

# Projetando um DAC para RaspberryPi

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**Live 01** – Visão Geral e  
PLANEJAMENTO

# Objetivo

*Construir um DAC de áudio de alta fidelidade para a RaspberryPi*

*DAC = Digital to Analog Converter*

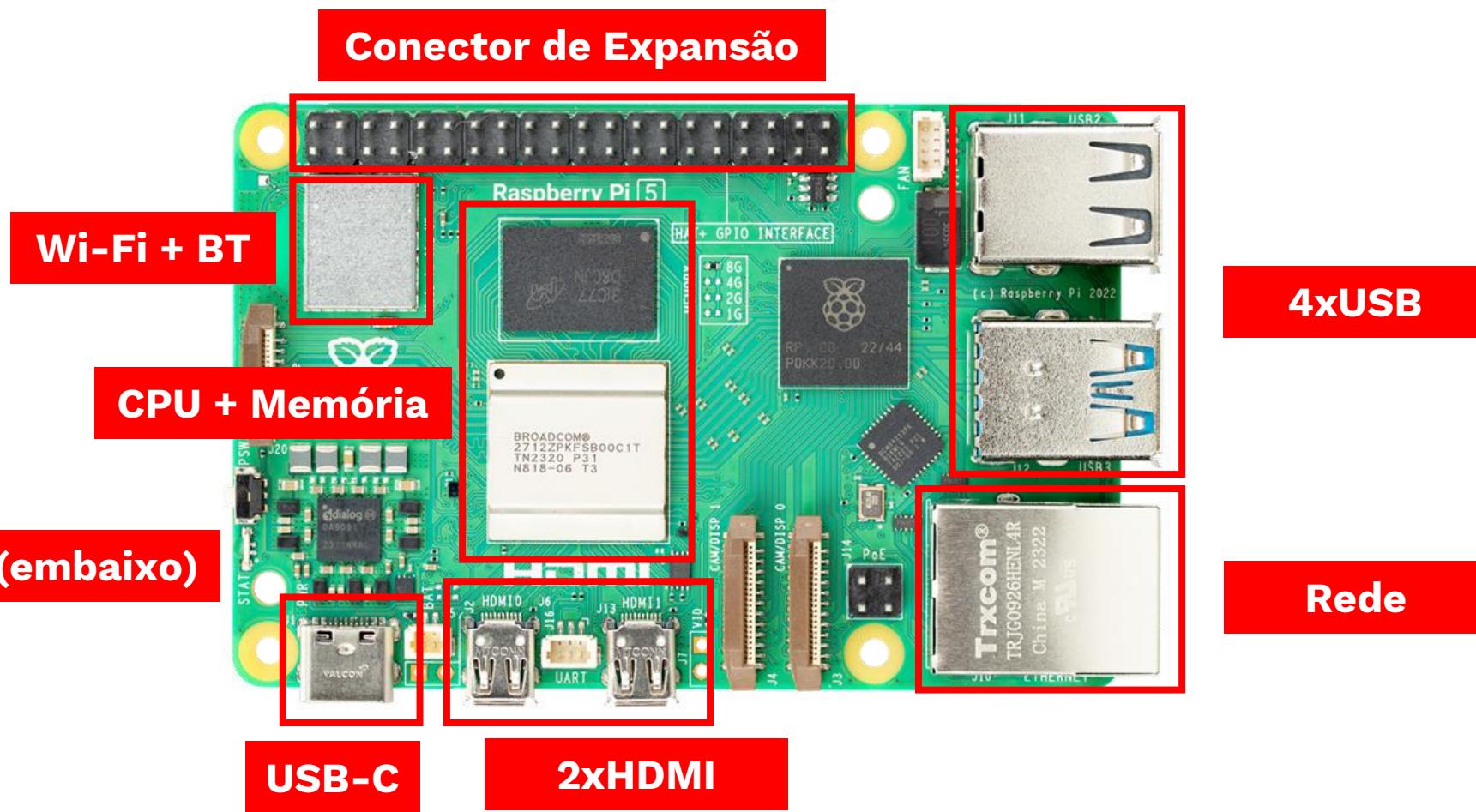
# O que é um DAC?



# O que é uma RaspberryPi?

*Computador do tamanho de um cartão de crédito*

# O que é uma RaspberryPi?



# Por que um DAC na Raspberry?

- Comunidade ampla
- Múltiplos usos
- Áudio bom em um computador pequeno
- Nova Raspberry Pi 5 não tem mais saída de áudio
- Para aprender (!!!)

