

Inductive Sensing: Meet the New Multichannel LDCs



Ben Kasemsadeh

If you have been reading my [blog series](#) on how to design inductive sensing with the [LDC1001](#) inductance-to-digital converter since we released it, you know how excited I am about the many uses and design opportunities. But until now, design could have been a bit complicated when your system required multiple inductive sensors. That's why I'm now excited to share that TI has expanded our inductive sensing portfolio to include six 3.3V I²C multichannel devices: the [LDC1312](#), [LDC1314](#), [LDC1612](#), [LDC1614](#) as well as the new [LDC2112](#), [LDC2114](#) and [LDC3114-Q1](#) (see [Figure 1](#)).

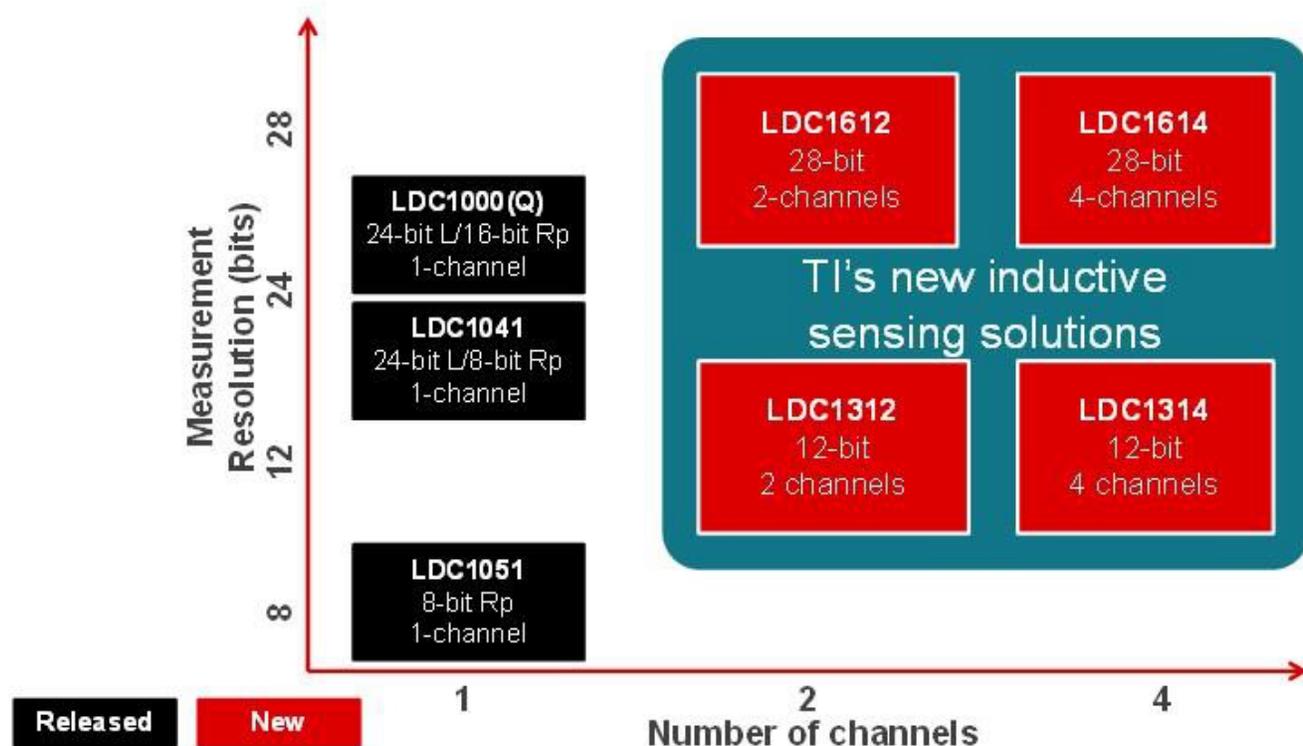


Figure 1. TI's New Inductive Sensing Solutions

The [LDC1312](#) and [LDC1314](#) are 12-bit [inductance-to-digital-converters](#) (LDCs), which can be used for applications such as rotational knobs, keypads or flow meters. The [LDC1612](#) and [LDC1614](#) are 28-bit LDCs, which can be used in high-precision applications such as linear encoders or strain gauges.

The [LDC2112](#) and [LDC2114](#) are 12-bit devices that can be used for touch-button applications.

The [LDC3114-Q1](#) is a 24-bit device that can be used for touch-button applications as well as for precise linear position sensing of metal targets for automotive, consumer and industrial applications by allowing access to the raw data representing the inductance value.

