TFA9810

Stereo full-bridge audio amplifier 2 x 12 W

Rev. 03 — 20 February 2008 Product data sheet

1. General description

The TFA9810 is a two-channel power comparator for high-efficiency class D audio amplifier systems. It contains two full-bridge Bridge-Tied Load (BTL) power stages, drive logic, protection control logic and full differential input comparators. By using this power comparator a compact closed-loop self-oscillating digital amplifier system or open-loop system can be built. The TFA9810 does not require a heat sink and operates using an asymmetrical supply voltage.

2. Features

- Stereo full-bridge power comparator for class D audio amplifier applications
- No external heat sink required
- Operating voltage range: asymmetrical from 8 V to 20 V
- Thermally protected
- Zero dead-time switching
- Current-limiting (no audible interruptions)

3. Applications

- Self-oscillating or open-loop class D audio amplifier applications
- Flat-panel television sets
- Flat-panel monitors
- Multimedia systems
- Wireless speakers
- High-end CRT television sets

4. Quick reference data

Table 1. Quick reference data

T_{amb} = 25 °C; V_P = 12 V; f_{osc} = 550 kHz; Figure 33 unless otherwise specified

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_P	supply voltage	$V_P = V_{DDPx} - V_{SSPx}$	8	12	20	V
I_{off}	off-state current	off mode	-	110	200	µA
I_q	quiescent current	with load, filter and snubbers connected	-	35	45	mA
η_{po}	output power efficiency	output power 2 x 9 W into 8 Ω; $P_o = P_{o(nom)}$	87	89	-	%

Table 1. Quick reference data *...continued*

T_{amb} = 25 °C; V_P = 12 V; f_{osc} = 550 kHz; Figure 33 unless otherwise specified

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$P_{o(RMS)}$	RMS output power	R_L = 8 Ω; V_P = 12 V; THD = 10 %; Two channel driven; no heat sink required.	-	9.5	-	W
P_o	output power	V_P = 12 V; R_L = 8 Ω	-	-	-	-
		THD = 10 %	8.5	9.5	-	W
		THD = 1 %	6.5	7.5	-	W
		V_P = 14 V; R_L = 8 Ω; THD = 10 %; thermally limited	-	15	-	W
		V_P = 16 V; R_L = 8 Ω; THD = 10 %; thermally limited	-	15	-	W
		V_P = 12 V; R_L = 6 Ω; THD = 10 %; thermally limited	-	12	-	W
		V_P = 12 V; R_L = 4 Ω; THD = 10 %; thermally limited	-	15	-	W

5. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
TFA9810T	SO32	SO32: plastic small outline package; 32 leads; body width 7.5 mm	SOT287-1