# Usos para um DAC na RaspberryPi



**Streamer**



**Digital Audio Player (DAP)**



**Retroconsole**

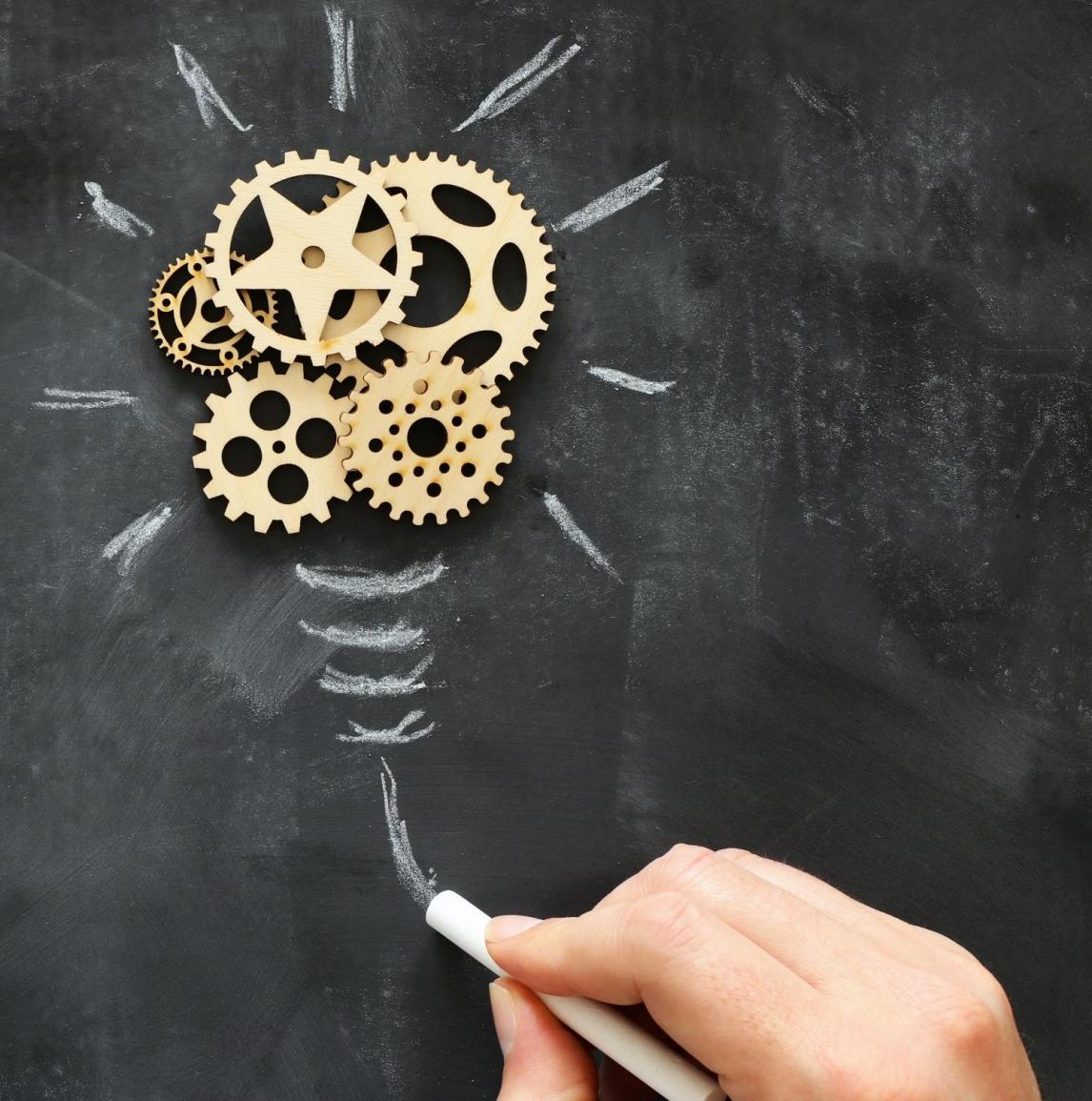
# Etapas do Projeto

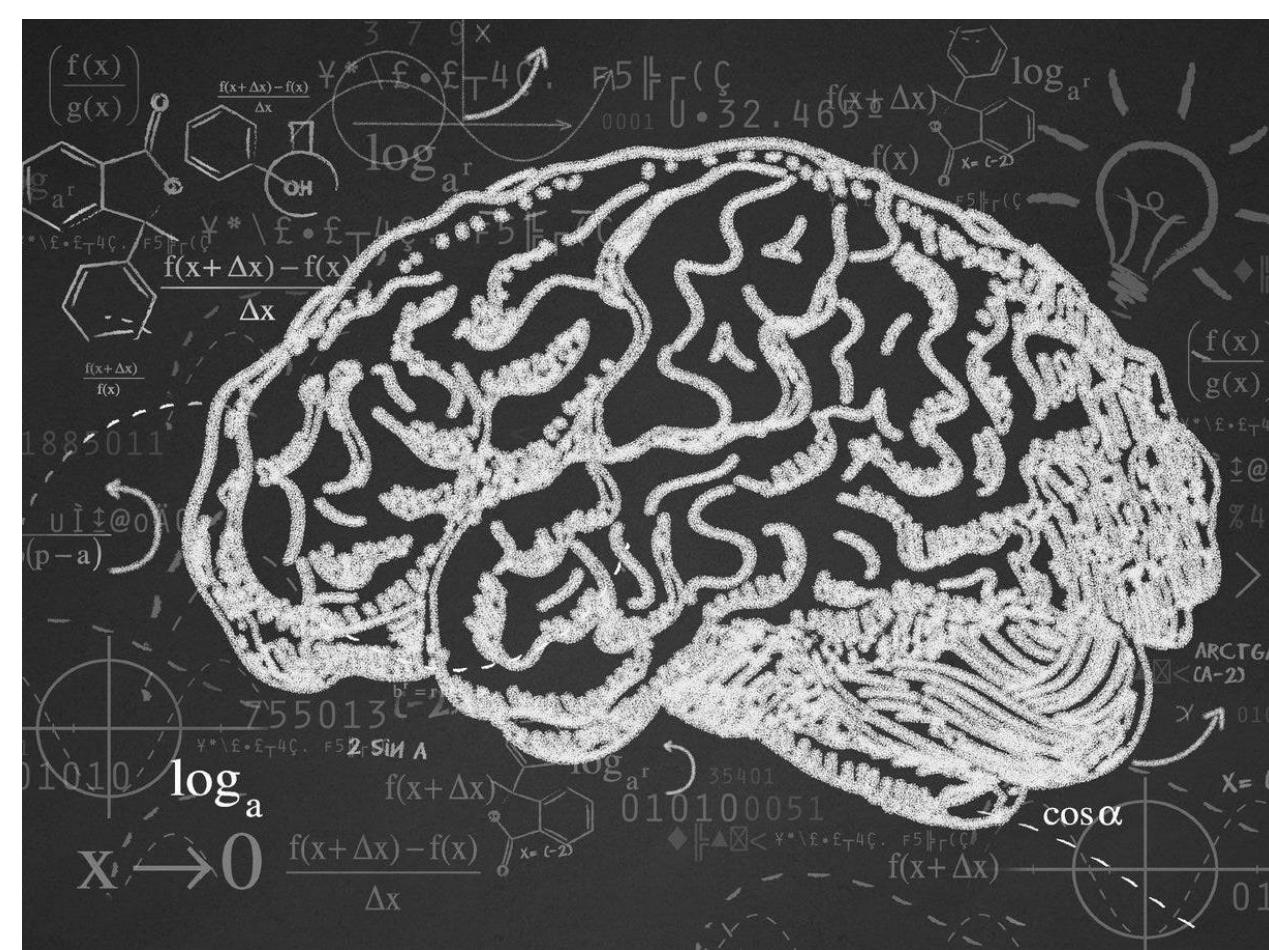
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# Conceito inicial

