

High Power Digital Audio Amplifier Evaluation Board for HIP4080A

January 1996

Features

- **150W at 86% Efficiency**
 - Reduced Heat Sinking
Eval Board Uses Std TO-220 Heatsinks for 150W
 - Light Weight
 - Smaller Size
 - Lower Systems Cost
- **Achieve Superior IMD Performance Evaluation Board Measured**
 - Input: 19kHz and 20kHz at 35W Continuous into 4Ω
 - Third Order Intermodulation Products at 18kHz and 21kHz = -38dB (1.2% Distortion)
 - Difference Tone at 1kHz = -70dB (0.03% Distortion)
- **Allows Evaluation of Class D Topology with Impressive Performance. Provides Basic Circuit Design (80%) for Digital Audio Amplification**
 - THD Plus Noise Less than 0.2%
(20Hz to 1kHz at 35W Continuous, 4Ω)
 - THD Plus Noise Less than 0.8%
(20Hz to 20kHz at 4W Continuous, 4Ω)
 - Frequency Response ± 3 dB
(20Hz to 20kHz at 4W, Continuous 4Ω)
- **Power Requirements**
 - +14VDC to 18VDC (Input to On-Board 12V Regulator)
 - +10VDC to +50VDC for Output Rail Voltage

Ordering Information

PART NUMBER	TEMPERATURE RANGE	PACKAGE
HIP4080AEVAL2	N/A	PC Board 3 7/8" X 8"

Description

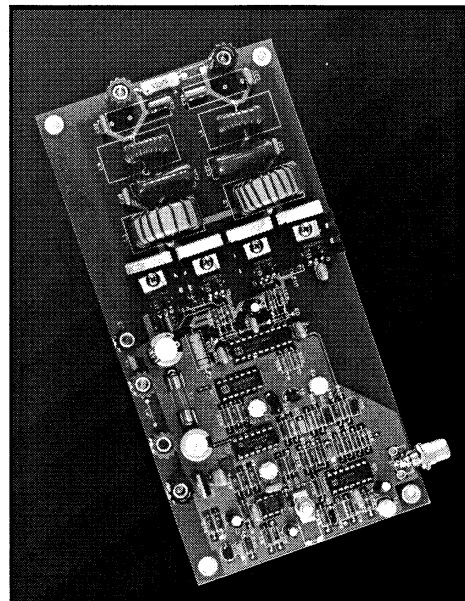
The HIP4080AEVAL2 Evaluation Board is a 150W Class D Audio Amplifier utilizing Harris' HIP4080AIP Full Bridge MOSFET driver in conjunction with RFP22N10 MOSFETs. The design provides the engineering community a quick method to evaluated Class D topology in audio applications. Audio Designers have been attracted to switch-mode/Class D amplifiers because of their high efficiency, reduced heat sink requirements, small size, light weight and low system cost. These benefits are balanced against the added complexity and RFI issues.

The concept of Class D amplification has existed for many years but was limited by the current and voltage characteristics of the output switching elements. Today with the availability of the HIP4080 family of MOSFET Drivers along with N-Channel MOSFETs, Class D topology becomes a reality.

In the block diagram the audio input modulates the duty cycle of a high frequency square wave. The amplitude-time product of this modulated carrier contains information about the input signal. The output is filtered and the amplified audio is applied to the speakers.

