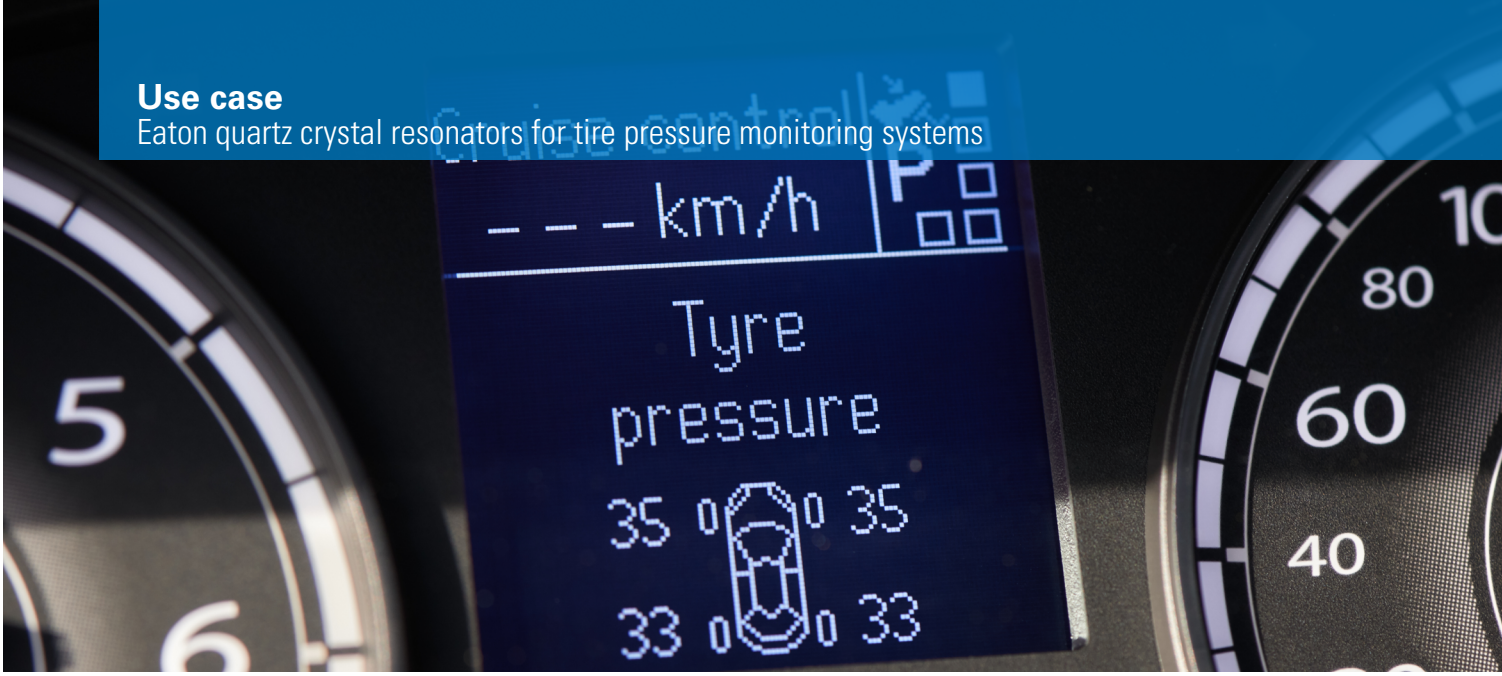
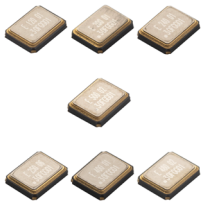
Use case
Eaton quartz crystal resonators for tire pressure monitoring systems





Utilizing Eaton's quartz crystal resonators in automotive tire pressure monitoring systems

Among many safety features in modern vehicles, tire pressure monitoring systems (TPMS) stand out for their essential role in maintaining vehicle safety. TPMS continuously monitor tire pressure, alerting drivers when the pressure is below or above the recommended levels. This ensures optimal tire performance and prolongs the tire life by reducing the risk of tire failures. Precision in tire monitoring is crucial, as delays or inaccuracies in tire pressure readings can adversely impact driver and pedestrian safety and increase the risk of accidents.

A major challenge in TPMS design is ensuring reliable operation under varying environmental conditions such as vibration, temperature fluctuations, and electromagnetic interference (EMI). These factors impair the stability and precision of frequency control and timing mechanisms within TPMS sensors. High vibration can disrupt a sensor's mechanical components or alter its calibration, leading to inaccurate pressure readings. Temperature fluctuations can also impair the accuracy of the sensors by causing changes in resistance and capacitance values, which can potentially affect the sensor's output. Moreover, EMI from the vehicle's own electronic systems or external sources can introduce noise into the sensor's signal, leading to inaccurate readings. Such inaccuracies can compromise vehicle safety by failing to notify drivers of tire pressure issues or triggering false alarms.

Integrating crystal resonators into TPMS circuits can improve frequency control and timing accuracy in the system. These devices offer stable and precise oscillations, generating reliable clock signals to maintain accurate sensor operations and data integrity.

Eaton's quartz crystal resonators are designed to enhance the accuracy and reliability of tire pressure measurements. The precision timing and frequency control they offer ensures that TPMS can accurately monitor tire conditions and transmit data in challenging automotive environments. The small-footprint design of these products makes them suitable for space-constrained systems, enabling integration into a wide range of TPMS. These products are available in operating frequencies ranging from 12 MHz to 60 MHz and temperature ratings from -40 °C to +125 °C. The E3XA and E9XA models are AEC-Q200 qualified for compliance with automotive standards. Eaton's quartz crystal resonators are RoHS compliant and performs reliably in high-temperature applications while meeting lead-free soldering requirements. Eaton offers customized options, such as options in nominal frequency, frequency stability, tolerance, and so on, to meet specific application needs.

Eaton
Electronics Division
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com/electronics

www.eaton.com/electronics

Powering Business Worldwide

© 2024 Eaton
All Rights Reserved
Printed in USA
Publication No. ELX1422 BU-ELX22302
April 2024

Eaton is a registered trademark.

All other trademarks are property of their respective owners.

Follow us on social media to get the latest product and support information.