



Get louder sound from a small, power-efficient amplifier

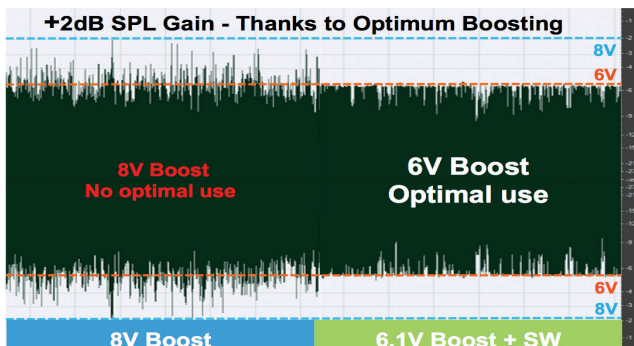
TFA9896 Smart Power Amplifier



The tiny TFA9896 smart power amplifier enhances user experience with great battery consumption performance, improved call quality and more loudness.

FEATURES AND BENEFITS OF TFA9896

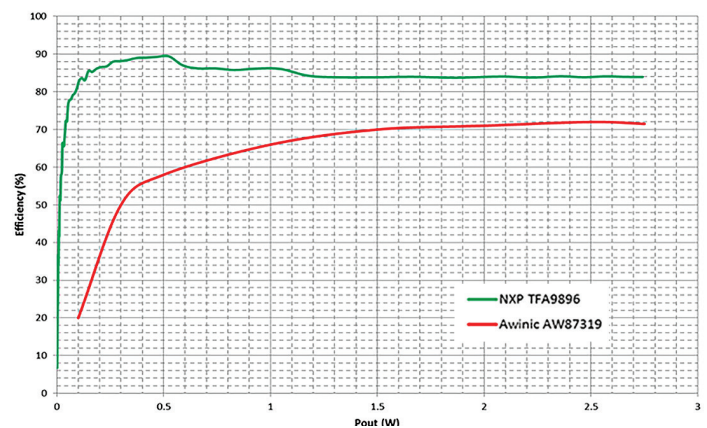
- ▶ Higher output power
 - 2.1 W–8 Ohm and 3.2 W–4 Ohm
 - 6.1 V voltage boost
 - >3.4 Ohm speaker impedance
- ▶ Power consumption
 - Ultra-low power idle mode 22mW
 - > 80% Efficiency when playing standard audio
- ▶ Embedded DSP
- ▶ Speaker Protection 2.0
- ▶ Proposed with NXP® Audio Software suite
- ▶ Package size: 2.72 x 2.06 mm



PERFORMANCE AND SOUND QUALITY

Get better loudness and sound quality at 6.1V than available 8V solutions

EFFICIENCY COMPARISON



HIGH EFFICIENCY

Improved battery consumption extends audio playback time



KEY FEATURES

▶ SPK Class-D

- 2.1W into 8 Ohm (THD <1%; VBAT= 4V)
- 3.2W into 4 Ohm (THD <1%; VBAT= 4V)
- Low noise: 27 μ V at normal gain mode; 18 μ V at low gain mode

▶ 6.1V DC-DC Boost

- Enabling high output power to the speaker
- High system efficiency

▶ Power consumption

- Ultra-low power idle mode: 22 mW at silent input (DSP bypassed)
- Optimized battery consumption of 169 mW at P_{OUT} =130 mW average
- Total system efficiency >83%
P_{OUT}= 1W, RL= 8 Ohm and VBAT=4V