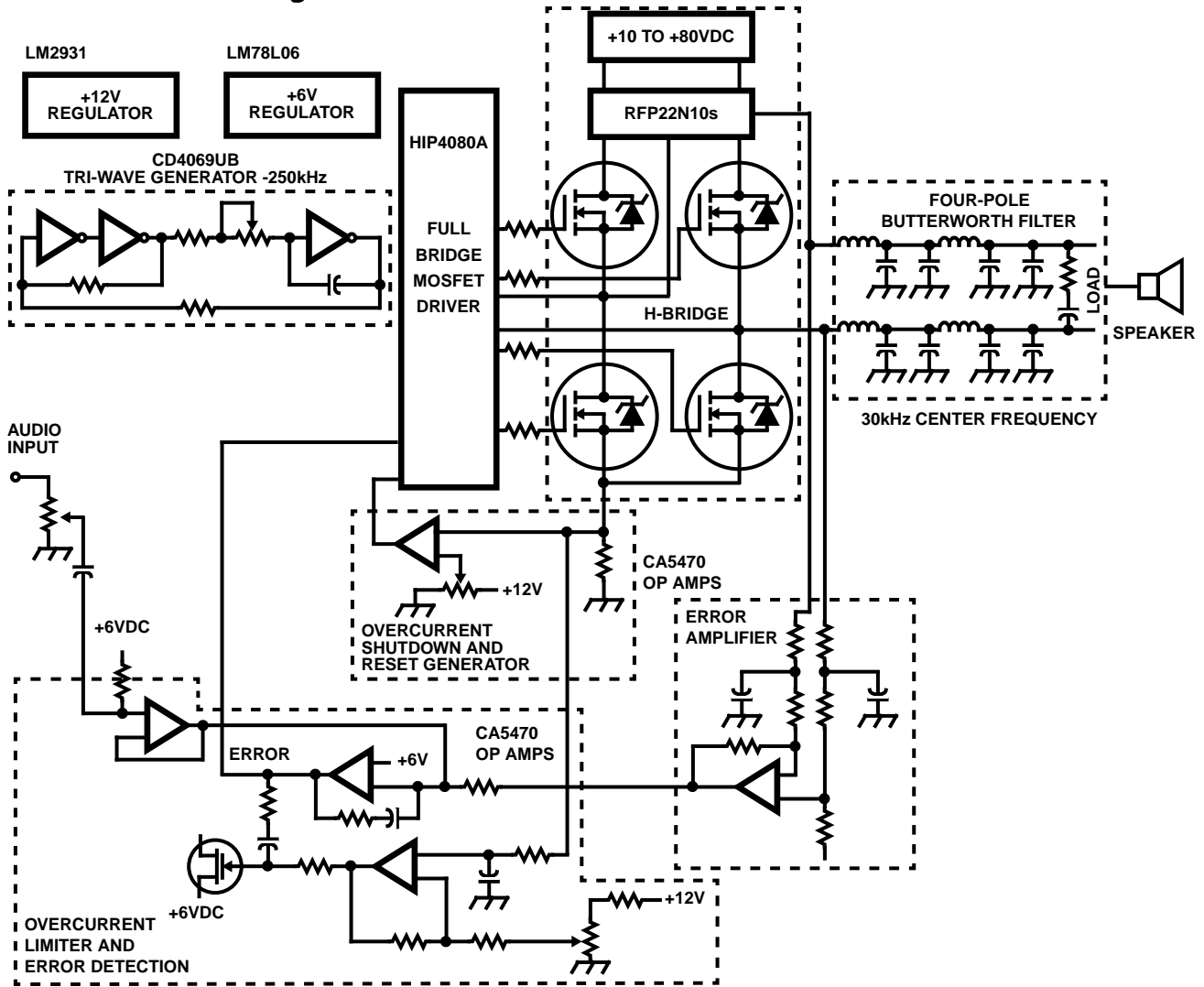
The HIP4080A, which includes an input comparator and PWM control circuit, generates the necessary drive signals to control four N-Channel power MOSFETs in a full bridge output stage. Unlike the output stage in a linear Class A/B amplifier, a Class D amplifier operates its output stage in saturation of cut-off mode. Consequently, Class D amplifiers do not exhibit the crossover distortion nor losses associated with Class A/B designs.

Evaluation Board



HIP4080AEVAL2

Functional Block Diagram



The Class D audio amplifier evaluation board with the HIP4080A full bridge driver is available to designers for part evaluation and prototyping. The board is capable of delivering 150W_{RMS} of audio power given sufficient supply rails (typically 36V to 48V) The board efficiency measured 86% at 150W. Standard TO-220 heatsinks have been used on the

output power MOSFETs for the measurements shown. The frequency response has less than 0.2dB amplitude variation at 4W_{RMS} into 4Ω THD and IMD Audio Precision plots are shown for the HIP4080AEVAL2 (Note: THD measurements include butterworth filter distortion components due to center frequency of filter being at 30kHz).