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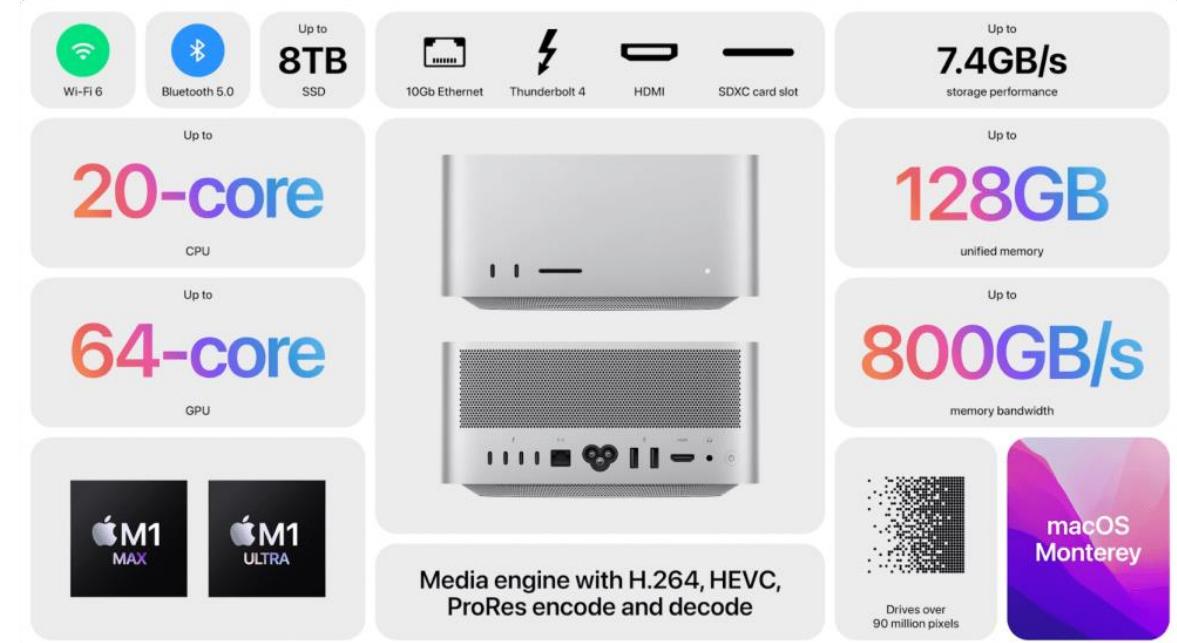


