitjs.html>. Analog Simulator