Semi-High
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Digital input best efficiency automotive 4X45w power amplifier with built-in diagnostics features

General Description

The SMH7083 is a quad-bridge amplifier based on advanced BCD technology, integrating a 1full D/A converter, a digital input interface directly compatible with I²S or TDM, and a high-performance MOSFET output stage. The integrated D/A converter delivers outstanding performance, with a signal-to-noise ratio of 115 dB and a dynamic range exceeding 110 dB.

In addition, the SMH7083 integrates a High efficient ClassAB amplifier technology. This approach enables up to a 50% reduction in dissipated output power under typical monitoring conditions compared to conventional Class AB solutions.

The device also features a programmable PLL capable of handling an input frequency of 64×Fs across all supported input configurations. A comprehensive diagnostic system is integrated, providing real-time speaker status feedback via the I²C bus. This same I²C interface allows for extensive device configuration and control.

Features and Benefits

- 24-bit digital processing
- 115 dB dynamic range (A-weighted)
- Extreme best efficiency Class-HE mode
- Support parallel mode function
- High output power capability:
    - 4 x 27 W 4 Ω @ 14.4 V, 1 kHz, THD = 10%
    - 4 x 22 W 4 Ω @ 14.4 V, 1 kHz, THD = 1%
- Flexible mode control:
    - Full I2C bus driving 5V with four addresses selectable (only for PowerSO36 package option)
    - Independent front/rear play/ mute
    - Selectable digital gains for very-low noise line-out function
    - Digital diagnostic with DC and AC load detections
- Stop/start-car prepared: keeps operating without audible disturbance during engine start at a battery voltage as low as 6 V
- Sample rates: 44.1 kHz, 48 kHz, 96 kHz, 192 kHz
- Flexible serial data port (1.8 V / 3.3 V):
    - I2S standard, TDM 4Ch, TDM 8Ch, TDM 16ch
- Digital input Offset detector
- Thermal Protection Programmable diagnostic pin
- CMOS compatible enable pin, Independent front/rear clipping detector
- Die temperature monitor real time
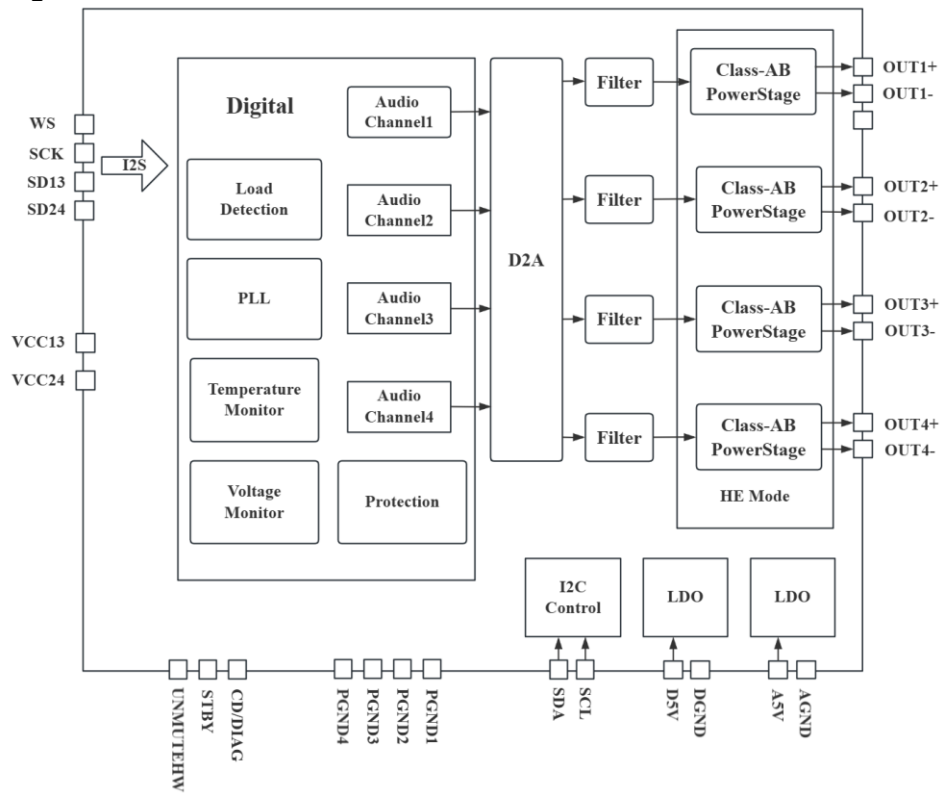- Digital impendence meter

