Factory Automation Case Study

Case Study

How an Industrial customer used a Renesas custom solution to meet their demanding performance requirements

Overview

Our customer is a leading supplier of solutions for factory and process automation. With their products, processes are controlled securely and efficiently, while protecting people.

For their latest product, they were developing a new safety system based on photoelectric principals, having a transmitter and receiver. The transmitter sends infrared light to the receivers' photoelectric cells and when these cells stop receiving their input, they immediately trigger that something is in the way, and shut the system down. It is vitally important that the function of the safety system is continuous and without any issues. As well as needing to have reliable functionality, there is also the requirement that the system is not reacting to false information, such as external effects from ambient light for example, and thus cause unnecessary equipment down time.

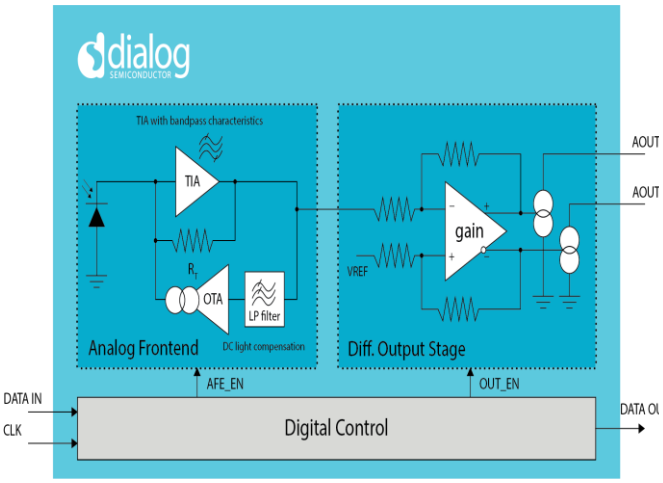
The requirements for the system made developing the solution with commercial off the shelf products impossible. Having worked with Renesas, formerly Dialog in the past and seen first-hand the advantages of a custom solution offer, they approached us to look at what was required for their latest design.

Requirements

The design specification targets for our customers new safety design required several very specific requirements. The design needed to be:

1. Designed on a bipolar process to achieve the performance required
2. To have the ability to integrate a photodiode with a dedicated AFE including a transimpedance amplifier
3. Meet the challenging package requirements
4. Have very low noise photodiodes to meet the 25-meter working conditions

Solution



To select the correct photodiode for this application, Renesas proposed several solutions to our customer. These photodiodes were designed, manufactured and tested by Renesas and the version that best fit the requirements was selected for use in the custom chip. The next stage in the process was integrating these photodiodes with the rest of the required circuitry for the final ASIC. The additional circuitry included a dedicated AFE and transimpedance amplifier.

A challenge for this custom solution was regarding the package option required. A standard package was not suitable and therefore Renesas needed to source an alternative. With the breadth and depth of suppliers that Renesas have this was not an issue and quickly the correct supplier and package option was identified.

Results

With the ASIC, our customer was able to achieve the following results:

- Integration of the photodiode with dedicated AFE and transimpedance amplifier
  - System tolerance requirements were met
- Low noise design
  - 25m working distance possible
- Optical epoxy on package
  - Key for the photodiode

For more information on how an ASIC can benefit your next Industrial design, visit our website or contact us at info-asic@diasemi.com