

20W Stereo Class-D Audio Amplifier with Power Limit And Dynamic Temperature Control

Features

- Single supply voltage
8 ~ 26V for loudspeaker driver
Built-in LDO output 3.3V for others
- Loudspeaker power from 24V supply
BTL Mode: 20W/CH into 8Ω @0.09% THD+N
PBTL Mode: 40W/CH into 4Ω @0.15% THD+N
- Loudspeaker power from 13V supply
BTL Mode: 10W/CH into 8Ω @10% THD+N
- 87% efficient Class-D operation eliminates need for heat sink
- Differential inputs
- Four selectable, fixed gain settings
- Internal oscillator
- Short-Circuit protection with auto recovery option
- Under-Voltage detection
- Over-Voltage protection
- Pop noise and click noise reduction
- Adjustable power limit function for speaker protection
- Output DC detection for speaker protection
- Filter-Free operation
- Over temperature protection with auto recovery
- Dynamic temperature control prevents chip from over heating

- Boom-Box
- Powered speaker
- Consumer Audio Equipment

Description

The AD52580 is a high efficiency stereo class-D audio amplifier with adjustable power limit function and dynamic temperature control. The loudspeaker driver operates from 8~26V supply voltage and analog circuit operates at 3.3V supply voltage. It can deliver 20W/CH output power into 8Ω loudspeaker within 0.09% THD+N and without external heat sink when playing music.

AD52580 provides parallel BTL (Mono) application, and it can deliver 40W into 4Ω loudspeaker within 0.15% THD+N. The adjustable power limit function allows user to set a voltage rail lower than half of 3.3V to limit the amount of current through the speaker.

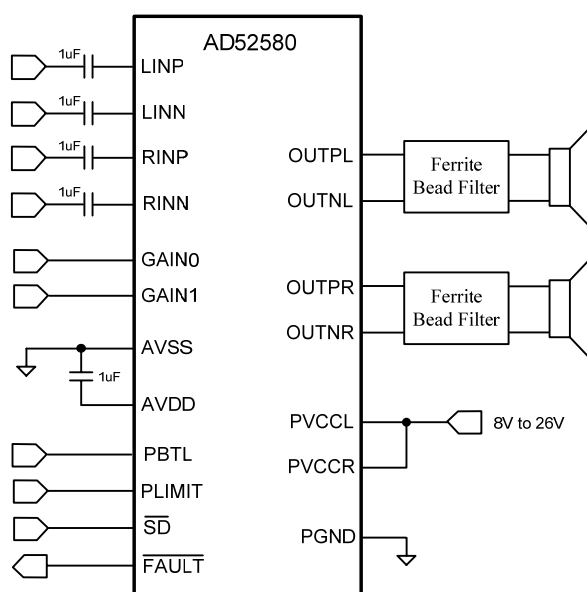
Output DC detection prevents speaker damage from long-time current stress. The dynamic temperature control is a gain control system. As chip junction temperature higher than a warning level, the gain level will decrease until junction temperature lower than the warning level.

The output short circuit and over temperature protection include auto-recovery feature.

