

# Inductive Sensing: How to Configure a Multichannel LDC System - Part 1



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Last week, I introduced the latest addition to our [inductance-to-digital converter](#) (LDC) portfolio. We released [four multichannel LDCs](#): the [LDC1312](#) and [LDC1612](#), which feature two matched channels; and the [LDC1314](#) and [LDC1614](#), which have four matched channels. In this post, the first in a series, I will explain how to configure them in a multichannel system.

## Benefits

There are several benefits to multichannel designs:

- Systems that require multiple sensors can now use a single IC, as shown in [Figure 1](#). This results in a lower system cost and greatly simplifies system design because sensors can be placed remotely from the LDC.
- The individual channels are well matched in terms of parasitics and sensor drive. These well-matched channels can be used for high-precision differential designs, such as the differential linear position sensing shown in [Figure 2](#). Alternatively, one channel can be used as a reference coil that has no target, or a target at a fixed position. The reference-coil channel can be used to set a threshold, compensate for temperature variation, or determine target distance in a lateral or rotational position-sensing system.
- The reduced system overhead of a multichannel architecture also reduces power consumption.

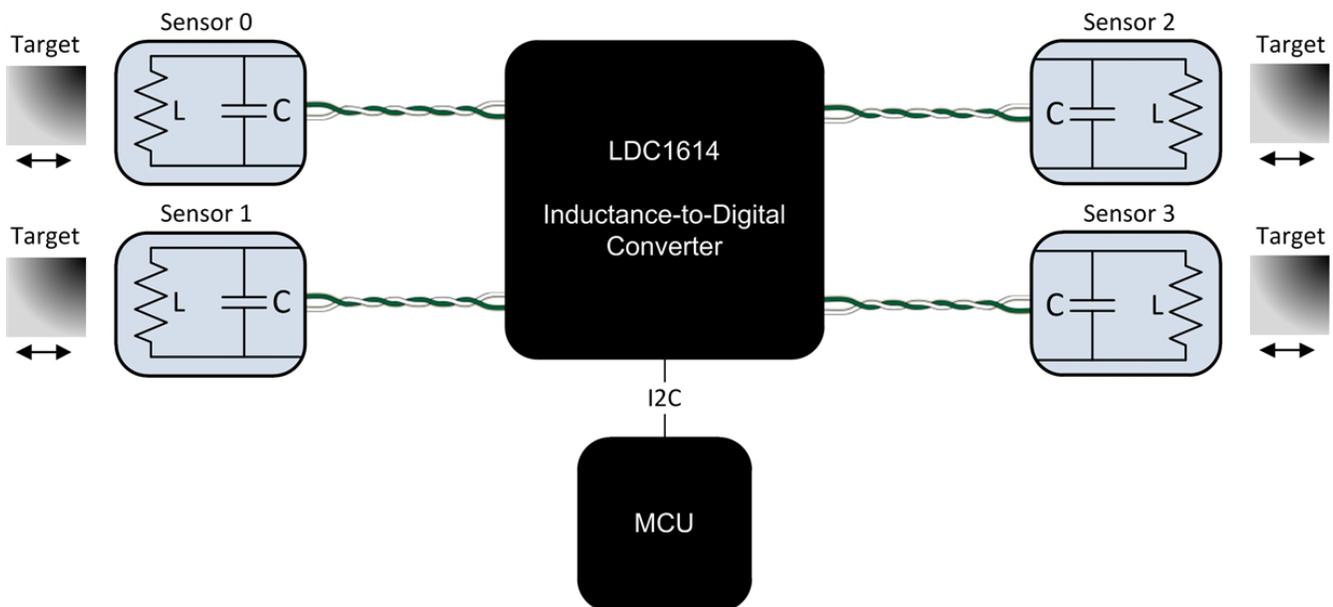
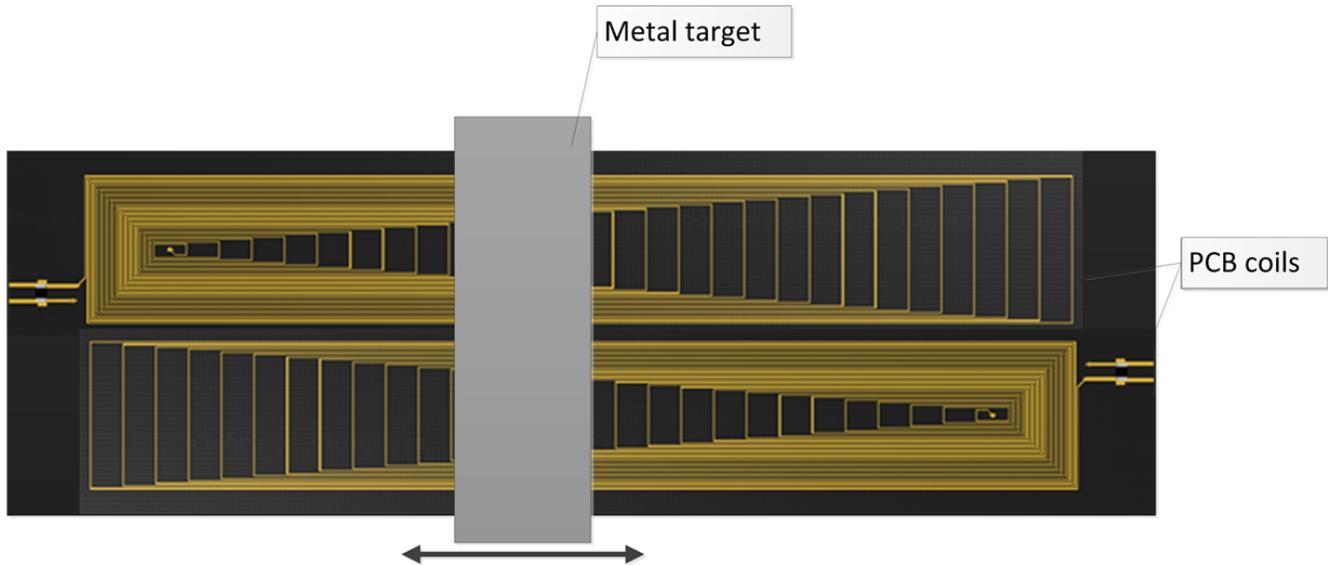