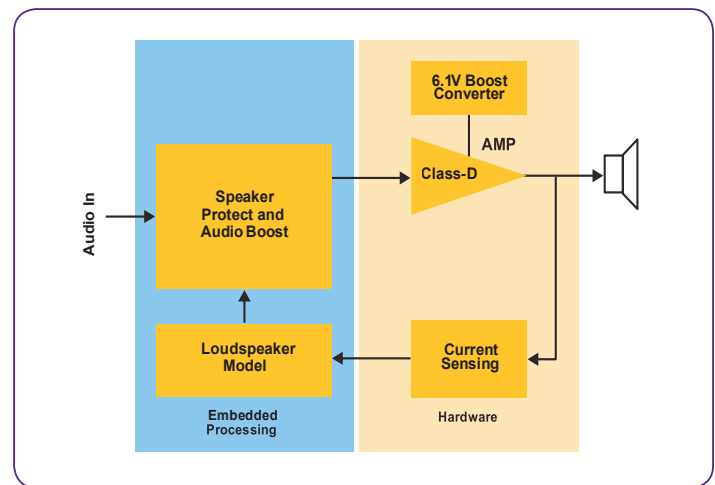
▶ Embedded DSP (optional to use)

- Speaker damage protection for thermal mechanical damage overload and enhanced loudness on speaker for 2 to 3 dB
- Enhanced battery safeguard

▶ 2 x TDM Full Duplex (Four lines)

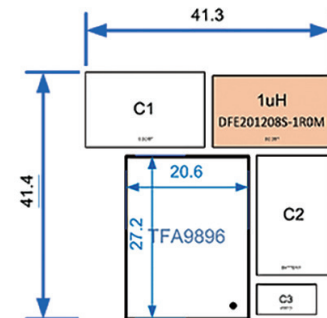
- Support for 2 to 16 slots
- Input and output for main audio stream, speaker current and voltage monitoring for enhancing acoustic echo cancellation (AEC)
- Gain I/O synchronization

TFA9896 BLOCK DIAGRAM



PCB AREA

Optimized area and cost



SMART AMPLIFIER PORFOLIO

		Size Optimized Products	
		TFA9895	TFA9896
Product Information	Embedded DSP	Yes	Yes
	Package type	WLCSP29	WLCSP30
	Package size	3.19 x 2.07 x 0.6	2.72 x 2.06 x 0.5
Interfaces	Audio input interface	2 x TDM-I2S	TDM-I2S 2 Data
	Inter-chip communication	TDM-I2S	TDM-I2S 2 Data
	AAEC feedback	Yes	Yes
Performance	Boost voltage	5.3 V	6.1 V
	RMS output power (8 Ω)	1.65 W	2.1 W
	RMS output power (4 Ω)	2.65 W	3.2 W
	Speaker channels	Mono	Mono
	Typical speaker load (Ω)	4-8	4-8-32
	PSRR (dB)	90	90
	SNR (dB)	97	100
	MB-DRC	(On Host)	(On Host)
	TDH+N	0.03%	0.03%
	Noise (μ V) /receiver mode	45/31	27/18
Special Features	Speaker as microphone	No	No
	Smart tap detection	No	No

Premium Products			
TFA9891	TFA9892	TFA9872	TFA9888
Yes	Yes	No	Yes
WLCSP49	WLCSP49	WLCSP42	WLCSP99
3.43 x 2.98 x 0.6	3.63 x 3.13 x 0.5	3.13 x 2.46 x 0.5	4.37 x 3.82 x 0.5
2 x TDM-I2S or 1 x PDM	2 x TDM-I2S or 1 x PDM	TDM-I2S 2 Data	TDM-I2S 3 Data and PDM
TDM-I2S, PDM	TDM-I2S, PDM	TDM-I2S 2 Data, PDM, Aux SAM	TDM-I2S 3 Data, PDM, 4 GPIOs
Yes	Yes	Yes	Yes
9.5 V	12 V	9.5 V	9.7 V
3.7 W	6.6 W	5.1 W	2 x 2.4 W
3.7 W	7 W	6 W	2 x 2.4 W
Mono	Mono	Mono	Stereo
4-8	4-8-32	4-8-32	8-32
75	75	80	80
97	115	100	103
Yes (3-band)	Yes (3-band)	(On host)	Yes (7-band)
0.03%	0.04%	0.04%	0.03%
66	16	19	42/11
No	No	(On host) V2.0	No
No	No	(On host) V2.0	No