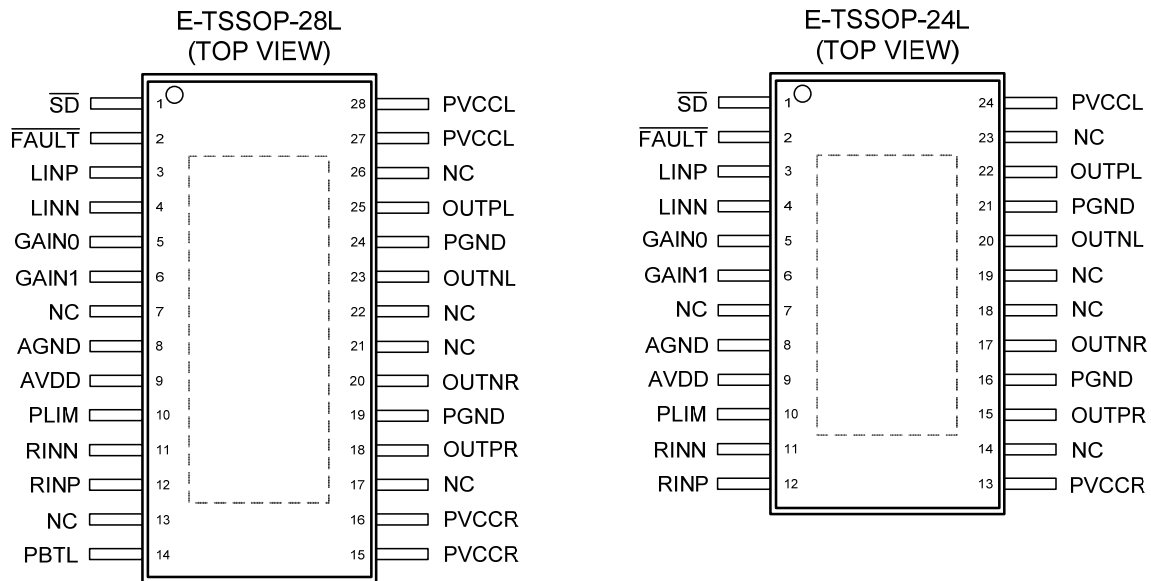
Applications

- TV audio

Simplified Application Circuit



Pin Assignments



Pin Description

NAME	E-TSSOP -28L	E-TSSOP -24L	TYP	DESCRIPTION
SD	1	1	I	Shutdown signal for IC (Low = disabled, output Hi-Z; High = operational). Voltage compliance to 26V.
FAULT	2	2	O	Open drain output used to display short circuit or dc detect fault. Voltage compliant to 26V. Short circuit faults can be set to auto-recovery by connecting FAULTB pin to SD pin. Otherwise, both short circuit faults and dc detect faults must be reset by cycling PVCC.
LINP	3	3	I	Positive audio input for left channel. Biased at 1.65V.
LINN	4	4	I	Negative audio input for left channel. Biased at 1.65V.
GAIN0	5	5	I	Gain select least significant bit. Voltage compliance to 26V.
GAIN1	6	6	I	Gain select most significant bit. Voltage compliance to 26V.
NC	7	7		Not connected.
AGND	8	8	P	Analog signal ground. Connect to the thermal pad.
AVDD	9	9	O	3.3V regulated output.
PLIMIT	10	10	I	Power limit level adjustment. Connect a resistor divider from AVDD to GND to set power limit. Give $V(\text{PLIMIT}) < 1.55\text{V}$ to set power limit level. Connect to GND for no power limit.
RINN	11	11	I	Negative audio input for right channel. Biased at 1.65V.
RINP	12	12	I	Positive audio input for right channel. Biased at 1.65V.
NC	13	NA		Not connected.
PBTL	14	NA	I	Parallel BTL mode switch, high for parallel BTL output. Voltage compliance to 26V.

PVCCR	15,16	13	P	High-voltage power supply for right-channel. Right channel and left channel power supply inputs are connect internal.
NC	17	14		Not connected.
OUTPR	18	15	O	Class-D H-bridge positive output for right channel.
PGND	19	16	P	Power ground for the H-bridges.
OUTNR	20	17	O	Class-D H-bridge negative output for right channel.
NC	21	18		Not connected.
NC	22	19		Not connected.
OUTNL	23	20	O	Class-D H-bridge negative output for left channel.
PGND	24	21	P	Power ground for the H-bridges.
OUTPL	25	22	O	Class-D H-bridge positive output for left channel.
NC	26	23		Not connected.
PVCCL	27,28	24	P	High-voltage power supply for right-channel. Right channel and left channel power supply inputs are connect internal.
Thermal Pad			P	Must be soldered to PCB's ground plane.

Ordering Information

Product ID	Package	Packing	Comments
AD52580-QG24NAT	E-TSSOP 24L	62 Units / Tube 100 Tubes / Small Box	Green
AD52580-QG28NAT	E-TSSOP 28L	50 Units / Tube 100 Tubes / Small Box	Green
AD52580-QG28NAR	E-TSSOP 28L	2500 Units / Reel 5000 Units / Small Box	Green

Available Package

Package Type	Device No.	θ_{JA} (°C/W)	θ_{jc} (°C/W)	Ψ_{jt} (°C/W)	Exposed Thermal Pad
E-TSSOP 24L	AD52580	32.8	6.0	1.33	Yes (Note 1)
E-TSSOP 28L		28			

Note 1.1: The thermal pad is located at the bottom of the package. To optimize thermal performance, soldering the thermal pad to the PCB's ground plane is necessary.

Note 1.2: θ_{ja} is measured on a room temperature ($T_A=25^\circ\text{C}$), natural convection environment test board, which is constructed with a thermally efficient, 4-layers PCB (2S2P). The measurement is tested using the JEDEC51-5 thermal measurement standard.

Note 1.3: θ_{jc} represents the heat resistance for the heat flow between the chip and the package's top surface.