Here are some reasons to consider a new LDC device for your next design.

Multichannel Operation

With the dual-channel [LDC1312](#), [LDC1612](#) and [LDC2112](#) devices and the quad-channel [LDC1314](#), [LDC1614](#), [LDC2114](#) and [LDC3114-Q1](#) devices, system design can become much simpler while also improving cost effectiveness. The inherent channel matching from using a multichannel LDC improves system performance in high-precision designs that either employ differential measurements, or use one coil as a reference to reduce the effect of temperature, mechanical tolerances or other system variables.

Sensitivity

The maximum sensing distance changes with coil diameter. As with the [LDC1000](#), the [LDC1312](#) and [LDC1314](#) operate best if the maximum target distance is kept within 50% of the coil diameter. However, the high-resolution of the [LDC1612](#) and [LDC1614](#) can effectively sense targets as far as two coil diameters away from the sensor.

Power Consumption

We significantly improved power consumption of the new LDC family to benefit battery-operated applications. Lowering the supply voltage from 5.0V to 3.3V allowed us to drop power consumption in active mode by 20%, from 8.5 mW to 6.6 mW. Standby-mode power consumption dropped by 91%, from 1.25 mW to 0.11 mW. Additionally, the new LDC family features a pin for shutdown mode, during which the device consumes only 0.2 μ A.

In low-sample-rate battery-operated applications, the sleep mode and shutdown mode functions can be used to cycle the LDC. The LDC turns on to perform the conversion and then returns to one of the low-power modes. The [Inductive Sensing Design Calculator Tool](#) contains a power-consumption estimator for this purpose.

Start Designing

Each of the four multichannel devices has a new evaluation module (EVM) ([Figure 2](#)), which is [available now](#). Together with our new multichannel EVM software, you can get started with the new features of our inductance-to-digital converters within minutes. You can also check out the EVM and GUI quick-start videos.

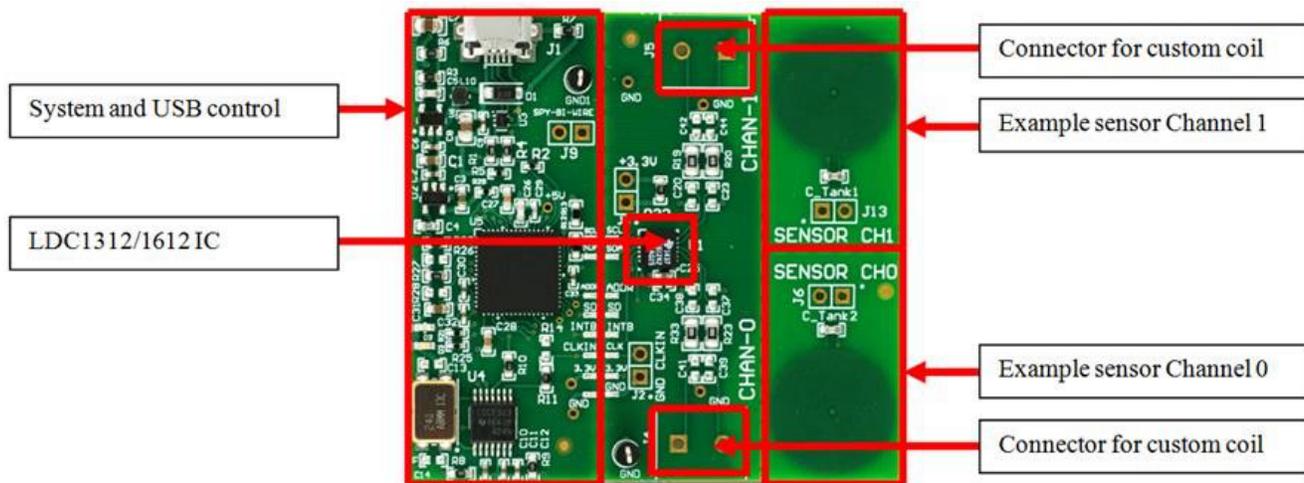


Figure 2. LDC1312/LDC1612 EVM

In upcoming posts, I will explain how to configure a multichannel system and explore the possibilities that the increased sensing range of the [LDC1612](#) and [LDC1614](#) offer.

Additional Resources

- Learn more about [Inductive Sensing](#)
- Get started with the [LDC1614EVM](#) and software
- Check out a TI Design reference design for a [touch-on-metal button design](#) using the [LDC1614](#).
- Read more [blogs](#) on inductive sensing design, including [Should I measure L, RP or both?](#)

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