**Desejos e expectativas → Idéia no papel**



# Especificação

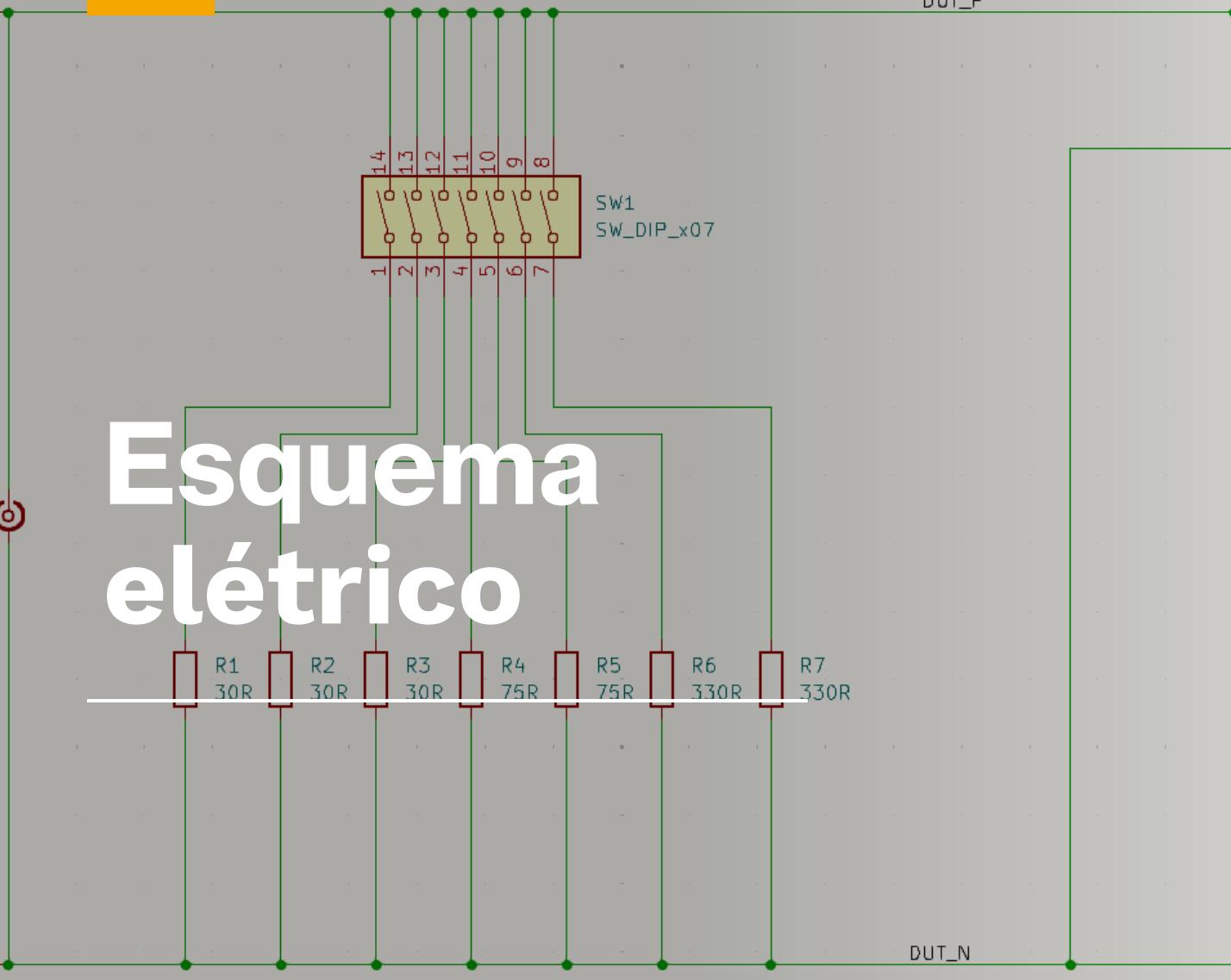




**Idéia no papel → Tabelas, Diagramas,  
Prestissas, Restrições, etc**

interface

Resistor network

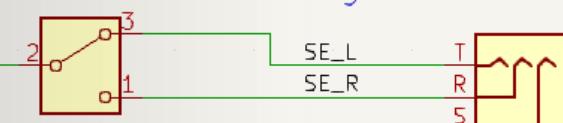


# Esquema eléctrico

DUT\_P

DUT\_N

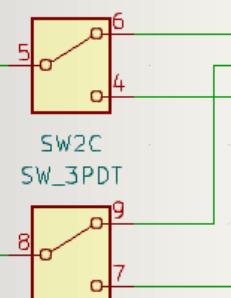
SW2A  
SW\_3PDT



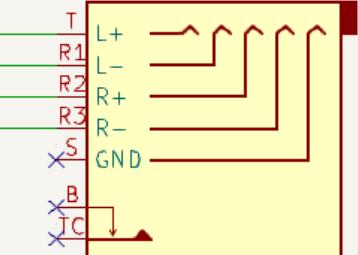
Single Ended 6.35mm Jack

J1  
AudioJack3

SW2B  
SW\_3PDT



Balanced 4.4mm Jack (Pentaconn)



J2  
AudioJack\_Pentaconn



Up to  
**8TB**  
SSD

Up to  
10Gb Ethernet  
Thunderbolt 4

HDMI  
SDXC card slot

Up to  
**7.4GB/s**  
storage performance

Up to  
**i-core**

CPU

Up to  
**U-core**

GPU

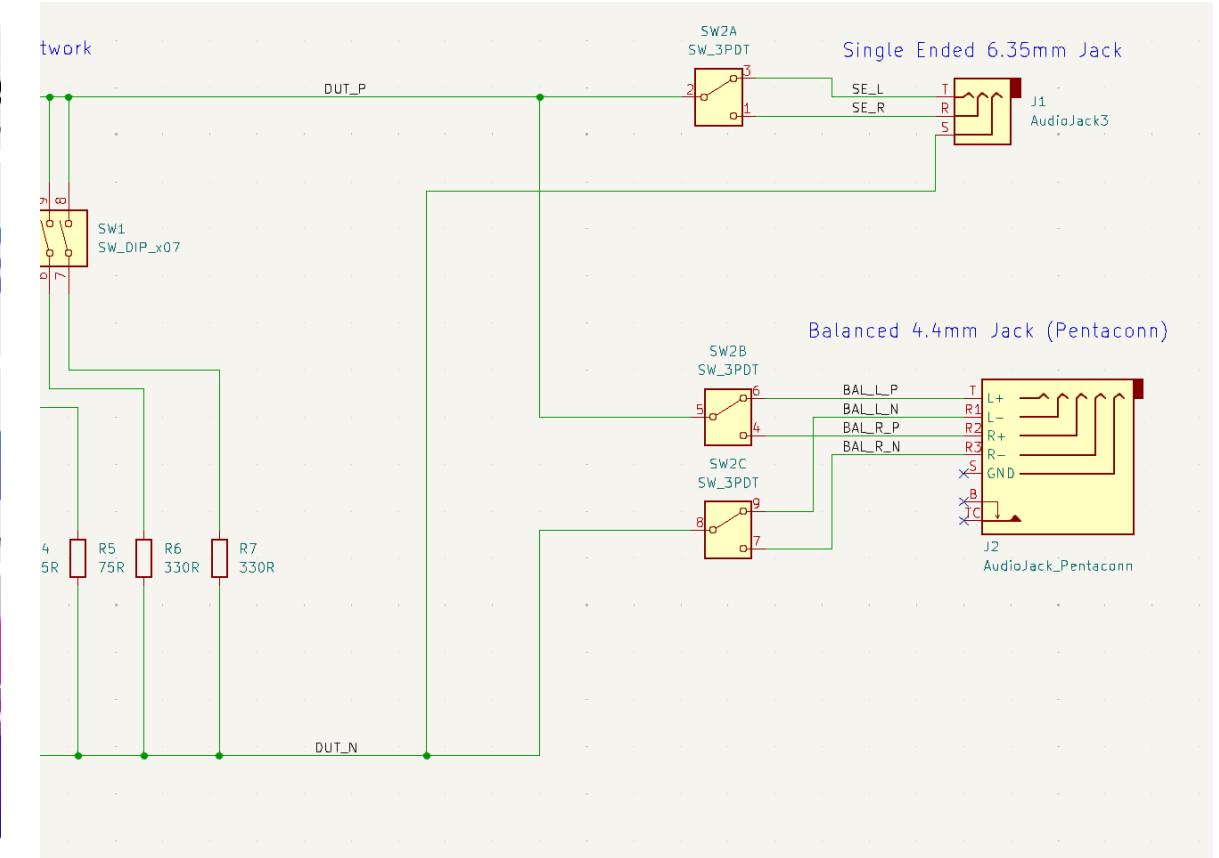
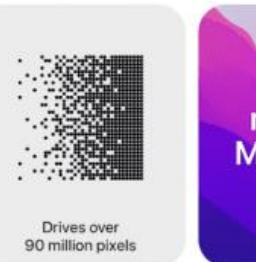