Figure 1. The New Multichannel Core Simplifies Systems with Multiple Sensors



**Figure 2. A Multichannel Core Improves Performance in High-precision Differential Designs**

### Channel Selection

The LDC has two modes of operation:

1. Single-channel (continuous) mode: In this mode, the LDC activates the connected sensor and then continuously converts on the selected channel. To put the device into this mode, you would set the following registers:
  - a. Put the LDC into single-channel mode by setting `AUTOSCAN_EN = 0` (register 0x1B, bit [15]). Note that setting this mode results in `RR_SEQUENCE` (register 0x1B, bit [14:13]) having no effect.
  - b. `ACTIVE_CHAN` (register 0x1A, bit [15:14]) selects the active channel. Set this value to the desired channel (e.g., 00 will select channel 0).

Keep in mind that the high-current sensor-drive feature (`HIGH_CURRENT_DRV`, register 0x1A: bit [6]) is only available in single-channel mode for channel 0.

1. Multichannel (sequential) mode: In this mode, the LDC switches between the selected channels in a round-robin fashion. To configure the device in this mode, set the following registers:
  - a. `AUTOSCAN_EN = 1` (register 0x1B, bit [15]) to set multichannel mode. When this is set, `ACTIVE_CHAN` (register 0x1A, bit [15:14]) has no effect.
  - b. `RR_SEQUENCE = 00` (register 0x1B, bit [14:13]) selects conversion on channels 0 and 1. On the four-channel [LDC1314](#) and [LDC1614](#), option 01 enables three channels (channels 0-2) and option 10 enables all four channels (channels 0-3).

The multichannel devices include an internal filter to reduce the sensitivity to sensor noise. Set the `DEGLITCH` setting (register 0x1B, bit [2:0]) appropriately. This setting is common for all selected channels. In some applications, different sensor designs may be used for different channels. Therefore, it is important to choose the lowest `DEGLITCH` bandwidth setting that is still above the highest-frequency channel.

In this first installment, I've explained how to configure LDCs in multichannel mode. If you are using the [LDC1312](#), [LDC1314](#), [LDC1612](#) or [LDC1614](#) in a multichannel system, be sure to check out [the next installment in this series](#), when I'll explain the timing of these multichannel systems.

### Additional Resources

- Learn more about [inductive sensing](#).
- Watch a [video](#) to learn how to design a 16-button keypad with TI's inductive sensing technology.
- Read other [blog posts](#) about designing with LDCs.
- Start a multichannel design with [WEBENCH® Inductive Sensing Designer](#).

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