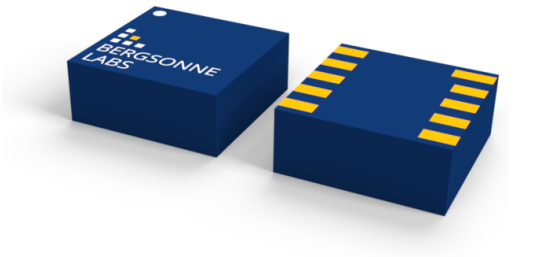
Drive.A.2

I2C/SPI-input dual 3W Class-D amplifier



The Drive.A.2 is a dual-channel audio output tile combining a DAC63202W 12-bit smart DAC with two TPA2028D1 Class-D audio power amplifiers. It provides two independent audio channels, each capable of delivering up to 3 W into 4 Ω or 880 mW into 8 Ω speakers.

The DAC63202W generates analog waveforms from digital data with 12-bit resolution and supports built-in waveform generation (sine, cosine, triangular, sawtooth) for processor-less tone generation. The DAC connects to a host processor via either I2C (up to 1 Mbps) or SPI (up to 50 MHz), auto-detected at power-on.

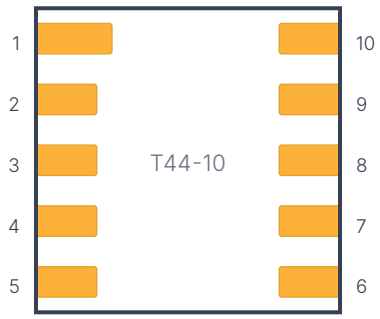
Each TPA2028D1 amplifier features I2C-programmable gain control (−28 dB to +30 dB in 1 dB steps), automatic gain control (AGC), and dynamic range compression (DRC) to prevent speaker overdrive and enhance perceived loudness. The amplifiers operate filter-free in Class-D mode for high efficiency and include thermal and short-circuit protection.

The tile operates from a 2.5 V to 5.5 V supply. All three ICs are controlled via a shared I2C bus, while the DAC can alternatively be driven over SPI for higher-bandwidth waveform updates.

Overview

Revision	**a**
Package	**T44-10**
Power	**2.5–5.5V (logic inputs can go down to 1.8V)**
Component	**DAC63202W**
Component	**TPA2028D1**
Interfaces	**I2C, SPI**

Pad Assignments



(top view)

PAD	TYPE	FUNCTION	NOTE
1	power	GND	
2	digital	GPIO	an internal 100k pull-up
	digital	SPI.MISO	
3	digital	A0	an internal 100k pull sets the default I2C address to 0x49.
	digital	SPI.MOSI	
4	digital	I2C.CLK	
	digital	SPI.CS	

5	digital	I2C.DAT	
	digital	SPI.CLK	
6	drive	OUT.0-	
7	drive	OUT.0+	
8	drive	OUT.1-	
9	drive	OUT.1+	
10	power	V+	2.5-5.5V

Interfaces

I2C

I2C

Mode	slave
Max Clock	1MHz
Addresses	0x49 (default), 0x48, 0x4A, 0x4B

FUNCTION	REQ	PAD(S)
I2C.CLK	Yes	4
I2C.DAT	Yes	5

SPI

SPI

Mode	slave
Max Clock	50MHz

FUNCTION	REQ	PAD(S)
SPI.MISO	Yes	2
SPI.MOSI	Yes	3
SPI.CLK	Yes	5
SPI.CS	Yes	4

Application Notes

Automatic Bus Detection

The DAC in the Drive.A.2 tile automatically detects whether it is connected via I2C of SPI.

I2C Addresses

The Drive.A.2 can be configured for one of four I2C addresses by manipulating the connection of pad 3 (A0). Leaving the pad floating (or connecting to V+) uses the default address of 0x49. Connecting pad 3 to GND will change to address 0x48, while connecting to pad 3 to pad 4 (I2C.CLK) or pad 5 (I2C.DAT) will set the address to 0x4B or 0x4A, respectively.