Media engine with H.264, HEVC,  
ProRes encode and decode



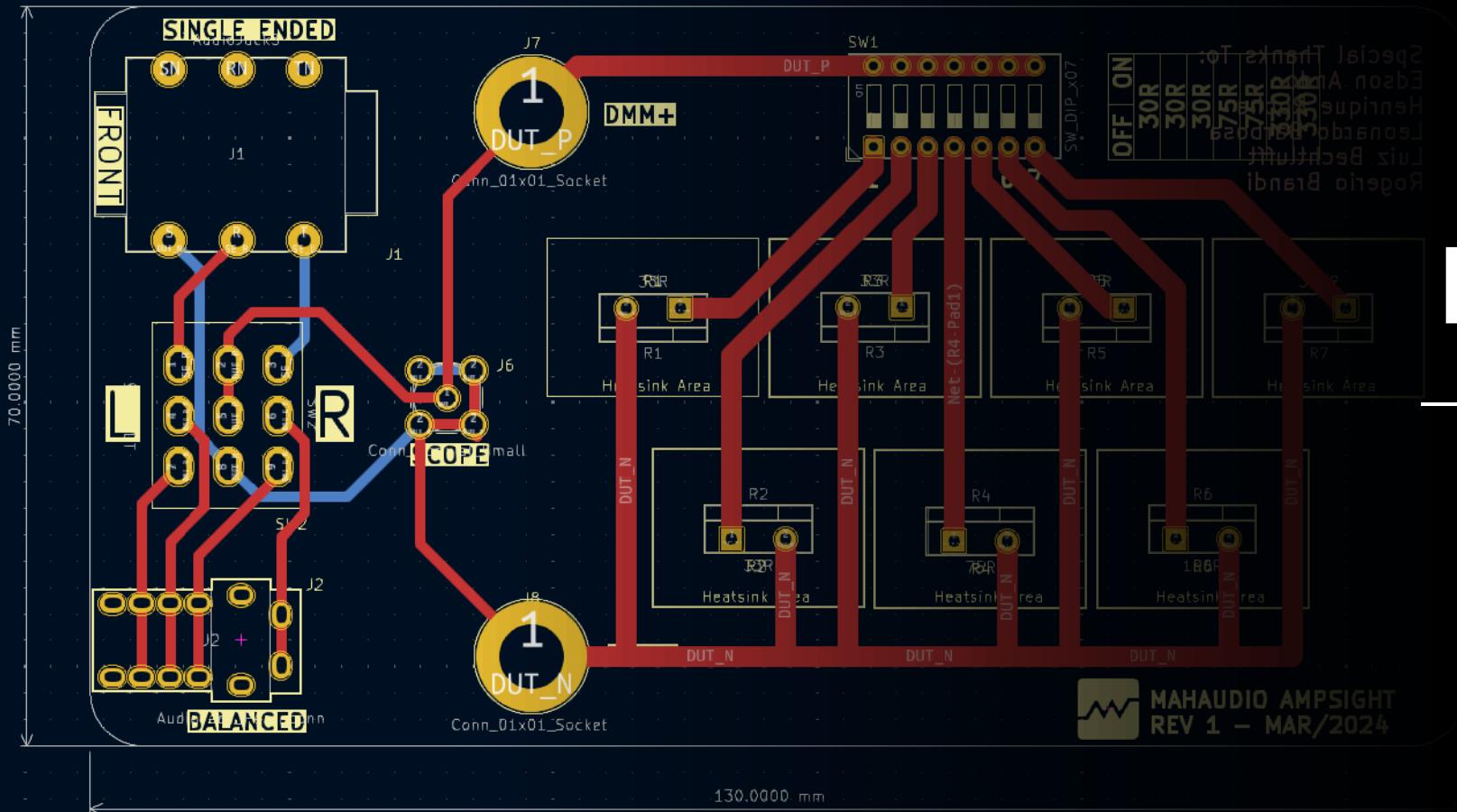
Up to  
**128G**  
unified memory

Up to  
**800G**  
memory bandwidth



# Especificações → Diagrama Esquemático

Layer Name	Type	Material	Thickness (mm)	Color	Epsilon R	Loss Tangent
F.Silkscreen	Top Silk Screen	Not specified	0 mm	White	1	0
F.Paste	Top Solder Paste		0 mm		1	0
F.Mask	Top Solder Mask	Not specified	0.01 mm	Black	3.3	0
F.Cu	copper		0.035 mm		1	0
Dielectric 1	core	FR4	1.51 mm	FR4 natural	4.5	0.02
B.Cu	copper		0.035 mm		1	0
B.Mask	Bottom Solder Mask	Not specified	0.01 mm	Black	3.3	0
B.Paste	Bottom Solder Paste		0 mm		1	0
B.Silkscreen	Bottom Silk Screen	Not specified	0 mm	White	1	0



