2VRMS Audio Line Driver from a Single 3.3V Supply

Maxim's DirectDrive™technology allows for set top box and cable modem applications to operate from a single 3.3V supply while providing a $2V_{RMS}$ output signal into a 10kΩ load.

Conventional single-supply audio line drivers typically require a 9-12V supply in order to generate a $2V_{RMS}$ output signal. The higher voltage supply increases system size, cost, and complexity. Maxim's DirectDrive™technology eliminates the need for a high voltage supply and provides the $2V_{RMS}$ output signal necessary for audio line driver applications from a single, 3.3V supply. It also eliminates the need for large large DC-blocking output capacitors.

The DirectDrive Advantage

Maxim's patented DirectDrive technology uses a charge pump to invert the positive supply, creating an internal negative supply voltage, while allowing the amplifier outputs to be biased about ground. This unique architecture almost doubles the dynamic range of the amplifier (Figure 1).

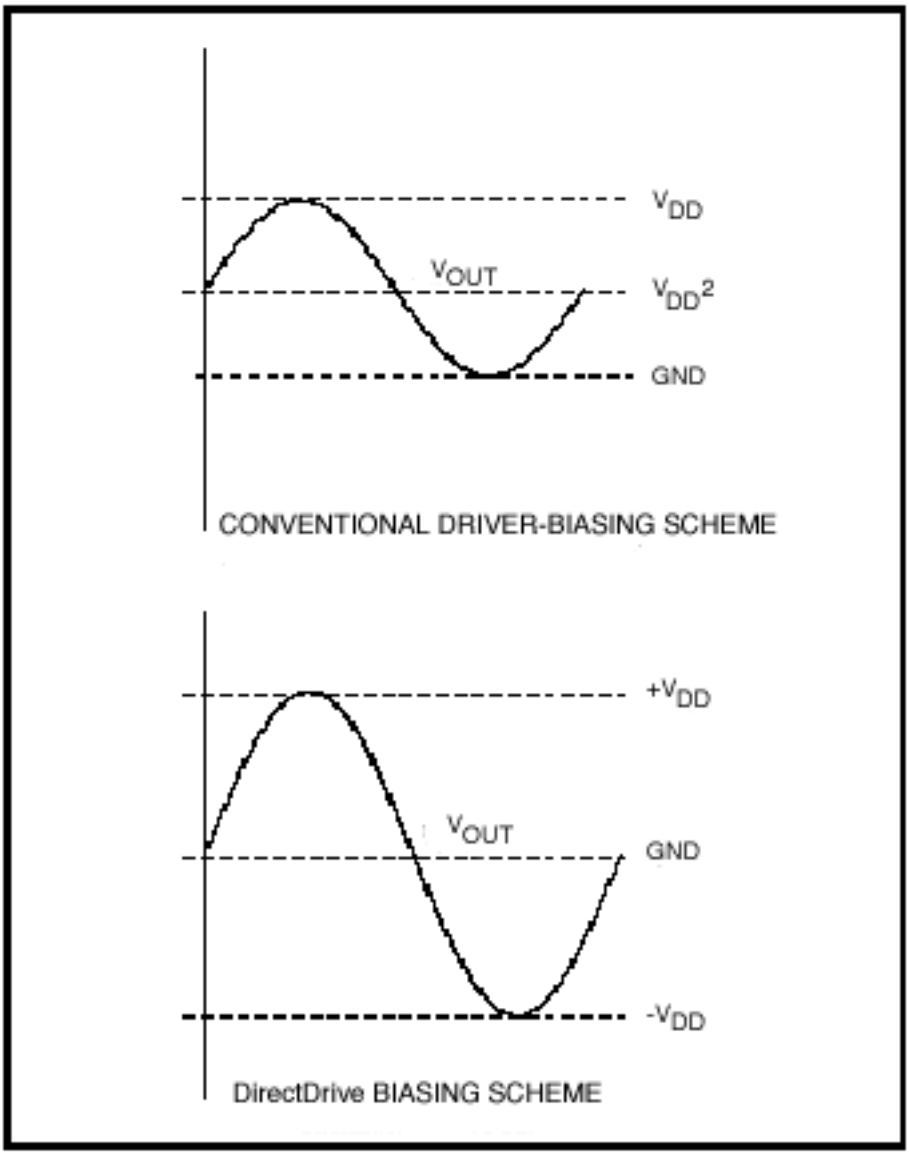

Figure 1. Conventional Amplifier Output Waveform vs Maxim's Patented DirectDrive Output Waveform. (see MAX9720 datasheet, figure 1, page 11)

Conventional single-supply headphone amplifiers have their outputs biased about a nominal DC voltage (typically half the supply) for maximum dynamic range. Large value coupling capacitors are needed to block this DC bias from the headphone. Without these capacitors, a significant amount of DC current flows to the headphone, resulting in unnecessary power dissipation and possible damage to both the headphone and the headphone amplifier. DirectDrive technology eliminates the DC component and removes the need for large DC-blocking capacitors. Instead of two large tantalum capacitors, a charge pump requires two small ceramic capacitors, conserving board space, reducing cost, and improving the frequency response of the headphone amplifier.

