

# Audio solution guide

## Analog audio ICs





# Analog audio solution

## STMicroelectronics offers smart analog audio solutions for all audio equipment

Leveraging its long experience in audio devices, ST offers an analog audio device portfolio covering all audio segments from a few milliwatts up to hundreds of watts. ST's portfolio offers portables, home systems and TVs a smart and reliable design resource with outstanding audio quality that takes into account the needs of the most innovative and up-to-date audio equipment.

This brochure includes a selection guide for all of ST's analog audio ICs, audio processors and power amplifiers operating in class AB and class D. A section is dedicated to low-power amplifiers specifically designed for portable and headphone applications.

### ANALOG AUDIO ADVANTAGES

You will find what you are looking for in ST's analog audio ICs portfolio to meet the needs of your particular application. Here we discuss the different aspects of the different technologies available.

### CLASS-AB AMPLIFIERS

Analog audio ICs using the traditional class-AB operating mode still offer specific advantages in many applications. We can summarize these as follows:

- Excellent audio quality
- Reliability
- Simplicity of use
- Fast implementation reducing time to market
- No EMI issues
- No interference in multichannel equipment
- Low cost due to the reduced BOM
- Output power from a few mW up to 100 W per channel

The reduced efficiency versus class-D audio amplifiers is the only drawback for the final application but this issue in most home-audio applications is not necessarily that important.

### ANALOG AUDIO ICs

- Power amplifiers
- Analog class AB
- Analog class D
- Low power
- Headphones and portables
- Audio processors
- Analog

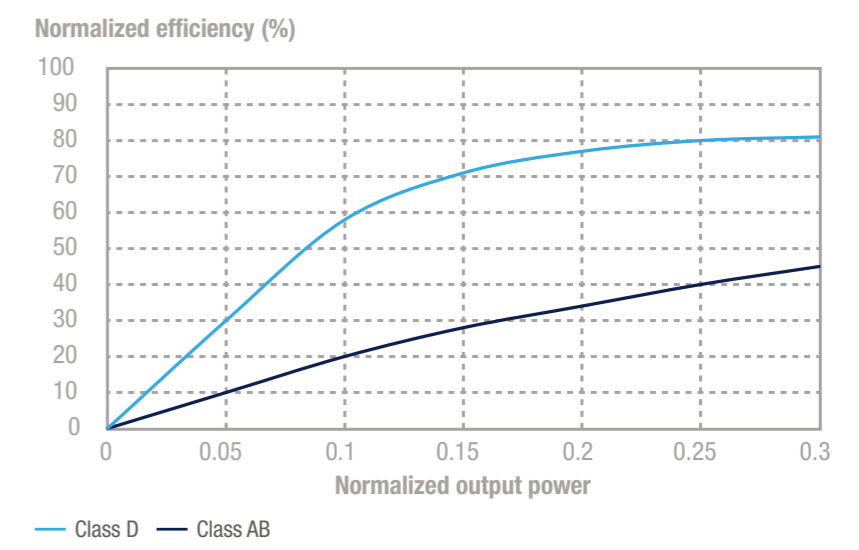
### CLASS-D AMPLIFIERS

Analog audio ICs using class-D operating mode are the recommended solution in applications where available space and efficiency are the main constraints, as is the case for portables and flat panel TVs, for example.

The higher efficiency offered by class-D solutions extends battery life in portable equipment, reduces the heatsink dimensions or eliminates it completely for the devices assembled in packages that use the PCB copper area as dissipating element.

ST's class-D portfolio gives you a wide choice of devices to meet the specific needs of your particular application, including from portables, active speakers, TVs and home systems. Our class-D amplifiers feature:

- High efficiency
- Differential inputs for common mode noise reduction
- Filterless operation
- Fixed selectable gains
- Externally synchronizable
- Output power from a few mW up to 200W per channel



## ANALOG AUDIO PROCESSORS

Analog audio processors are designed to control more advanced features on home audio systems, such as tone controls, surround mode, voice canceller, input and output multiplexers, bass boost, bass ALC and headphone driving capability.

Data transmission between the main application microprocessor and the audio processor is via a 2-wire I<sup>2</sup>C bus interface.