# Layout



Up to  
**8TB**  
SSD

Up to  
10Gb Ethernet  
Thunderbolt 4

HDMI  
SDXC card slot

Up to  
**7.4GB/s**  
storage performance

Up to  
**i-core**

CPU

Up to  
**l-core**

GPU

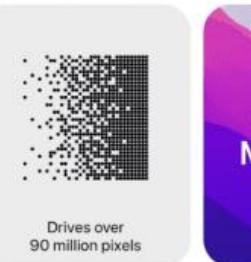
**1**  
**M1**  
ULTRA



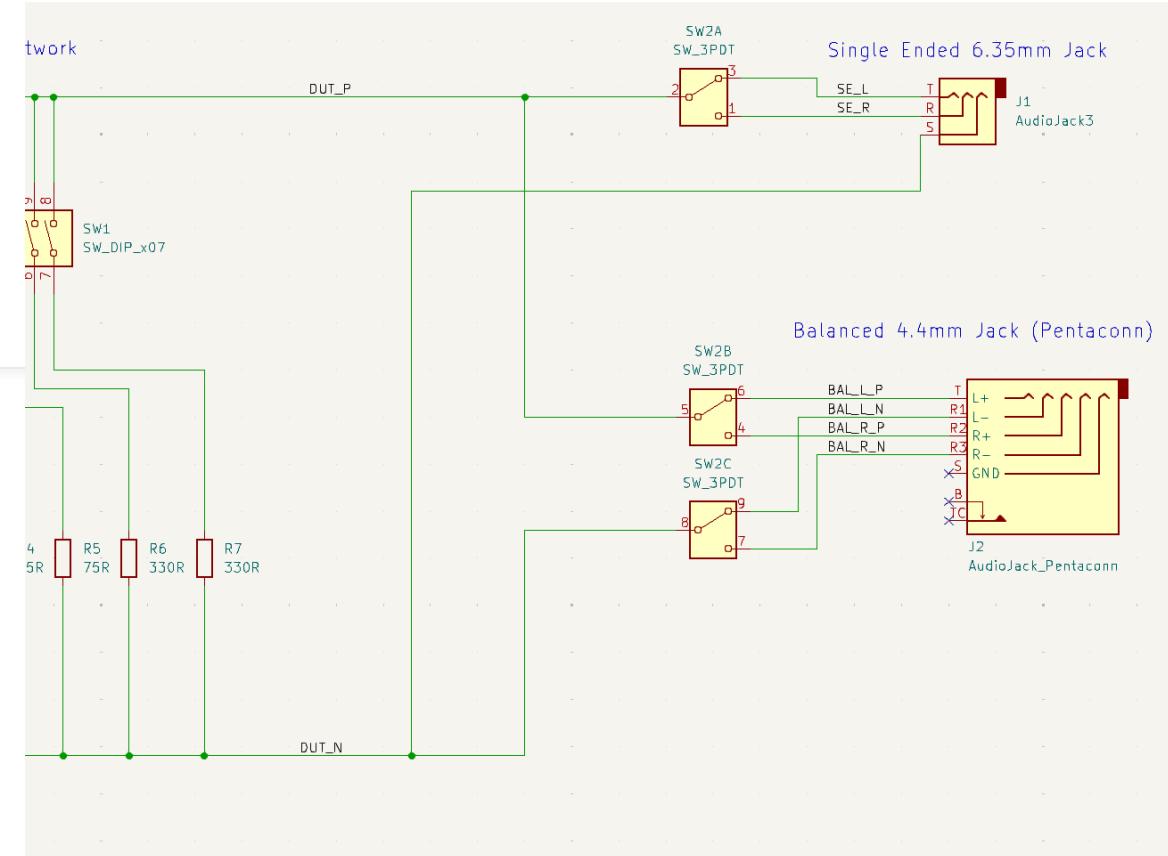
Media engine with H.264, HEVC,  
ProRes encode and decode

