Tire Pressure Monitoring System

Overview

The MPXY8020 series is compatible with tire pressure monitoring systems using a remote RF sensing approach, and is ideal for integration with existing remote keyless entry (RKE) systems. In addition, Freescale Semiconductor offers a comprehensive chip set for a TPMS-RKE system that eliminates the need for an additional TPM specific receiver. This chip set is comprised of the following:

> MPXY8020—pressure and temperature sensor and interface circuit

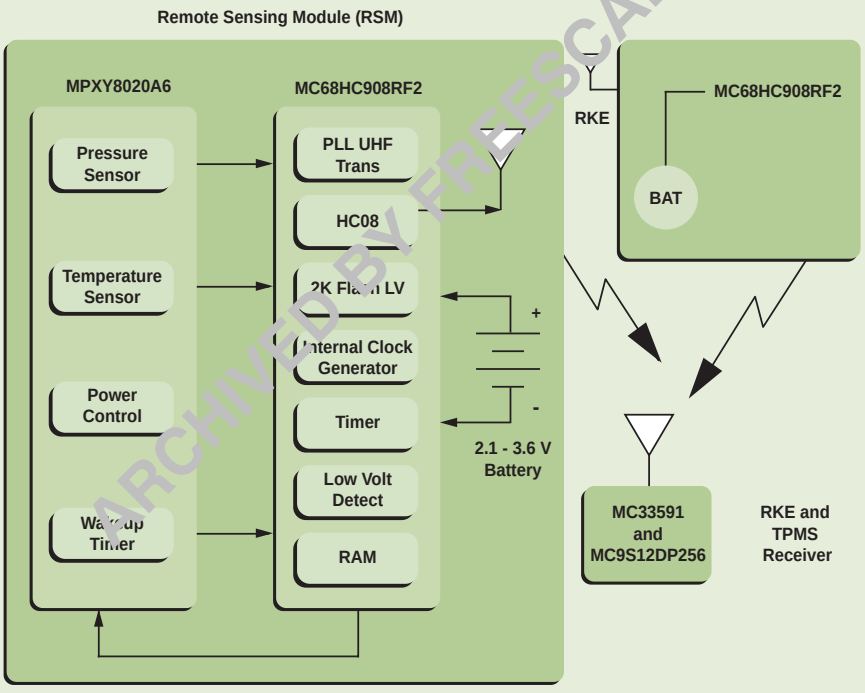
> 68HC908RF2—MCU and RF transmitter housed in a single package

> MC33591—RF receiver

> MC9S12DP256—microcontroller

The features of this chipset enable a system to identify individual tires (including the spare) as well as to detect both "over-pressure" and "under-pressure" conditions. The system also has the ability to compensate for changes in cargo load and monitor tire temperature. The module low energy management supports extended battery life and signals a low-battery condition. Furthermore, the system is compatible across vehicle platforms and tire technologies (such as run-flat tires)

TIRE PRESSURE MONITORING SYSTEM ENABLING CHIP SET



Key Benefits

> Compensates for cargo load changes, tire temperature, and battery conditions

> Supports vehicle platforms ranging from small cars to light trucks and across tire technologies

> Monitors individual tires, including the spare, detecting changes in pressure and performance

> Offers the possibility to couple with a remote keyless entry (RKE) system for a low-cost total solution

> Offers the small size and enhanced media protection of the SSOP package

Freescale Ordering Information

Part Number	Product Highlights	Additional Information
MC33591	RF receiver	www.freescale.com[Note]
MC68HC908RF2	Microcontroller/transmitter	
MC9S12DP256	16-bit microcontroller	
MPXY8020	Pressure and temperature sensor and interface circuit	

Note: Search on the listed part number.

Design Challenges

A direct tire pressure monitoring system requires a very long battery life; 7 to 10 years. Because the battery resides inside the tire, a heavy, bulky battery is not an option. The frequency of measurements and transmissions must be carefully considered. In addition, low-consumption components must be chosen.

The environment inside a tire is very hard on electronic products and silicon pressure sensors exposed to the air. Media protection is vital to a product's survival, as well as thermal characteristics.

Power Consumption

Most auto manufacturers now require a 7 to 10 year operational lifetime for a TPM module. To meet this requirement, each component must have a very low-current standby or idle mode, as well as efficient measurement and transmission hardware. The control algorithm should limit measurements and transmissions to as infrequently as possible.

Size and Weight

Compounding on the power consumption issue, a heavy, bulky battery is simply not an option. Usually the entire module including the electronics, PCB, housing, and mounting hardware needs to be below 30 to 40 grams to avoid an out-of-balance tire.

Environment

Inside the tire is a very harsh environment, with possible temperatures from -40 to +125°C, and exposure to moisture, tire mounting grease, and a variety of other potentially corrosive materials. Careful package design is necessary to allow a broad temperature range and robust media compatibility.

Cost

As with practically all automotive applications, cost is a major issue. Integrating the functionality of the TPMS and the remote keyless entry (RKE) receiver can help to reduce the overall system cost. Also, smaller, more highly integrated components to reduce board space can present significant savings.

Freescale Semiconductor Solution

Freescale Semiconductor introduces the MPXY8020 tire pressure monitoring sensor that is comprised of a capacitive pressure sensing element, a temperature-sensing element, and an interface circuit with wake-up feature, all on a single chip. This chip is housed in a Freescale Semiconductor super small outline package (SSOP). The size and enhanced media protection of the SSOP makes it the perfect package solution for valve stem or wheel well-mounted tire pressure monitoring system (TPMS) remote sensing modules.

Contact your Freescale Semiconductor sales representative for complete information on existing products and custom solutions.

Development Tools

Tool Type	Product Name	Vendor	Description
TPMS Demonstration Kit	KIT1951MPXY8020	Freescale Semiconductor	Includes Hardware, Software, and Documentation

Related Documentation

Document Number	Description
AN1943	TPMS Demonstration Kit
AN1951	Freescale Semiconductor Tire Pressure Monitoring System Demo
AN1953	High Accuracy Digital Tire Pressure Gauge
BR1564	MPXY8020 Series Tire Pressure Monitoring Sensor

Learn More: Contact the Technical Information Center at +1-800-521-6247 or +1-480-768-2130.
For more information about Freescale products, please visit **www.freescale.com**.

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