HIP4080AEVAL2

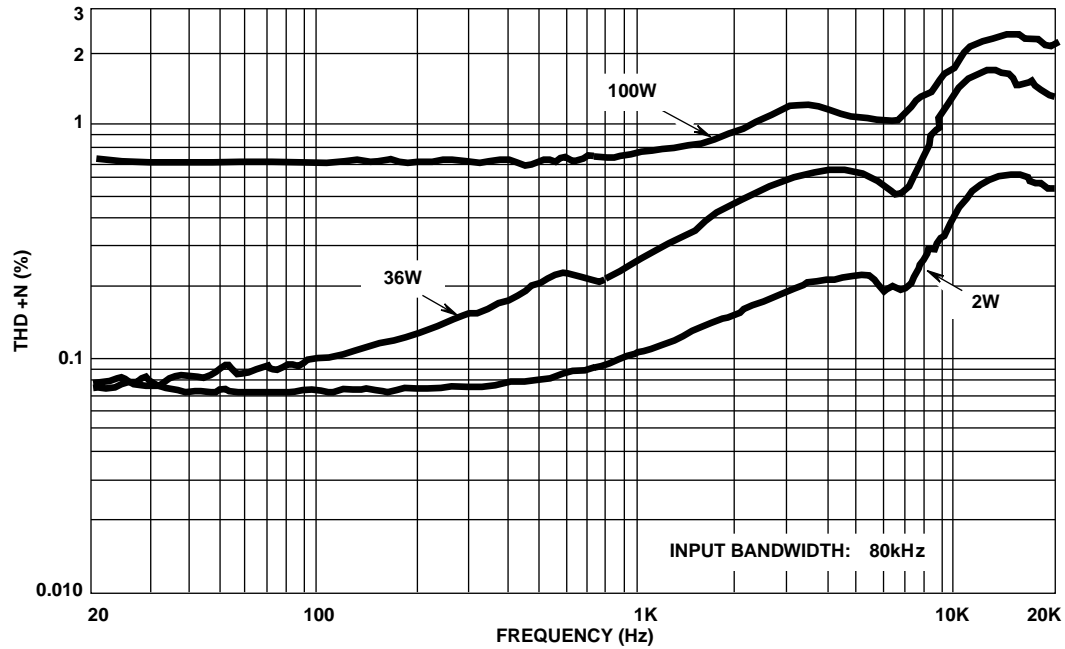


FIGURE 1. CLASS D AMPLIFIER EVALUATION BOARD TOTAL HARMONIC DISTORTION + NOISE

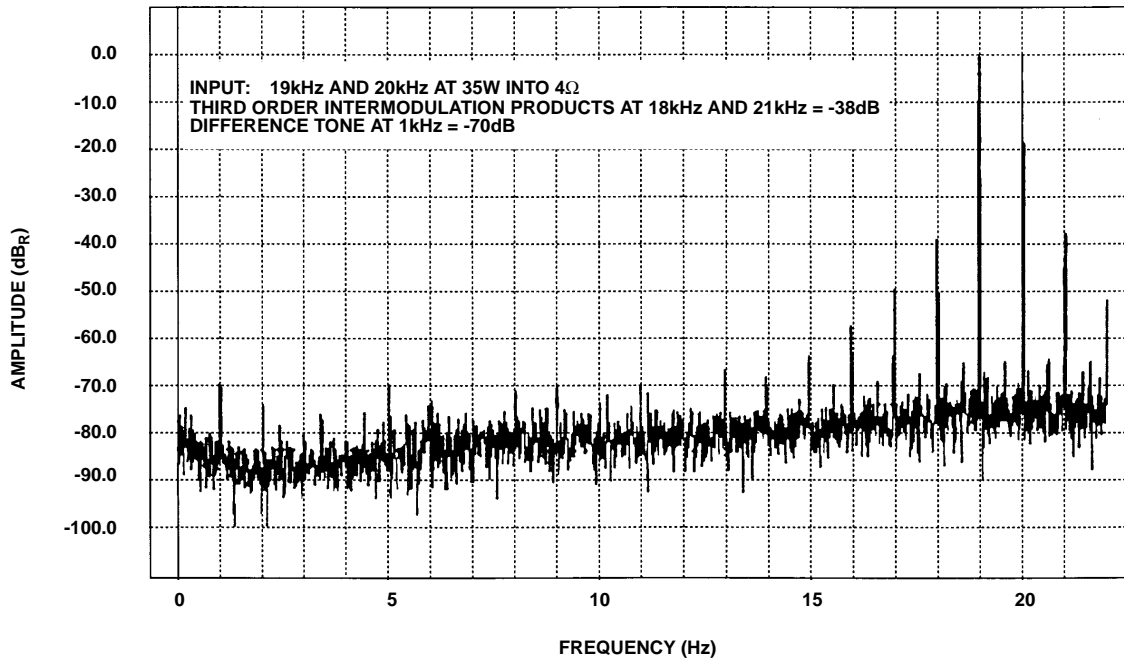


FIGURE 2. CLASS D AMPLIFIER EVALUATION BOARD TWO-TONE INTERMODULATION DISTORTION