Up to  
**128G**  
unified memory

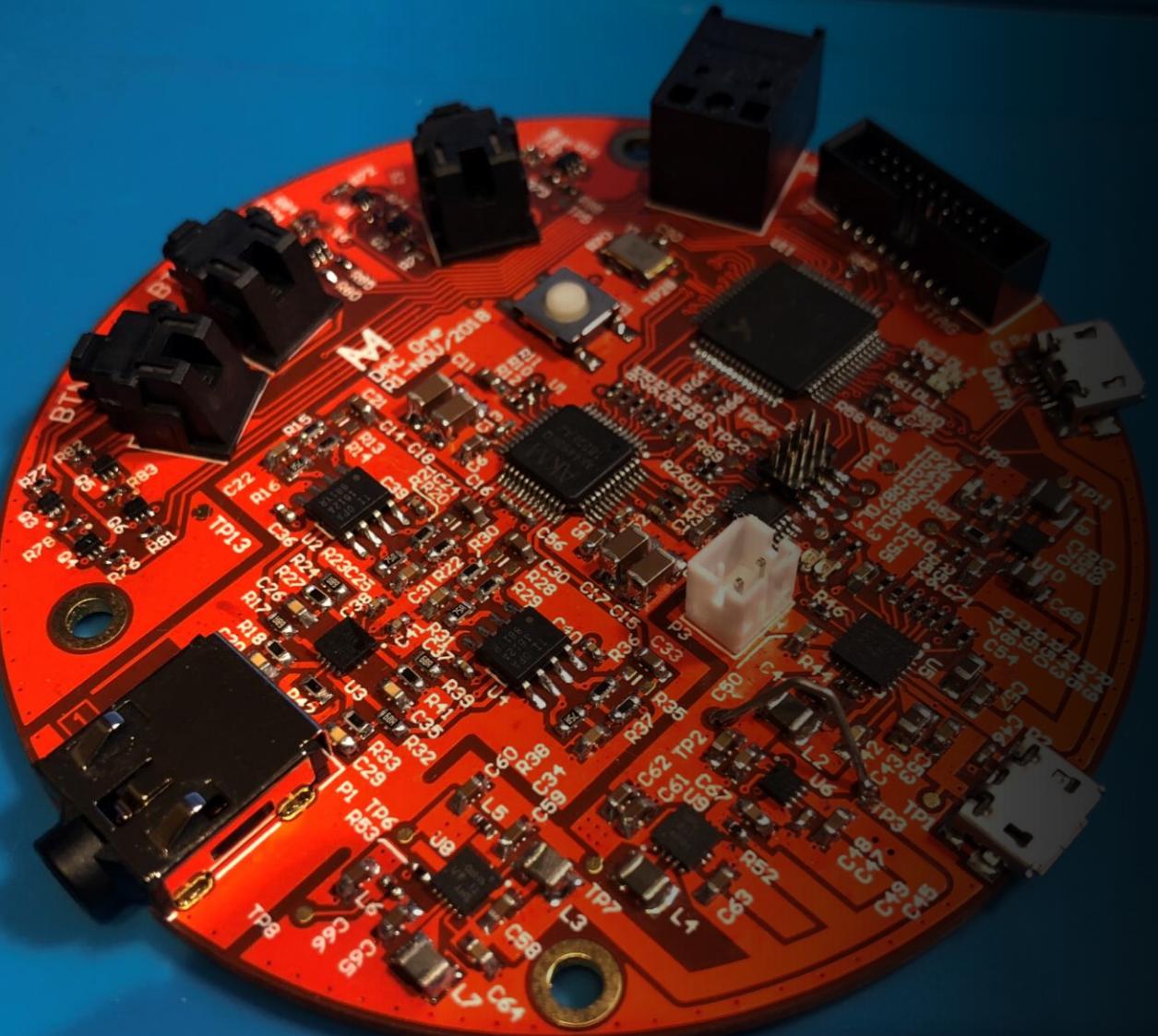
Up to  
**800G**  
memory bandwidth



Drives over  
90 million pixels



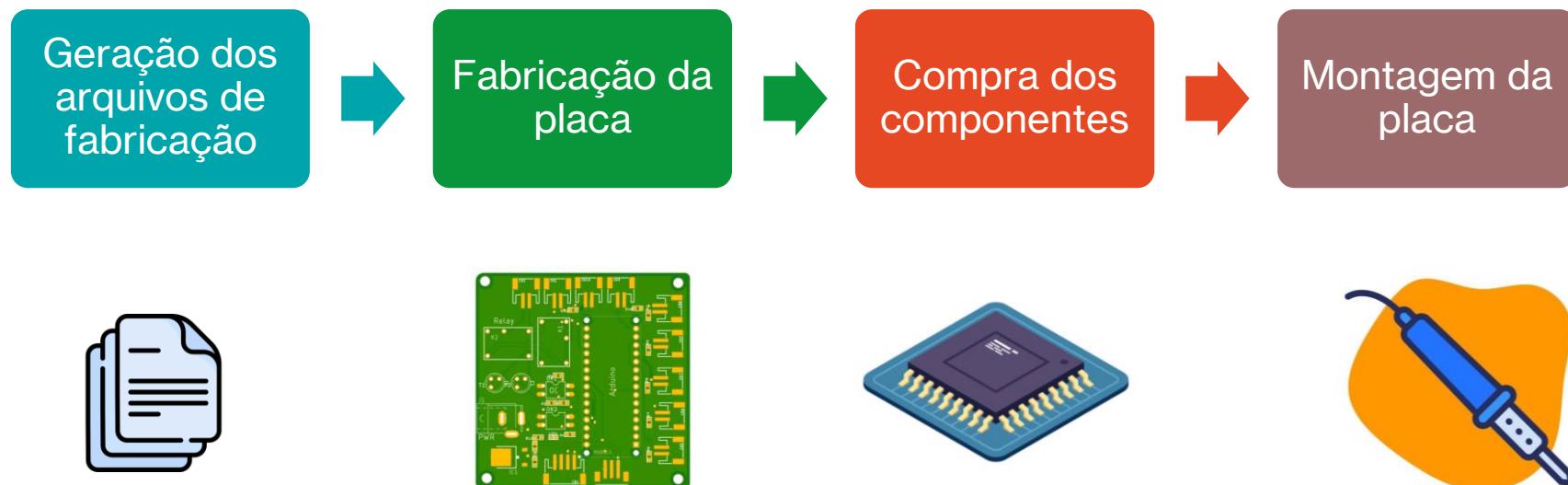
# Especificações → Diagrama Esquemático



# Prototipagem

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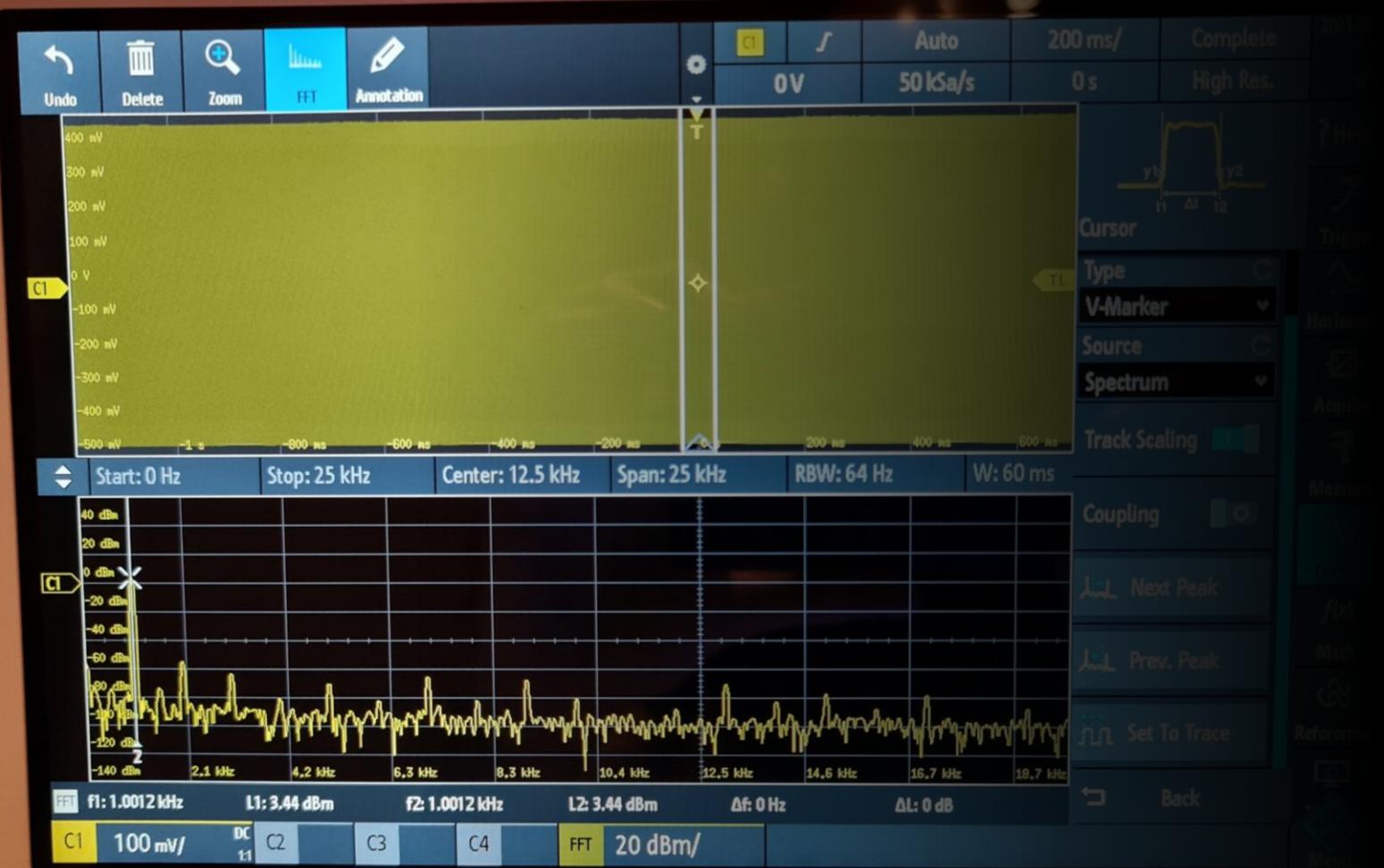
# Fluxo de prototipagem