Part number	Number of stereo inputs	Tone control	Surround modes	Volume control	Speaker attenuation	Supply voltage min/max (V)	Packages
TDA7430	4	3	3		•	7/10.2	TQFP44
TDA7439DS	4	3		•	•	7/10.2	S028
TDA7440D	4	2		•	•	6/10.2	S028
TDA7448	6 mono			•		4.75/10	S020
TDA7468D	4	2		•	•	5/10	S028
TDA7309D	3			•		6/10	S020

## CLASS-AB ANALOG AMPLIFIERS

### Medium and high power

Class-AB audio amplifiers offer excellent clarity and signal fidelity. Featuring pure analog, this signal quality is paid for with lower power efficiency relative to class D amplifiers. Nevertheless, these reliable components offer a warm, full-bodied tone that guarantees their place in the best audio systems available. The TDA729X family is recognized as a preferred solution for systems made with audiophiles in mind.

Part number	Mono	Stereo	Output power per channel (W) (1)	Mute/Standby	Supply voltage min/max (V)	Packages
TDA2009A		•	10		8/28	Multiwatt 11
TDA7269A		•	14	•	±5/±22	Multiwatt 11
TDA7264		•	25	•	±5/±25	Multiwatt 8
TDA7265		•	25	•	±5/±25	Multiwatt 11
TDA7265A		•	25	•	10/50	Multiwatt 11
TDA7265B		•	30	•	±8/±35	Multiwatt 11
TDA7266M	•		7	•	3/18	Multiwatt 15
TDA7266		•	7	•	3/18	Multiwatt 15
TDA7292		•	40	•	±8/±35	Multiwatt 11
TDA7296		•	60	•	±10/±40	Multiwatt 15
TDA7295	•		80	•	±10/±40	Multiwatt 15
TDA7294V/HS	•		10	•	±10/±40	Multiwatt 15
TDA7293V/HS	•		100	•	±12/±50	Multiwatt 15
STA540		2/3/4 ch	(2)	•	8/22	Multiwatt 15

Notes:

(1) Output power specified at THD = 10%

(2) Output power : 2 x 26 W; 2 x 12 W + 1 x 26 W; 4 x 12 W

## Class AB, low power

ST's low-power class-AB audio amplifiers offer quality and simplicity of use in applications such as small active speakers, radio and in all audio equipment requiring low power and high-quality audio.

Part number	Mono	Stereo	Output power per channel (W)	Mute/standby	Supply voltage min/max (V)	Packages
TDA2822D	•	•	1 x 1, 2 x 0.3		1.8/15	S08
TDA7233D	•		1		1.8/15	S08
TDA7266P		•	5	•	3.5/12	PowerS0-20
TDA7266D		•	3	•	3.5/12	PowerSS0-24

## CLASS-D ANALOG AMPLIFIERS

ST's analog switch-mode class-D power amplifiers enable a higher efficiency, thus reducing the power dissipation and the need for larger heatsinks.

The class-D portfolio ranges from 3 W up to 2 x 160 W in mono and stereo configurations and offers:

- Filtered and filterless operation
- External synchronization
- Selectable gains
- Surface-mount PS036 and PSS036 slug-up and -down packages for optimized space

Part number	Channels	Output power (W)	Selectable gain (dB)	Filterless	Differential inputs	Supply voltage min/max (V)	Packages
TDA7493	1	2 x 3	20, 26, 30, 36	•	•	3 to 5.5	HTSS0P24
TDA7491LP	2	2 x 5	20, 26, 30, 36	•	•	5 to 14	PSS036 slug-down
TDA7491P	2	2 x 10	20, 26, 30, 36	•	•	5 to 18	PSS036 slug-down
TDA7491HV	2	2 x 20	20, 26, 30, 36		•	5 to 18	PSS036 slug-down
TDA7491MV	1	1 x 25	20, 26, 30, 36		•	5 to 18	PSS036 slug-down
TDA7492	2	2 x 50	21.6, 27.6, 31.1, 33.6		•	10 to 26	PSS036 slug-up
TDA7492P	2	2 x 25	21.6, 27.6, 31.1, 33.6		•	10 to 26	PSS036 slug-down
TDA7492MV	1	1 x 50	21.6, 27.6, 31.1, 33.6		•	10 to 26	PSS036 slug-down
TDA7492PE	2	2 x 45	20.8, 26.8, 30, 32.8		•	7 to 26	PSS036 slug-down
TDA7492E*	2	2 x 60	20.8, 26.8, 30, 32.8		•	7 to 26	PSS036 slug-up
TDA7498L	2	2 x 80	25.6, 31.6, 35.1, 37.6		•	10 to 36	PSS036 slug-up
TDA7498	2	2 x 100	25.6, 31.6, 35.1, 37.6		•	10 to 36	PSS036 slug-up
TDA7498MV	1	1 x 100	25.6, 31.6, 35.1, 37.6		•	10 to 36	PSS036 slug-up
TDA7498E	2	2 x 160 1 x 220	23.8, 29.8, 33.3, 35.8		•	14 TO 36	PSS036 slug-up

