Projetando um DAC para RaspberryPi
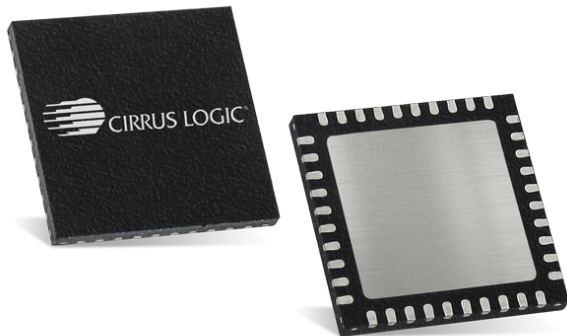
Live 06 – Análise do AK4493

mahaudio

Valeu apoiadores!

- Alexandre
- Beatriz
- Cássio
- Digão
- Edson
- Erik
- Henrique
- Leonardo B.
- Leonardo C.
- Rogério

Na live anterior

PCM and DSD Processor Mode Parameter [2,3,4]				Minimum	Typical	Maximum	Units
HPOUTx; R_L = 10 kΩ C_L = 200 pF OUT_FS = 10 Volume = 0 dB,[5] unless otherwise specified	Dynamic range (defined in Table 3-1)	24-bit, 32-bit, DSD	A-weighted	122	128	—	dB
			Unweighted	119	125	—	dB
		16-bit	A-weighted	91	97	—	dB
			Unweighted	88	94	—	dB
	THD+N (defined in Table 3-1)	24-bit, 32-bit	0 dB	—	−113	−107	dB
			−20 dB	—	−95	—	dB
			−60 dB	—	−65	−59	dB
		16-bit	0 dB	—	−94	−88	dB
			−20 dB	—	−74	—	dB
			−60 dB	—	−34	−28	dB
		DSD	0 dB	—	−109	−103	dB
			−20 dB	—	−95	—	dB
			−60 dB	—	−65	−59	dB
	Idle channel noise (A-weighted) (defined in Table 3-1)	24-bit, 32-bit, DSD		—	0.55	—	µV
	Full-scale output voltage			3.76	3.96	4.16	Vpp
	Interchannel isolation [6] (defined in Table 3-1)		217 Hz	—	120	—	dB
			1 kHz	—	120	—	dB
			20 kHz	—	100	—	dB

HPOUTx; R_L = 16 Ω C_L = 200 pF OUT_FS = 00 Volume = 0 dB, unless otherwise specified	Dynamic range (defined in Table 3-1)	24-bit, 32-bit	A-weighted	113	119	—	dB
			Unweighted	110	116	—	dB
		16-bit	A-weighted	89	95	—	dB
			Unweighted	86	92	—	dB
	THD+N (defined in Table 3-1)	24-bit, 32-bit	0 dB	—	−100	−94	dB
			−20 dB	—	−86	—	dB
			−60 dB	—	−56	−50	dB
		16-bit	0 dB	—	−94	−88	dB
			−20 dB	—	−74	—	dB
			−60 dB	—	−34	−28	dB
		DSD	0 dB	—	−100	−94	dB
			−20 dB	—	−86	—	dB
			−60 dB	—	−56	−50	dB
	Idle channel noise (A-weighted) (defined in Table 3-1)	24-bit, 32-bit, DSD		—	0.55	—	µV
	Full-scale output voltage			1.34	1.41	1.48	Vpp
	Output power			—	15.6	—	mW
	Interchannel isolation [6] (defined in Table 3-1)		217 Hz	—	105	—	dB
			1 kHz	—	100	—	dB
			20 kHz	—	85	—	dB

CIRRUS LOGIC

PROS
- HP AMP
- IMPEDANCIA DE E AS
- POUCOS COMP EXT
- DESIGN SIMPLES ELÉTRICO
- PERF α
- QFN

CONS
- COMPLEXO (MUITO) ✓
- É CARO 12,52 USD ✓
- N TEM RST NECESSÁRIA
- N TEM SNR NO MANUAL
MUITO TRABALHO POR POUCA COISA

Dynamic Range vs SNR

Parameter	Definition
Dynamic range	The ratio of the rms value of the signal to the rms sum of all other spectral components over the specified bandwidth. A signal-to-noise ratio measurement over the specified bandwidth made with a –60-dB signal; 60 dB is added to resulting measurement to refer the measurement to full scale. This technique ensures that distortion components are below the noise level and do not affect the measurement. This measurement technique has been accepted by the Audio Engineering Society, AES17–1991, and the Electronic Industries Association of Japan, EIAJ CP–307. Dynamic range is expressed in decibel units.

