



AN-6066

FAN3800 Application Guide

Objective

The purpose of this document is to provide guidance for typical operation of and layout guidelines for the FAN3800.

Features

- Regulated Positive Supply
- Negative Supply Generator Allows for Ground-centered Output Swing
- Dual Speaker Drivers with Mono/Stereo Switch Capability
- Complete External Microphone Interface
- Manual and Remote Send-End Switch Interface
- Pop and Click Suppression
- Single 2.7V to 4.5V Operation
- 2kV ESD (HBM) Protection
- MLP 24 Pin Package

Applications

- One-piece Stereo/Mono Headset with Microphone
- 3.5mm Stereo Headphone Adapter
- 2.5 or 3.5 Adapter for Stereo Headset with Microphone

Related Datasheets

- *FAN3800*

Description

The FAN3800 is a low-cost solution to integrate the many discreet parts currently used in stereo and mono headset applications. It provides mono/stereo speaker drivers and a complete microphone interface. Manual and remote Send-End switching is also supported.

The FAN3800 speaker drivers are designed to operate with a ground-centered output signal. This allows for the removal of large and expensive DC blocking capacitors. In addition, it allows for interfacing with externally powered speakers. The speaker drivers are capable of driving up to 15.6mW_{RMS} with 16Ω loads.

The FAN3800 delivers a complete solution for interfacing an external microphone. The microphone interface provides a regulated, high PSRR supply, differential input sense to single-ended output driver amplifiers and output muting. Gain is fixed at 38dB and can be attenuated externally with a resistor divider network on Micout.

Send-End switching automatically routes the microphone output to the D+ output. When activated, the speakers switch from stereo to mono mode, both driven by the D- input. Pop and click noise are minimized during power on, power off, and mode switching. Send-End information can be generated manually through an external switch.

Overview

The FAN3800 is intended for headset applications using Universal Serial Bus (USB) connectivity. The main purpose of the FAN3800 is to reduce the discrete components currently being used in these applications. The FAN3800 includes an internal power supply, speaker and microphone

amplifiers, multi-purpose button interface, mono/stereo switching, USB detection and identification, and muting. Figure 1 is a block diagram illustrating the device.

