



## How Rental Companies and Rock Bands Benefit from HF Enabled Sensors

Nathan runs a firm that rents high end amplifiers and sound equipment to musicians, performers and rock bands. While many of his clients hire experienced electricians, others cobble together the equipment and cabling – which could cause equipment to overheat.

The less experienced renters may not be aware of voltage drops and cable run limits across stage floors. Reduced voltage at the remote end creates high internal equipment temperatures and combined with increased ambient temperatures from stage lights, and cables overheating – stage equipment can be damaged or have its lifetime reduced. Sensitive electronic components wear out faster than Nathan expected, meaning increased maintenance and replacement costs – all costs that are passed on to his clients.

Even with careful contract language, how can Nathan monitor and verify operating temperatures to protect his investment or charge when he knows the equipment has been over-heated?

### HF RFID Enabled Sensing

Melexis has created the MLX 90129 sensor IC that can be matched with multiple sensor inputs and read with a 13.56MHz Radio Frequency IDentification (RFID) reader from Proxima RF. Using the MLX 90129, a simple, cost effective temperature data-logger could be attached to rental equipment to verified operating temperatures with a handheld reader on rental return.

The read/write sensor IC has an internal temperature sensor and three additional inputs for sensing or monitoring. By combining resistive sensing with passive high frequency (HF) RFID, Melexis opens the door to new sensing applications that previously were difficult to achieve. As a bonus, the HF RFID can use unique product identifiers for inventory and rental control plus can be password protected for added security.

### What Can Be Sensed?

The Melexis sensor IC can be used for more than just temperature sensing. Combined with virtually any resistive sensor on up to three sensors or monitoring ports, the sensor IC can provide data through proximity RFID for monitoring applications that include:

- Strain or force sensors to measure small movement, stretching, weight
- Pressure sensors (air, liquid pressure, vacuum)
- Flow (liquid or gas)
- Temperature, humidity
- Electrical voltage, resistance and current
- Tampering, tilting, breaking a seal
- Proximity of nearby objects or linear position
- Shock, rotational speed, angular position, and light
- Run time, duty cycles, on/off

### Battery-Less Sensing or Data logging?

The combined Melexis 90129 sensor IC and sensors can be encased in a number of different form factors; from tiny, inexpensive plastic housings to water-proof and high temperature enclosures.

The complete sensor can be embedded in equipment or new construction to create an “in situ” battery-less sensing product for taking data at a particular point in time. The low power sensor IC with passive 13.56MHz interface draws power



from the HF reader designed by Proxima RF – this energy harvesting means designers can embed sensors in products and equipment where water and liquid are a problem for ultra-high frequency (UHF) RFID.

By adding a battery, the sensor becomes a data logger – taking data points on a time schedule matched to application needs.

### **Why High Frequency for Sensors?**

HF is a “proximity” read technology that has a short read range. Shorter read ranges are useful where personal, human intervention is preferred or is already part of the standard operating procedure such as in healthcare, high security applications or with mission critical or sensitive devices. Personal interaction allows human verification of the read and the environment, to add redundancy in the system. The short read range ensures 100% reads without interference or need for anti-collision software as is necessary with longer read active UHF technology used in real time locating and inventory systems.

High frequency 13.56MHz RFID has superior performance characteristics in and around liquids making it a logical choice for use with sensor systems used to monitor foodstuffs, beverages and liquid products either in process control, manufacture, transport or storage.

The proximity read nature of passive 13.56MHz RFID results in less ambient emissions – a benefit in healthcare applications or anywhere emissions could create a concern with sensitive electronic equipment. The recent HIBCC ANSI 4.0 standard specifically recommends use of HF in healthcare to reduce concerns that active UHF may interfere with sensitive equipment.

### **HF Readers – Desktop or Mobile**

The MLX 90129 based sensors can be read with the off-the-shelf Proxima RF USB Desktop Reader or the AV-X mobile reader. The FCC/CE USB Desktop Reader has an internal antenna so no extra parts are needed. The small polycarbonate box pulls power from the USB connection and includes a LED for visual read confirmation.

The Proxima RF AV-X mobile HF reader is designed specifically for the rugged Psion Teklogix Workabout Pro product line. The reader is designed to work with the other radios in the handheld device – the operator can keep the WiFi, bar-code scanner or GPS running while making the HF read. Since many users require mobile reads, the AV-X is a perfect fit for HF-enabled sensor applications.

### **Developing Applications for HF RFID Enabled Sensors**

Melexis and Proxima RF have partnered to create the DVK 90129 kit so sensor designers can easily evaluate the features on the MLX 90129 sensor IC. The kit includes an evaluation board pre-populated with a temperature, light sensor and a potentiometer. The evaluation board is read with the USB HF Desktop Reader from Proxima RF. The kit includes powerful drag & drop dashboard software. An optional key fob style temperature sensor (ST-KF1) can be ordered with the kit for developers who may be interested in trialing sensor in an application ready form factor.

The DVK 90129 is available from Future Electronics or your local Melexis representative.

### **Why Rock Bands Should Care**

Nathan, the equipment renter, is like any business person; he needs to ensure he is providing quality product, protects his investment and keeps costs down. If he finds his equipment lifetime is shortened by overheating, he will simply charge more. But everyone saves time, money and headaches by instantly verifying operating temperatures with a simple, mobile reader. And Rock Bands can go back to making music.