A-weight

- Calibração para percepção humana
- Curvas padrão → Instrumento calibra

A-weighting (blue), B (yellow), C (red), and D-weighting (blk)
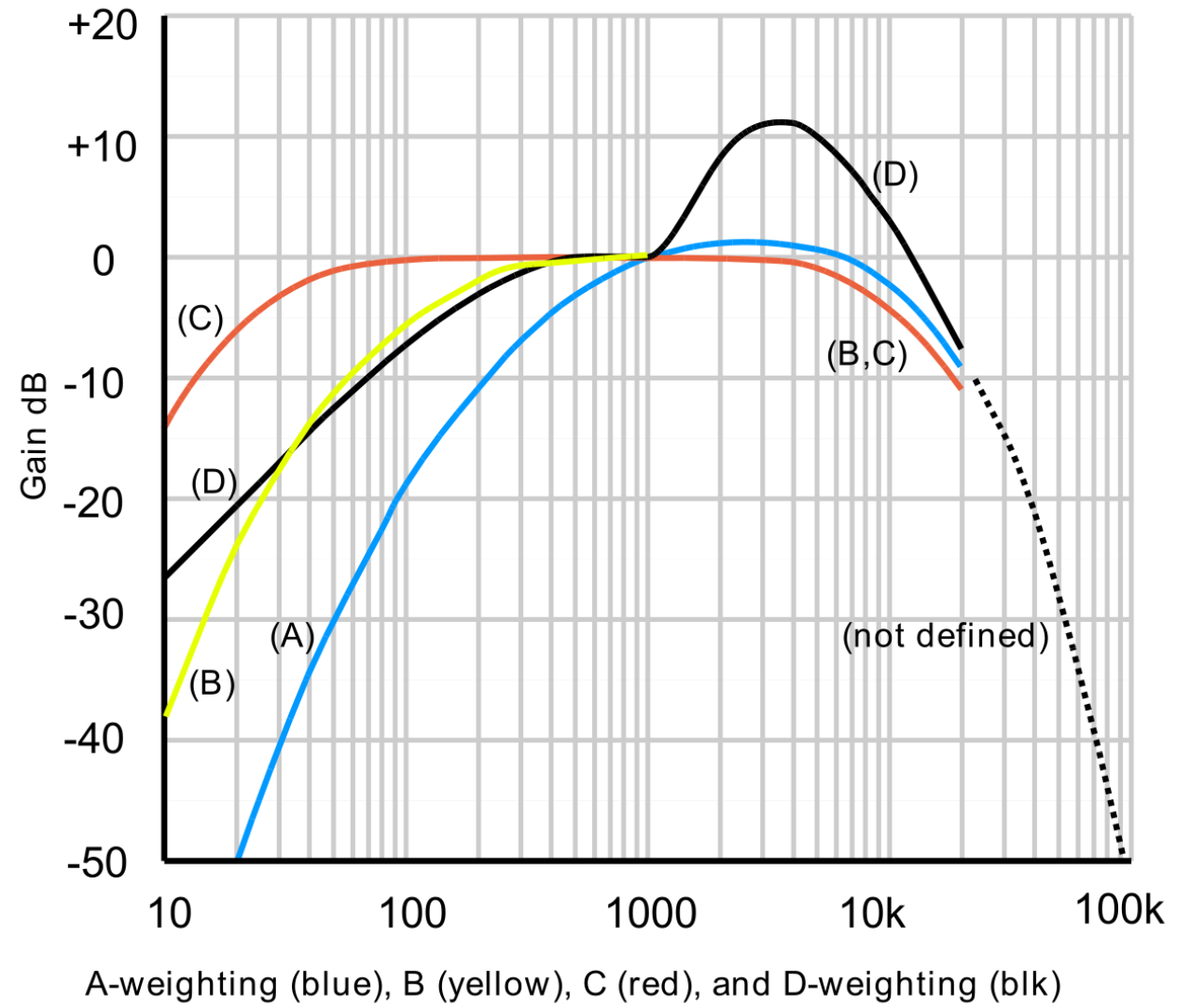
Relendo as specs de sinal

