

Rarely Asked Questions

Strange stories from the call logs of Analog Devices



Contributing Writer
John Ardizzoni is an Application Engineer at Analog Devices in the High Speed Amplifier Group. John joined Analog Devices in 2002, he received his BSEE from Merrimack College in 1988 and has over 28 years experience in the electronics industry.

The Difference Between Different Differential Amplifiers

Q. I'm perplexed. Why is the output voltage of my ADC differential amplifier driver not what it should be?

A. It's probably related to the type of differential amplifier you've selected. Often, when we exam a customers schematic, we find the amplifier is behaving exactly as it was designed to. The problem turns out to be something as simple as not being familiar with the differential amplifier.

Selecting the right differential amplifier is sort of like picking a new car. There are many models to choose from, and each are packed with various options and features. They all do essentially the same thing: get you from point A to point B. However they all have their own subtleties and that is where the trouble can begin.

When selecting a differential amplifier, the options and features really matter. The three essential classes of differential amplifiers are the sports car, the mid-size and the economy; each class has a little something different to offer.¹

The sports car differential amplifiers run at the highest frequencies. This class of differential amplifiers features gigahertz bandwidths, ten thousand volts-per-microsecond slew rates, a VCM pin that adjusts input and output common mode voltage, ultralow distortion, and single-ended or differential input drive capabilities. These amplifiers typically find use in broadband and IF communication applications.

The mid-size operates in the hundreds of megahertz range, has low distortion, excellent DC performance, output gain balance and phase matching, suppressing even order harmonics, high slew rate, single-ended or differential input drive capability, a VOCM pin that easily adjusts the output common mode voltage. Some models are



even available as duals. This device is used in communications and instrumentation systems to name a few applications.

The economy model comprises a pair of amplifiers integrated with gain-setting and feedback resistors in a single package, simplifying the design and saving board space. This model provides high input impedance, low power and low noise. The device is typically used with a single-ended input and has unbalanced differential outputs. It operates in the tens of megahertz range, and is usually found in low-power precision applications.

So, next time you're in the market for a differential amplifier, take a walk around the lot, kick the tires and take one out for a test ride (simulation). You'll be glad you did. As always, don't forget to read the owners manual (datasheet) front to back; it can save you a lot of time and help ensure you get the most out of your differential amplifier.

¹ To match up ADI part numbers and the various car models check out the link below.

**To Learn More About
 Differential Amplifiers**
 Go to: <http://rbi.ims.ca/5719-100>

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