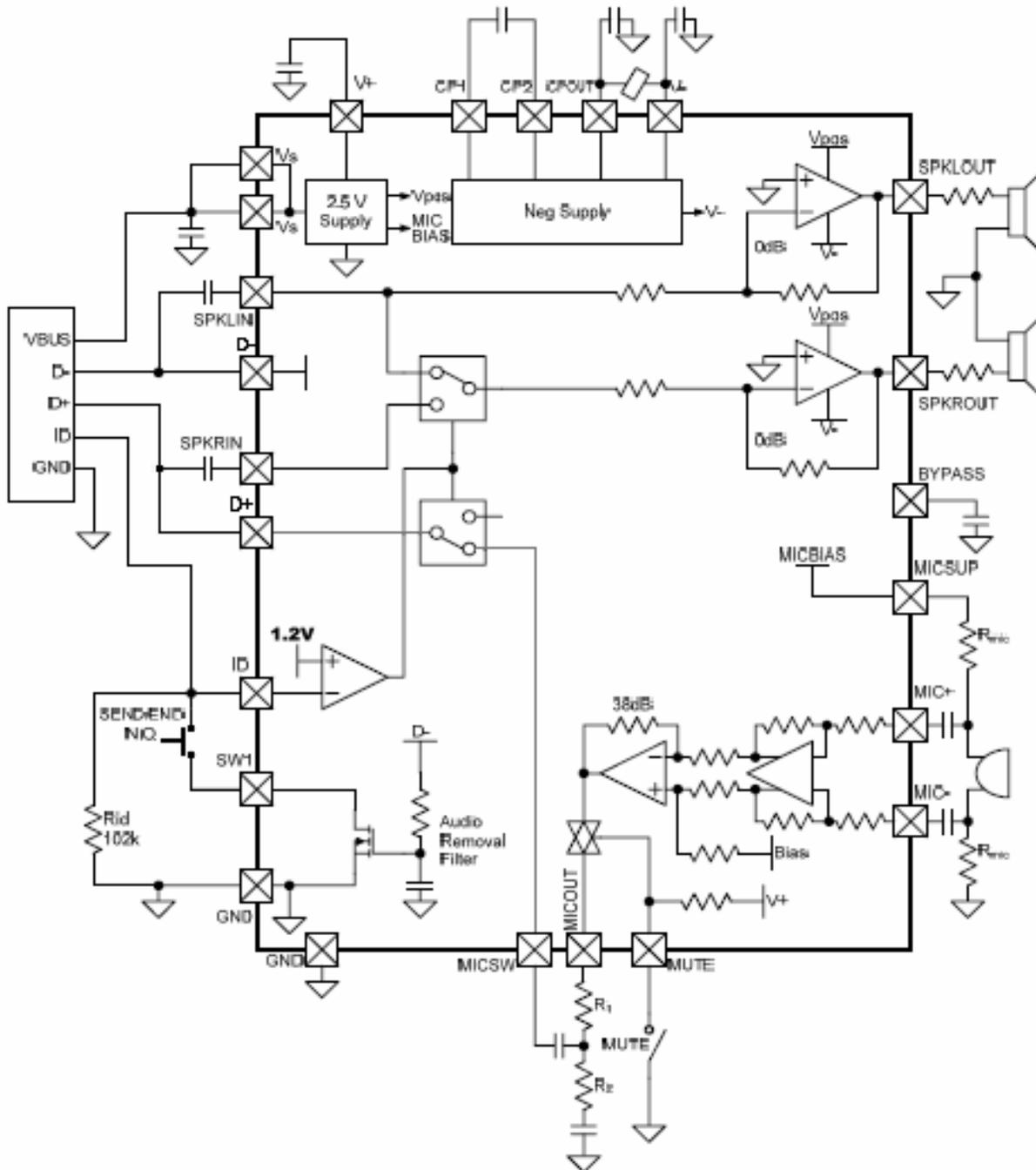


Figure 1. Block Diagram

Functional Description

When a FAN3800 headset, configured as shown in Figure 1, is connected to a device (such as a phone); a pull-down resistor in the headset pulls ID down below the device's supply rail. This change in the ID voltage informs the device that a headset is attached. The FAN3800 headset provides a USB low ($<0.8V$) on D+. The device then looks for a USB low from the headset. Once acknowledged, the device provides V_{BUS} to the FAN3800 headset. The FAN3800 reacts by providing a USB low ($<0.8V$) on D- and USB high ($>2.0V$) on D+. With the FAN3800 headset detected, the device pulls the ID line higher, $>1.2V$, to switch the headset to stereo mode. The headset then places a USB low ($<0.8V$) on D+. The device verifies a USB low ($<0.8V$) on both D+ and D-. This acknowledges a FAN3800 headset is present.

In mono mode, the ID line is in a low ($<0.8V$) state. The microphone audio is routed through the D+ line and the D- line routes speaker audio to both the right and left speakers.

In stereo mode, the ID voltage is increased ($>1.2V$), which tells the headset to switch to stereo mode. The right speaker channel from the D+ is routed to the right speaker output and the left speaker channel from the D- line is routed to the left speaker output. In stereo mode, the microphone is muted.

In standby, the device turns off the V_{BUS} voltage and configures the D- line to the internal supply rail. ID remains biased so the device may detect when the headset is disconnected.

Layout Considerations

When designing in the FAN3800, use the following guidelines to optimize the design:

1. When possible, use a four-layer board.
2. Place decoupling capacitors ($0.1\mu F$ and $1\mu F$) as close to the power (V_s) pins as possible.
3. Place RF bypass capacitors ($33pF$ - $100pF$) on all I/O pins, as close to the device as possible.
4. Connect all ground pins as tightly as possible, preferably with a large ground plane.
5. Minimize all trace lengths to reduce series inductance.



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