PCM and DSD Processor Mode Parameter [2,3,4]				Minimum	Typical	Maximum	Units
HPOUTx R_L = 600 Ω C_L = 200 pF OUT_FS = 11 Volume = 0 dB +1dB_EN = 0, unless otherwise specified	Dynamic range (defined in Table 3-1)	24-bit, 32-bit, DSD	A-weighted	124	130	—	dB
			Unweighted	121	127	—	dB
		16-bit	A-weighted	91	97	—	dB
			Unweighted	88	94	—	dB
	THD+N (defined in Table 3-1)	24-bit, 32-bit	0 dB	—	−115	−109	dB
			−20 dB	—	−97	—	dB
			−60 dB	—	−67	−61	dB
		16-bit	0 dB	—	−94	−88	dB
			−20 dB	—	−74	—	dB
			−60 dB	—	−34	−28	dB
		DSD	0 dB	—	−108	−101	dB
			−20 dB	—	−97	—	dB
			−60 dB	—	−67	−61	dB
	Idle channel noise (A-weighted) (defined in Table 3-1)	24-bit, 32-bit, DSD		—	0.55	—	µV
	Full-scale output voltage			4.66	4.90	5.14	Vpp
	Output power			—	5	—	mW
	Interchannel isolation (defined in Table 3-1)		217 Hz	—	120	—	dB
			1 kHz	—	120	—	dB
			20 kHz	—	100	—	dB
HPOUTx R_L = 600 Ω C_L = 200 pF OUT_FS = 11 Volume = 0 dB +1dB_EN = 1, unless otherwise specified	THD+N (defined in Table 3-1)	24-bit, 32-bit, DSD	0 dB	—	−105	—	dB
	Full-scale output voltage			5.42	5.70	5.99	Vpp
	Output power			—	6.8	—	mW
Other characteristics for HPOUTx	Interchannel gain mismatch (defined in Table 3-1)			—	±0.1	—	dB
	Interchannel phase mismatch (defined in Table 3-1)			—	—	±0.01	°
	Output offset voltage: Mute (defined in Table 3-1)			—	±50	±100	µV
	Gain drift (defined in Table 3-1)			—	±100	—	ppm/°C
	Load resistance (R_L)			600	—	—	Ω
	Load capacitance (C_L)			—	—	1	nF
	Turn-on time (defined in Table 3-1)			—	—	12	ms
	Click/pop during PDN_HP enable or disable		A-weighted	—	±50	±100	µV

Um resumo

Pros
SNR = 130dB
THD+N = -115dB
Amplificador de Fones
Medição de impedância
PLL interno
Poucos componentes externos

Cons
Complexo
Caro – USD 12.52
Fraco - 30mW em 32ohms (SE)
Saída pseudo diferencial
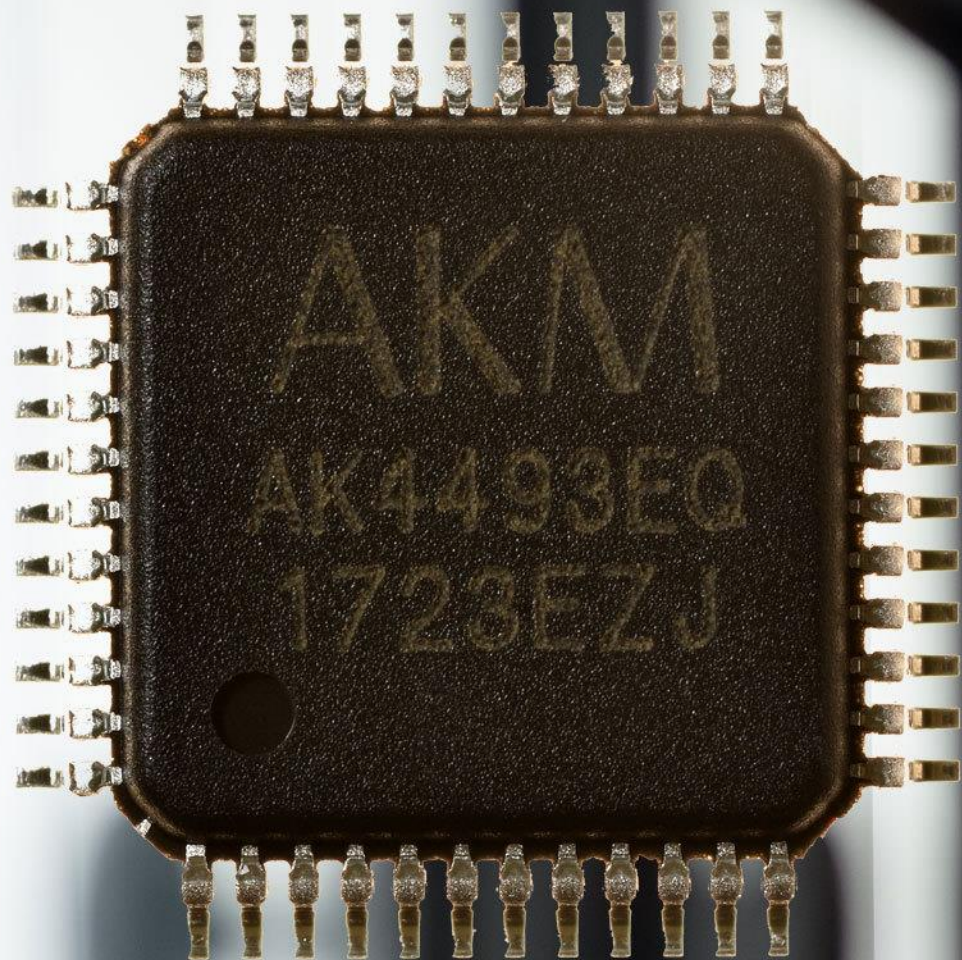
Análise do AK4493EQ

Próximos
Passos