Device summary

Order code	Package	Qty	Packing
SMH7083	PSO36 (exp. pad up)	840	Tray
SMH7803-48X	ZIP27(Vertical)	1000	Tube

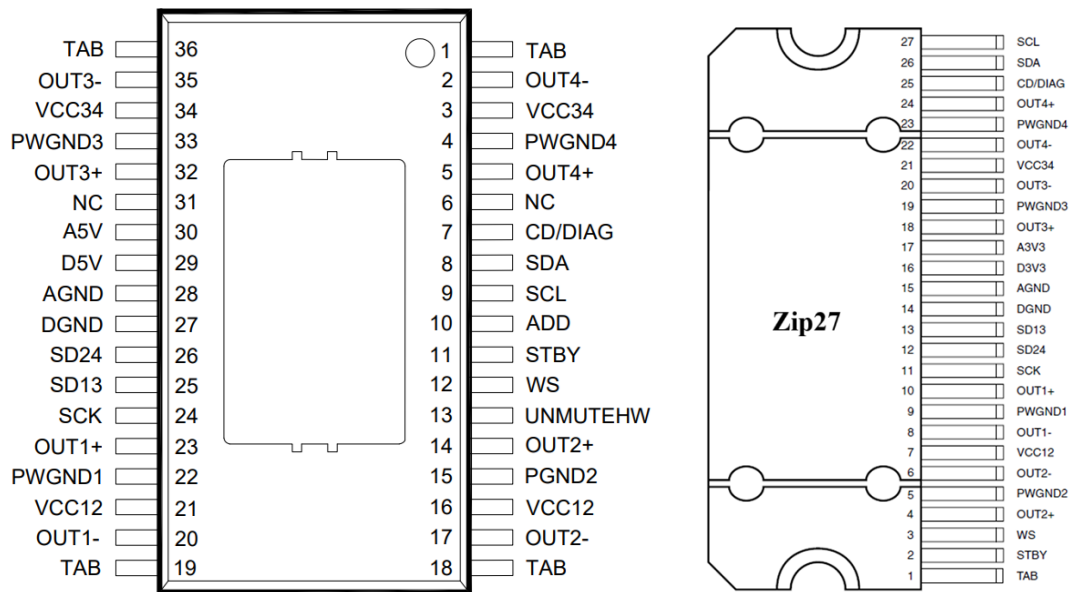# 1　Block diagram and pins description

1.1 Block diagram

Figure 1. Block diagram

1.2 Pin description

Figure 2. Pins connection diagram

4   Operational status

SMH7083 functions are regulated by finite state machines. The finite state machine diagram is shown in Figure 13.

The main statuses are:

• Standby

• ECO mode

• Amplification mode

• Turn on Diagnostics

• Permanent diagnostics (runtime diagnostics)

• Real-time diagnostics

4.1 Standby status

When the STBY pin is at the VILSTBY voltage, the amplifier is in standby and the current consumption is very low.

4.2 ECO mode status

ECO mode status

When the STBY pin is on VIHSTBY, the amplifier is in a low current sink state, i.e., ECO mode. Short-circuit protection is active, and the amplifier is ready to receive commands from the microcontroller via the I2C interface.

The output and A5V supply are biased at 0V.

4.3 Amplifier mode status

Amplifier mode status

When the SMH7083 is in ECO mode, IB7-d0 is set to "1", (amplifier on), and the I2S clock is present, the amplifier moves to the amplifier mode state.

The output is biased from 0V to Vcc/2 and the current draw reaches the "Iq" level until the amplifier is set to mute or a low signal is played. The user can move the amplifier from mute to playback and vice versa, acting on the IB2-d4, d3 bits.

The hardware unmute pin is only available in the PSO36 package.

4.4 Turn-on, run time and real time diagnostic

SMH7083 provides 3 types of diagnostic flow: turn on diagnostic, run-time diagnostic and real-time diagnostic.