



NXP single digital-loop Class-D amplifiers TDF853x

Class-D amplifiers for an A+ audio experience

Equipped with a single digital-feedback loop, these ultra-performance Class-D amplifiers reduce system cost in automotive applications while delivering unparalleled sound quality.

KEY FEATURES

- ▶ Three, four, or five 2 or 4 Ω load Class-D BTL channels
- ▶ Two BTL channels can combine to drive 1 Ω
- ▶ Feedback after low-pass filter for lower BOM cost and better audio quality
- ▶ Operation voltage from 5.5 V to 18 V (optional 25 or 45)
- ▶ Digital input in TDM/I²S format to ensure easy board layout
- ▶ Line-driver mode to drive an external amplifier via direct loudspeaker cable
- ▶ Quality in accordance with AEC-Q100
- ▶ Diagnostic
 - Startup diagnostic for AC and DC coupled loads
 - Supply voltage feedback with 8-bit resolution
 - Selectable clip detection
 - Selectable diagnostic information on DIAG pins
 - IEEE 1194.1-compliant, board-level boundary scan
 - DC output offset diagnostics
- ▶ Protection
 - Independent output current per channel with selectable thresholds
 - Load dump protection (50 V)
 - Over- and undervoltage protection
 - Thermal fold-back and thermal protection

- ▶ Interleaved power stages (optional) for improved EMC and reduced output-filter cost/complexity

TARGET APPLICATIONS

- ▶ Automotive head-unit radio
- ▶ Automotive sound systems
- ▶ Automotive-engine sound design

The NXP TDF853x family is a series of ultra-efficient Class-D amplifiers that create a seamless audio experience in vehicles that support 5.5 V stop- start requirements.

Ideally suited for use in active noise-cancellation systems, these amplifiers also fit head units and sound systems, and can be used to generate ambient and/or engine sounds in electric vehicles.

The output power per channel varies with the supply voltage. The devices support up to 18 or 25 V, with 45 V to drive the loudspeaker.

The TDF8531 has three channels, the TDF8532 has four channels, and the TDF8534 has five channels. The TDF8536 has four 45 V channels.



The block diagram illustrates the internal architecture of the TMS320C6745 DSP. Key components include:

- Microprocessor and Diagnostic Blocks:** These blocks interface with various pins: MOD1, MOD2, MOD3, GPIO1, DIAG1, DIAG2, and DIAG3. The Microprocessor also handles ADS1, ADS2, and ADS3 signals.
- I²C and Protections:** The I²C block is connected to SCL and SDA. The Protections block is connected to the Diagnostic block and the Temp Monitor.
- Supply and Temperature Monitoring:** The Supply Monitor and Temp Monitor are connected to the Diagnostic block. The Supplies and References block is connected to ENABLE, VDDA, VDDE, VDDP, and VDDD.
- Charge Pump:** This block is connected to the Supplies and References block and provides power to the Charge Pump, which is connected to CPCP, CPCM, and CP.
- Channel 1 of 5:** This block contains a Digital Loop Filter, PWM Control, and a multi-output driver. It is connected to MUTE_N, SDI1, SDI2, SDI3, FS, and SCLK. The driver outputs OUT1P1, OUT1P2, OUT1M1, and OUT1M2. It also interfaces with VDDP1, VSSP1, FB1P, and FB1M.
- PLL and JTAG:** The PLL block is connected to SYNC and provides power to the JTAG block. The JTAG block is connected to TDO, TDI, TMS, TCK, and TRST_N.
- Power and Ground Connections:** The device is connected to VSSP, VSSA, VSSD, and HW pins.

Type	Channel	Supply	Max output power	THD+N / Noise	Parallel Mode	Idle Power Dissipation	Interleaved Mode
TDF8531HH	3	5.5 V – 25 V	3 x 80 W	0.005 % 26 µV	Yes	2.1 W	Key Code
TDF8532HH	4	5.5 V – 25 V	4 x 80 W	0.02 % 26 µV	Yes	2.8 W	Key Code
TDF8532BHH	4	5.5 V – 18 V	4x 70 W	0.005 % 42 µV	–	2.8 W	–
TDF8534HH	5	5.5 V – 25 V	5 x 80 W	0.005 % 26 µV	Yes	3.5 W	Key Code
TDF8534BHH	5	5.5 V – 18 V	5x 70 W	0.02 % 42 µV	–	3.5 W	–
TDF8536HH	4	5.5 V – 45 V	4 x 140 W	0.005 % 48 µV	Yes	3.0W	Included