The MAX4410 Solution

The MAX4410 uses DirectDrive. While operating from a single 3.3V supply, the charge pump of the MAX4410 creates an internal -3.3V supply. Thus, the power amplifiers are driven by ±3.3V, allowing each output of the MAX4410 to swing >6V peak-to-peak.

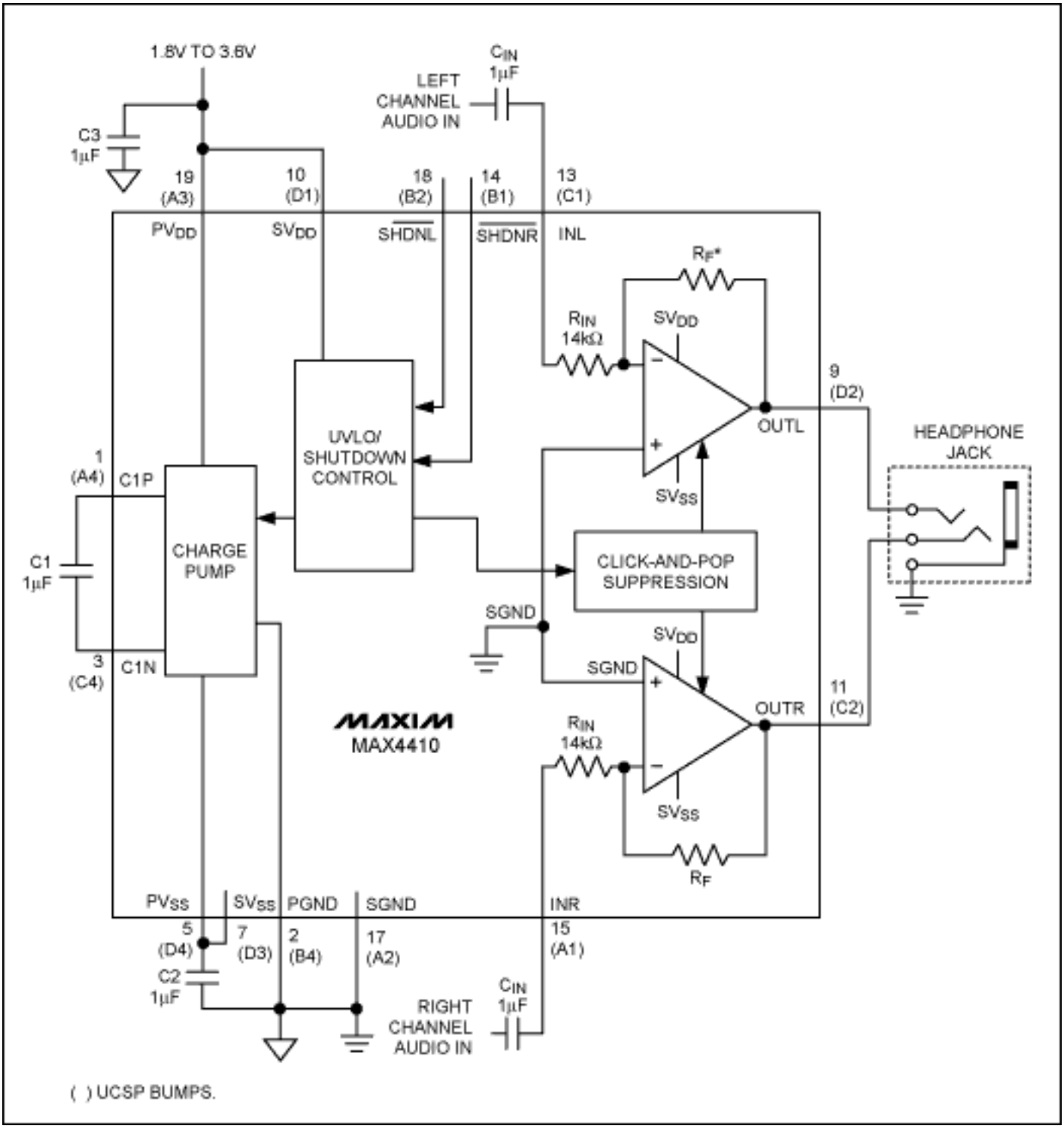

Figure 2. MAX4410 Typical Application Circuit. (see MAX4410 datasheet, page 17).

