Proxima RF

Cold Chain Monitoring with Low Power HF RFID enabled Sensors

Late last year, a major US based organic foods retailer planned to offer shoppers delicious New Zealand lamb as an alternative for their holiday plates. Unfortunately, when the shipment arrived in the state of the art, temperature controlled warehouse, the goods were already spoiled. As were the holiday dinner plans of countless customers.

With no time to replace the product, the food retailer was forced to cancel the planned and pre-paid advertising and promotion campaign, suffered the ire of its customers hankering for rare, organic lamb and lost the planned sales profit. While the refrigerated freight carrier and the distributor inevitably duelled over who would pay for the losses, no one knows for sure when or where the spoilage occurred - removing any certainty about how to avoid the problem in future. This scenario is played out every day, all over the world.

We know that the continuity of Cold Chain Monitoring (CCM) requires reliable sensing from production to consumption. The largest users of CCM are in the food and pharmaceutical industries.

There are multiple options for monitoring perishable goods via temperature controlled processes to ensure their safety and reduce vendor loss. Larger firms can afford real time location systems (RTLS) that combine software, active radio frequency tags, wireless communication motes, and GPS tracking – potentially power hungry systems that may require continual maintenance. These costs are borne by the logistics firm and/or distributor and ultimately, by consumers.

Real time systems provide data to allow immediate intervention. The total cost of ownership includes airtime for GPS and data feeds plus the hardware and software costs for outfitting and maintaining every tractor trailer and each distribution node with wireless motes. Further, every product has different transport parameters. For example, specialty items - like blood plasma products - need to be stored within 20 – 24 °C with gentle agitation for a shelf life of 5 days . Pharmaceuticals have varying package and temperature control requirements.

While “real time” monitoring sounds like the answer, it can be costly. In-transit problem mediation is more often done on a “lag time” basis to sufficiently identify the source of the “out of parameter” problem and make meaningful adjustments specific to the needs of individual products.

Conversely, by reducing the sensor power draw while maintaining data logging capability and mobile data upload capability, monitoring costs may be significantly reduced while increasing the flexibility to monitor individual packages and parameters throughout the cold chain.

The Melexis MLX90129 is a sensor transponder IC that combines a precise and programmable interface for external resistive sensors. What makes this sensor transponder unique is its unusually low power and voltage draw plus the ability to be accessed and controlled through its ISO15693 13.56 MHz high frequency (HF) radio frequency identification (RFID) antenna. There is one internal temperature sensor and two external resistive sensor interfaces connected via the IC to make battery-less sensing solutions. The read /write “tag” harvests energy from a HF RFID reader to supply a regulated voltage to the other components enabling long term embedded sensing.

Adding a simple coin-sized battery enables the standalone data logging mode. The sensor output data is stored in the internal 3.5kbits user memory or can be extended with external memory.
As an example - for CCM applications - the Melexis MLX90129 can be used as a unique RFID product identifier combined with sensors to monitor temperature, humidity or light. The sensor tag can log data over the in-transit and storage period – matching the data reads to the product requirements. Each sensor tag, about the size of a 50 cent piece could be attached to multiple, smaller items with data and product information re-written for re-usable applications. Alternatively, the sensor tag can be embedded without a battery in walls, containers or pallets to be energized and read with a desktop, handheld or automated HF device.

The RFID interface for the Melexis IC is 13.56 MHz high frequency; ideal for applications where the security and accuracy of proximity reading is required or where UHF emissions could interfere with sensitive equipment such as in healthcare (as recommended in the HIBCC ANSI 4.0 specification). The combination of low power sensing with HF radio frequency identification (RFID) delivers affordable cold chain, industrial and pharmaceutical data logging that is versatile and easy to implement.

While a HF RFID enabled sensor tag might not have prevented last year's holiday turmoil from spoiled lamb – the stakeholders would have had a reliable and cost effective data logger to pinpoint when and where the spoilage occurred and enabling corrective action. Pass the mint sauce, please.
Want to know more about HF RFID enabled sensors?

ProximaRF Technology Corporation and Melexis have partnered to create a unique plug and play, low power HF enabled sensor development kit so system integrators can focus on their cold chain and pharmaceutical applications instead of developing a HF reader.

The kit includes the Proxima RF plug and play USB Desktop reader that comes with a powerful API and evaluation software and development tools, unique to the 13.56 MHz HF RFID industry. The DVK90129 HF RFID enabled resistive sensor development kit also includes an evaluation board from Melexis populated with a temperature, light sensor and potentiometer.

About ProximaRF

Proxima RF™ designs, develops and manufactures High-Frequency RFID readers, and reader modules. Designed to read ISO15693 tags, CryptoRF ISO 14443B protocols plus HF RFID enabled Melexis 90129 sensor tags, Proxima RF readers are enabling the next generation of near-field and proximity solutions. ProximaRF enables integrators to create user-friendly proximity solutions with ready-to-ship readers, supporting software, OEM designs and sensor tag modules.

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About Melexis

Melexis (Euronext Brussels: MELE) is a supplier of smart mixed-signal semiconductors. Our core experience derived from more than ten years supplying ICs to the automotive electronics market sustains the expansion into Application Specific Standard Products for industrial and consumer product applications. Melexis' products include sensor ICs (Hall-effect, optical, infrared and Micro-Electro-Mechanical Systems or MEMS), communication ICs (low power RF, RFID and Automotive BUS), actuator ICs (for electric motors, solenoids and LEDs) and Application Specific Integrated Circuits (ASICs). Further information about Melexis can be found at http://www.melexis.com.

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