ROHDE &amp; SCHWARZ

RTB2004 · Digital Oscilloscope · 2.5 GSa/s



# Testes





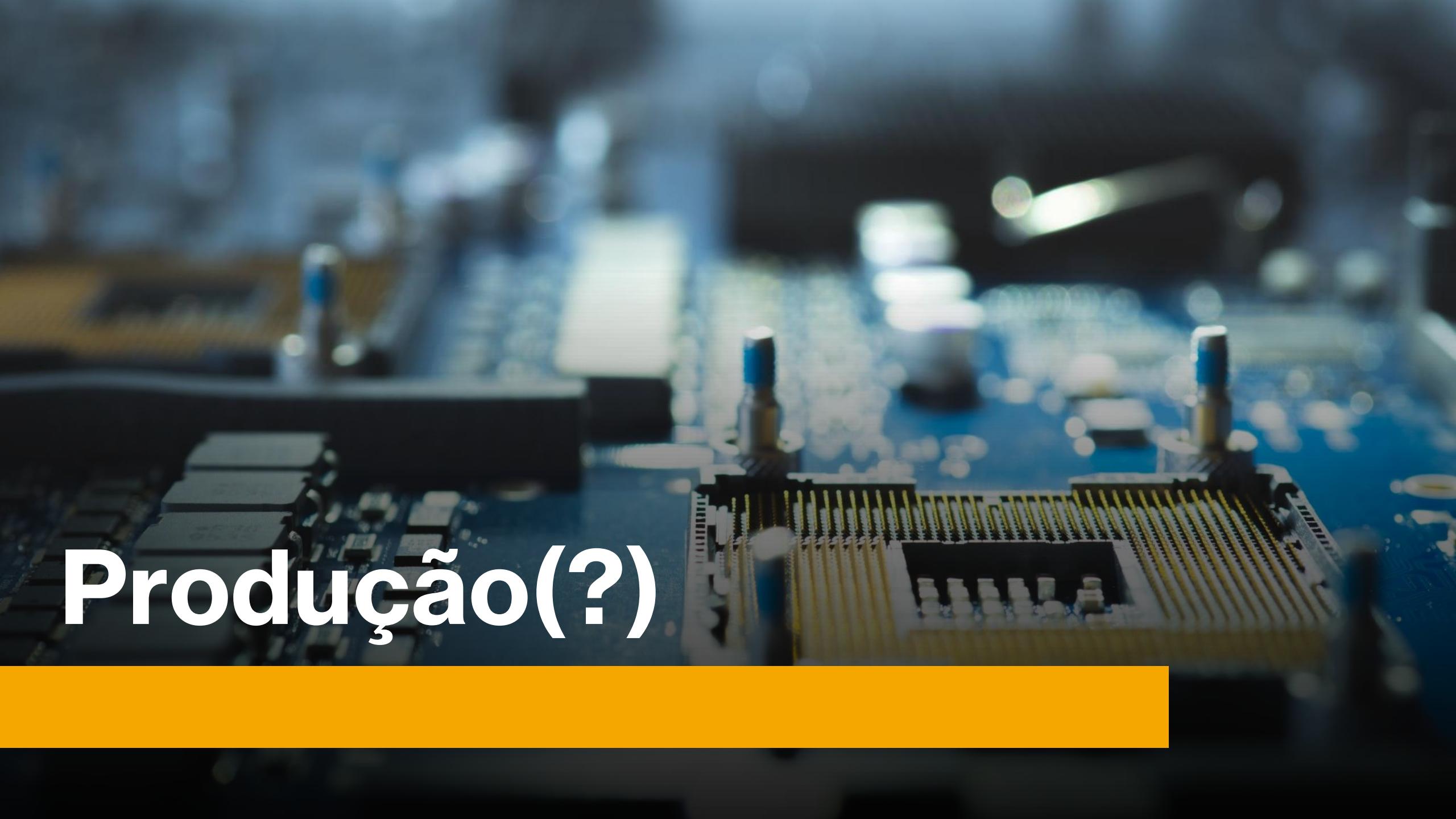
**Software**

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# Verificação e Validação

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Produção(?)

# Alguns pontos sobre Gestão

- Vídeos → Playlist pública
- Objetivo → 2 Lives por mês
  - Começamos na live, mas completamos offline
- Lives e vídeos tem grandes etapas;
- Apoiadores ficam por dentro do dia a dia;
- Todos os resultados → github do projeto
- Se obtivermos um bom produto → Podemos produzir e vender

# Conceito inicial

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