The MAX4410 can easily deliver $2V_{RMS}$ from a single 3.3V supply in typical audio line driver applications. The MAX4410 evaluation kit (EVKit) was used to test this application circuit, yielding the THD+N (total-harmonic-distortion-plus noise) curves outlined in Figure 3. The MAX4410 can deliver $2V_{RMS}$ into a 10kΩ load at 0.00052% THD+N.

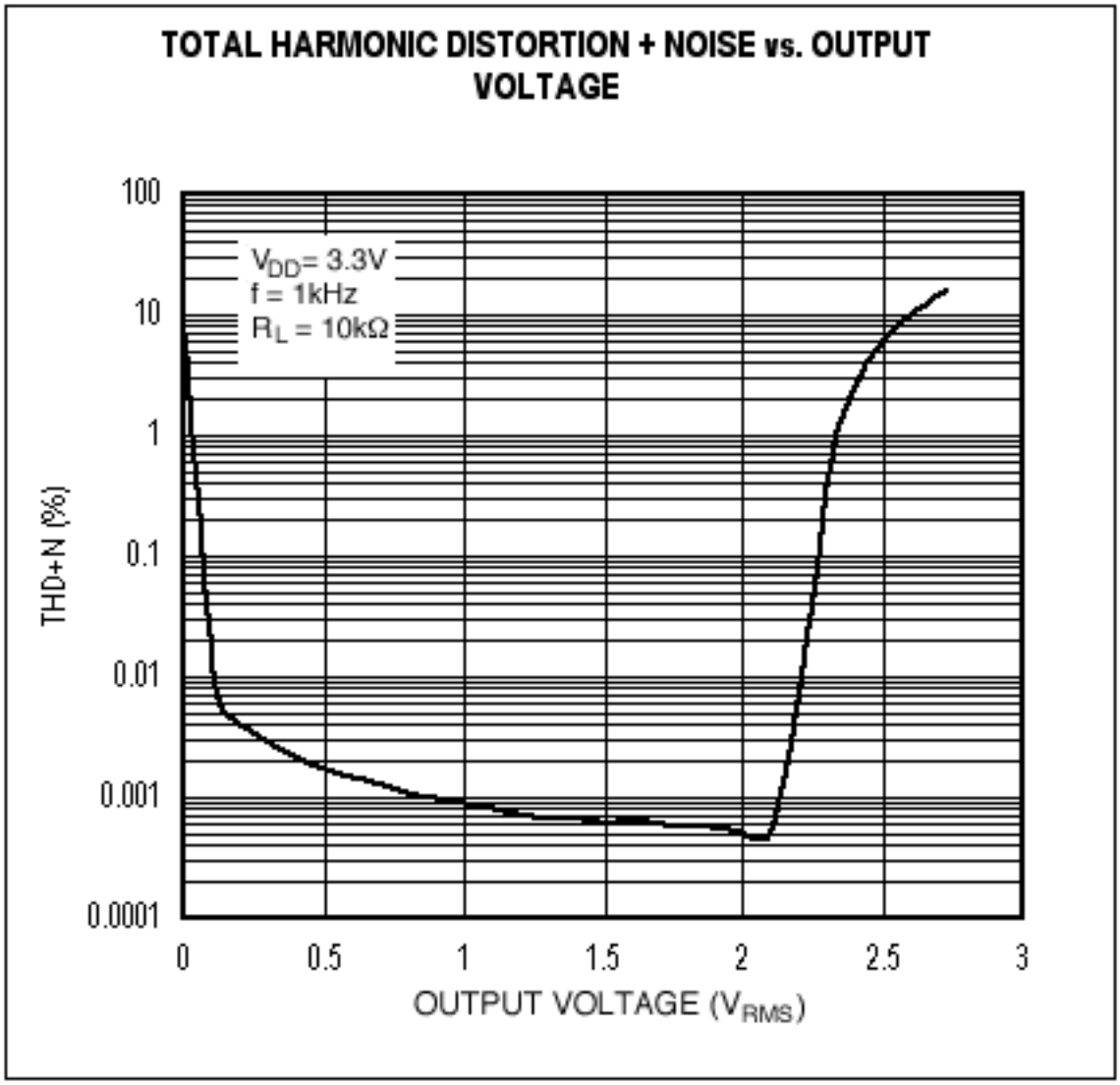

Figure 3. MAX4410 THD+N vs. Output Voltage

Maxim's DirectDrive technology offers improved performance at reduced system cost and size. Set-top-box and cable modem applications can operate from a single 3.3V supply while providing a $2V_{RMS}$ output signal into a 10kΩ load. Additionally, the MAX4410 is an appropriate choice for solutions requiring 2^{nd} order low pass filtering at the line out amplifier.

More Information

MAX4410: QuickView -- Full (PDF) Data Sheet -- Free Samples