6. Block diagram

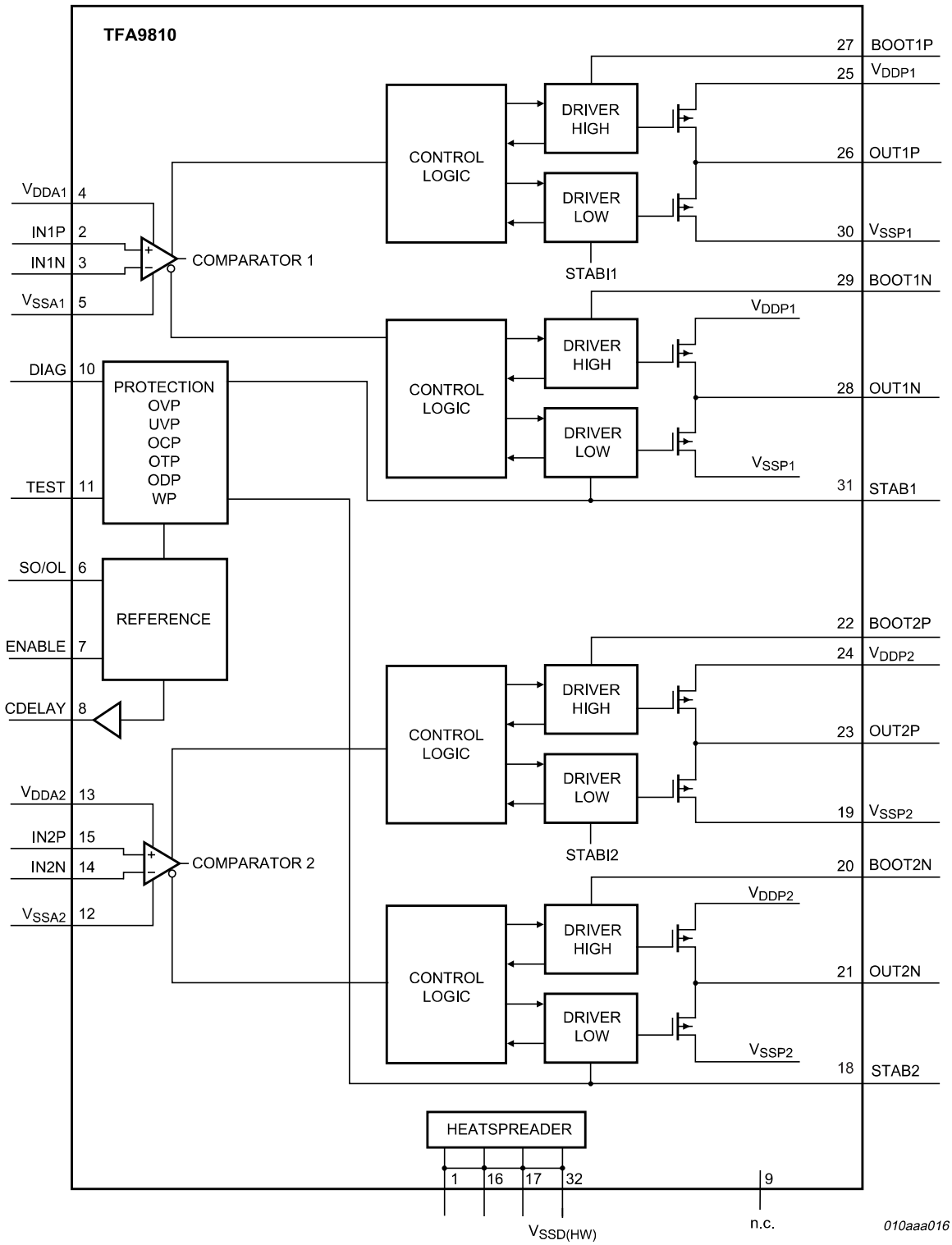

Fig 1. Block diagram

7. Pinning information

7.1 Pinning

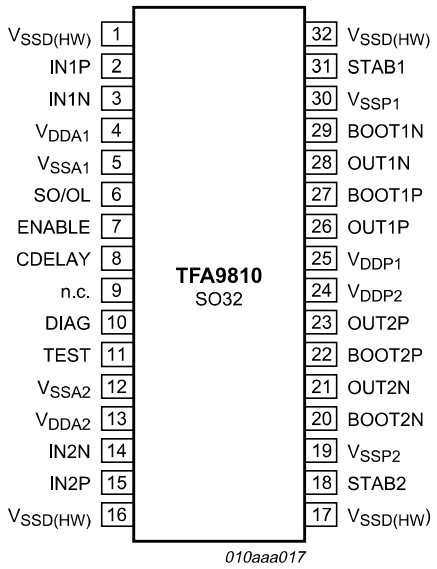

Fig 2. Pin configuration

The SO32 package has four corner leads. These leads (1, 16, 17, and 32) are internally connected to the die pad and must be connected to V_{SSA} in the application. Together with the applied copper area on the Printed Circuit Board (PCB) these leads determine the ambient temperature, which affects the thermal resistance of the junction.

7.2 Pin description

Table 3. Pin description

Symbol	Pin	Description
$V_{SSD(HW)}$	1, 16, 17, 32	Negative digital supply voltage and handle wafer
IN1P	2	Positive input comparator channel 1
IN1N	3	Negative input comparator channel 1
V_{DDA1}	4	Positive analog supply voltage channel 1
V_{SSA1}	5	Negative analog supply voltage channel 1
SO/OL	6	SO/OL input enables self-oscillating / open-loop configuration
ENABLE	7	Enable input to switch between SLEEP and OPERATING
CDELAY	8	CDELAY input determines the switch on/off timing
n.c.	9	Not connected
DIAG	10	Diagnostic output; open drain
TEST	11	Test signal input; for testing purposes only
V_{SSA2}	12	Negative analog supply voltage channel 2
V_{DDA2}	13	Positive analog supply voltage channel 2

Table 3. Pin description …continued

Symbol	Pin	Description
IN2N	14	Negative input comparator channel 2
IN2P	15	Positive input comparator channel 2
STAB2	18	Decoupling of internal 11 V regulator for channel 2 drivers
V_{SSP2}	19	Negative power-supply voltage channel 2
BOOT2N	20	Bootstrap high-side driver negative output channel 2
OUT2N	21	Negative output channel 2
BOOT2P	22	Bootstrap high-side driver positive output channel 2
OUT2P	23	Positive output channel 2
V_{DDP2}	24	Positive supply voltage power channel 2
V_{DDP1}	25	Positive power supply voltage channel 1
OUT1P	26	Positive output channel 1
BOOT1P	27	Bootstrap high-side driver positive output channel 1
OUT1N	28	Negative output channel 1
BOOT1N	29	Bootstrap high-side driver negative output channel 1
V_{SSP1}	30	Negative supply voltage power channel 1
STAB1	31	Decoupling of internal 11 V regulator for channel 1 drivers

8. Functional description

8.1 General

The TFA9810 is a dual-switching power comparator. It is the main building block for a stereo high-efficiency Class D audio power amplifier system. It contains two full-bridge BTL power stages, drive logic, protection-control logic and full differential input comparators and references (see Figure 1). By using this power comparator a compact closed-loop self-oscillating digital amplifier system or open-loop system can be built. A second-order low-pass filter converts the Pulse Width Modulation (PWM) output signal into an analog audio signal across the speaker.

8.2 Interfacing

The pins ENABLE and SO/OL control the operating mode of the TFA9810. Both the ENABLE and the SO/OL pins refer to $V_{SSD(HW)}$.

When the SO/OL pin is connected to V_{SSA} the TFA9810 is in self-oscillating mode: when the SO/OL pin is floating the TFA9810 is in open-loop mode.

The TEST pin needs to be connected to V_{DDA} in both situations.

Table 4. SO/OL connections

Interfacing	
SO/OL connected to	**Configuration**
$V_{SSD(HW)}$	Self-oscillating
Open	Open-loop

The device has two modes: SLEEP and OPERATING.