\* coming soon

## Headphone and low power for portables

ST's headphone and low-power amplifier portfolio offers the design and feature flexibility needed to fit your application perfectly:

- Class-AB, class-G and filterless class-D architectures for optimal audio performance and power efficiency
- Integrated features to reduce bill of materials, such as capless and filterless amplification
- Many packaging options, including ultra-tiny packages for applications where board space is at a premium

Part number	Description	Channels	Output power (W)	Supply voltage min/ max (V)	Packages
TDA2822D	Dual low-voltage power amplifier	•	1 x 1, 2 x 0.3	1.8/15	S08
TDA7233D	1W audio amplifier with mute		1	1.8/15	S08
TS2007	3 W filter free class D with fixed gain	1	1 x 3	2/5.05	UFQFPN8
TS2007FC	3 W filter free class D with 6-12 dB gain select	1	1 x 3	2/5.05	Flip-Chip 500u
TS2012	Filter free 2 x 2.8W class D	2	2 x 2.8	2/5.05	VFQFPN 20
TS2012FC	Filter free 2 x 2.8W class D	2	2 x 2.8	2/5.05	
TS419	360 mW class AB	1	1x 0.36	2/5.05	MSOP/TSSOP8
TS421	360 mW class AB	1	1 x 0.36	2/5.05	VDFPN 8
TS4601B	High-performance headphone amplifier with capless output and I <sup>2</sup> C bus interface	2	2 x 0.1	2/5.05	Flip-Chip 500u
TS4621B	High-performance class-G headphone amplifier with I <sup>2</sup> C volume control	2	2 x 0.25	2/4.08	Flip-Chip 400u
TS4621E	High-performance class-G headphone amplifier with I <sup>2</sup> C volume control	2	2 x 0.25	2/4.08	Flip-chip 400u
TS4621ML	High-performance class G headphone amplifier with I <sup>2</sup> C volume control	2	2 x 0.25	2/4.08	Flip-chip 400u
TS4657	Digital audio line driver with 2.2 Vrms capless outputs			3/5.05	VFQFPN 20
TS472	Very-low-noise microphone preamplifier	1		2/5.05	Flip-chip 500u,VFQFPN24
TS482	100 mW stereo headphone amplifier	2	2 x 0.1	2/5.05	MSOP/TSSOP8/S08
TS4871	1 W audio amplifier with standby	1	1 x 1	2/5.05	MSOP/TSSOP8,S08,VDFPN8
TS488	120 mW stereo headphone amplifier	1	2 x 0.12	2/5.05	UFSON8
TS4890	1 W audio amplifier with standby	1	1 x 1	2/5.05	MSOP/TSSOP8,S08
TS4909	Ultra-low-power headphone amplifier with capless output	1	1 x 0.88	2/5.05	VDFPN10
TS4962	3 W filter free class D with standby	1	1 x 3	2/6	UFQFPN8
TS4962M	3 W filter free	1	1 x 3	2/5.05	Flip-chip 500u
TS4984	2 x 1 W audio amplifier with standby	2	2 x 1	2/5.05	VFQFPN16

Part number	Description	Channels	Output power (W)	Supply voltage min/ max (V)	Packages
TS4990	1.2 W audio amplifier with standby	1	1 x 1.2	2/5.05	Flip-chip 500u, MSOP/TSSOP8, S08,VDFPN8
TS4994	1 W differential input/output audio amplifier with selectable standby	1	1 x 1	2/5.05	MSOP/TSSOP8, VDFPN10
TS4994FC	1 W differential input/output audio amplifier with selectable standby	1	1 x 1	2/5.05	Flip-chip 500u
TS4995	1.2 W fully differential amplifier with selectable standby and 6 dB fixed gain	1	1 x 1.2	2/5.05	Flip-chip 500u
TS4999	2 x 2.8 W class-D audio amplifier with selectable 3D effects	2	2 x 2	2/5.05	Flip-chip 500u

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