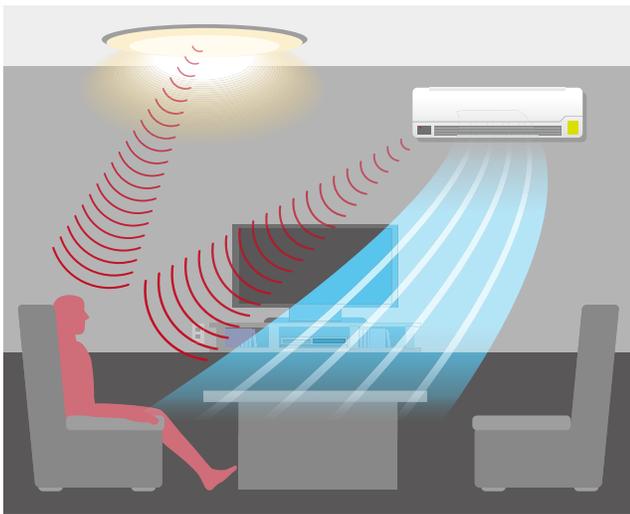**Optical Sensors**

Infrared-Based Presence Detection in a Single Package (VCNL4200)

By Samy Ahmed and Georg Sander

INTRODUCTION

With electronic devices becoming increasingly more intelligent, the need for them to be dynamically aware of their environment becomes an important factor. Be it to save power in a mobile device, adjust the backlight of a screen, or to unlock that cool feature during user input that sets your device apart from the rest, a device needs to be able to "see" its surroundings in order to react accordingly. The VCNL4200 gives a device "eyes" so it can adjust and react to its visual surroundings. The long distance proximity detection makes sure things are seen at a distance and in time, even if the object does not reflect very well, and the built-in ambient light sensor makes sure the ambient light conditions are always known so that the display can always look its best. All of this comes in a single-package solution with complete control over the component's features via an I2C interface.

Thanks to the integrated lenses on both the photodiode and emitter side, the sensor can detect a higher range than standard proximity sensors, without the need for external light-emitting components such as an external LED or a laser diode. The sensor not only detects long distances, but also comes with some extra "smarts" to allow easier integration into a product. The integrated cancellation register, for example, gives the designer the opportunity to put an infrared transparent glass in front of the sensor, with the sensor internally subtracting the offset counts of the cover, effectively calibrating the system in one easy step. With the autonomous measurement feature (self-timed mode) and the integrated interrupt logic mode (interrupt hysteresis), the sensor can be programmed to run on its own. A start-up routine could, for example, set the interrupt, as well as the forward current and integration time as needed, after which the sensor will run on its own, only interrupting the host MCU when an object appears in front of the sensor, triggering an interrupt to wake up the system. This allows even very power-sensitive applications to use this part, as the current consumption of the sensor is very low, especially when in stand-by. The proximity sensor is also robust in bright ambient DC light, as it compensates for this with every proximity measurement made, keeping noise low while the signal that is to be detected stays unchanged. All of these features are accessible via the simple I2C bus.

The VCNL4200 can find a place in many different applications. The small and thin all in one package with two smart integrated sensor elements can be used in light switches to function as a presence detector, switching on and off the light depending on if a person is in the room. Any application with a display can make use of both the proximity and the ambient light functionality, allowing the display to be woken up by the presence of a user as well as having the background light adjusted to the ambient conditions. Any device that depends on user interaction in a meeting room, be it the air conditioner, the lights, or detecting if someone is turning on their PC to then activate a camera for face detection to log the use in, can be activated and controlled with a VCNL4200. Taking things out of a serious work environment and integrating the sensor into your child's favorite toy can also prove of use, helping that new smart robot or RC car to stop in front of a wall, rather than trying to drive straight through it.

The VCNL4200 is an efficient and small sensor that can make any device that little bit smarter. Design it into your next application and allow your device to profit from its capabilities. For more information regarding design support, please visit the VCNL4200 product page: www.vishay.com/doc?84430

For technical questions, contact: consumersensors@vishay.com