



Smart

Microchip's PIC32MZ DA microcontroller (MCU) powers fully autonomous data logging with an intuitive touchscreen interface to enable stand-alone operation in the field without reliance on a PC or external display hardware.



Connected

The KSZ9563R Ethernet switch with IEEE® 1588v2 support ensures precise time synchronization and seamless module-to-module communication, simplifying scalable system integration in distributed test setups.



Secure

Microchip's PIC32MZ DA microcontroller (MCU) has a full-featured hardware crypto engine with Random Number Generator (RNG) for data encryption/decryption and authentication. Additionally, Code and data transfer to and from DRAM do not leave the package, making the system more secure.



Klaric Smarter Automotive Diagnostics Engineered by Promwad for Klaric

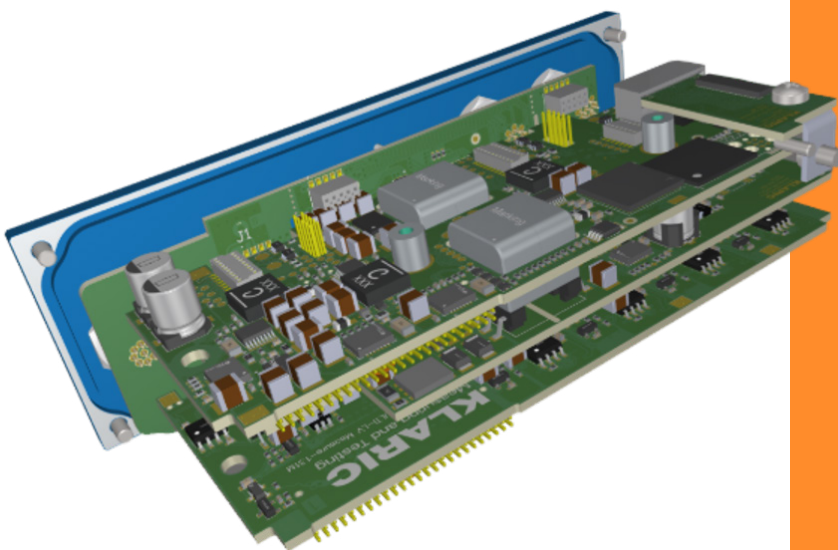
Flexible Data Logging Platform Supports Autonomous Operation, Synchronized Communication and Scalable Testing Architectures

Promwad Engineering Company partnered with Klaric to develop LV-LOG, a modular, stand-alone data acquisition system for Electric Vehicle (EV) diagnostics. Incorporating Microchip's PIC32MZ DA and KSZ9563R, it features synchronized communication, multi-source power input, a touchscreen UI, and scalable architecture, all in a compact, EMI-compliant design that is ready for demanding automotive testing environments.



Market Dynamics

The diagnostic tools market for electric vehicles (EVs) is expected to witness substantial growth between 2025 and 2035. This expansion is primarily driven by the rapid increase in EV ownership, advancements in automotive diagnostic technologies, and a rising demand for cost-effective battery monitoring solutions. Key factors contributing to this growth include the surge in EV sales, stricter emission regulations, and the increasing complexity of EV powertrains, all of which heighten the need for advanced diagnostic tools. Additionally, the adoption of cloud-based diagnostics, AI-powered fault detection, and remote vehicle monitoring systems are further propelling market growth.





The Challenge

Klaric GmbH & Co. KG, a trusted German provider of high-precision measurement systems for EV and hybrid testing, faced growing limitations with its legacy data acquisition tools. Their existing systems relied heavily on external PCs, lacked modular flexibility and offered restricted connectivity, making it difficult to adapt to dynamic testing scenarios and field conditions.

To remain competitive and meet the expectations of global OEMs, Klaric needed a stand-alone, reconfigurable subsystem that would support modular expansion, operate reliably across diverse power sources and provide a future-proof foundation for synchronized data capture and real-time control while complying with strict automotive EMI/EMC standards.





The Solution

To meet Klarić's need for a modular and autonomous automotive data acquisition platform, Promwad engineered the LV-LOG subsystem, a fully stand-alone, scalable solution designed for field operation and real-time diagnostics in EV and hybrid vehicle testing. Built around Microchip's embedded technologies, the system integrates robust data logging, versatile connectivity and industrial-grade resilience.

Here's how Promwad addressed each core challenge:

Modular Architecture for Customization

From concept to implementation, the system was designed with a modular approach. This allows Klaric and future clients to reconfigure the device easily and tailor features and performance to specific testing needs without a full redesign.

Embedded Data Logging with eMMC Storage

At the heart of the system is the PIC32MZ DA MCU, which collects high-resolution data from analog and digital sources and stores it securely in the on-board eMMC storage. This ensures reliable logging even without a PC, which is essential for stand-alone field operations.

Touchscreen Interface for Standalone Control

A built-in graphics engine, generous RAM and RGB interface support enabled the integration of a touch display, which eliminates the need for external PCs during configuration and operation and improves usability in mobile test setups.

Dual-Mode USB Type-C Connectivity

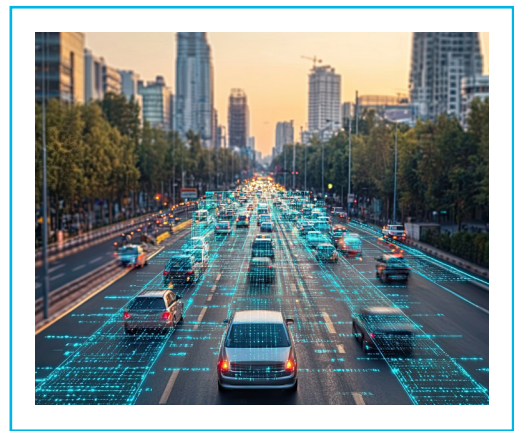
The system supports both Host and Device modes via USB 2.0 OTG, enabling flexible interaction with external storage and PCs. This improves data extraction and firmware update workflows.

Multi-Source Power Input

Promwad implemented automatic switching between multiple power sources—including CAN/Ethernet connectors, extension boards in HRS and USB PD (rev 3.0)—covering a wide +9 to +48V range. This ensures stable operation in variable automotive testing environments.

Interface Expansion and CAN Support

To support future testing scenarios, the platform includes a modular interface expansion mechanism. A dedicated CAN extension board enables synchronized, isolated communication across additional ADC modules to increase system scalability and flexibility.





High-Current Digital I/O Modules

IEC 61131-2-compliant digital I/O modules (up to 500 mA per I/O) were designed to support real-time interactions, including triggering ADC events and controlling external equipment directly from the logger.

Isolated Power Supply (IPS) Board

To meet strict EMI/EMC requirements, Promwad developed a compact +12V/+24V, 24W isolated dual-channel power module. A major challenge that was successfully solved was ensuring low electromagnetic interference in close proximity to sensitive ADC circuits.

Ethernet With Precision Time Protocol (PTP)

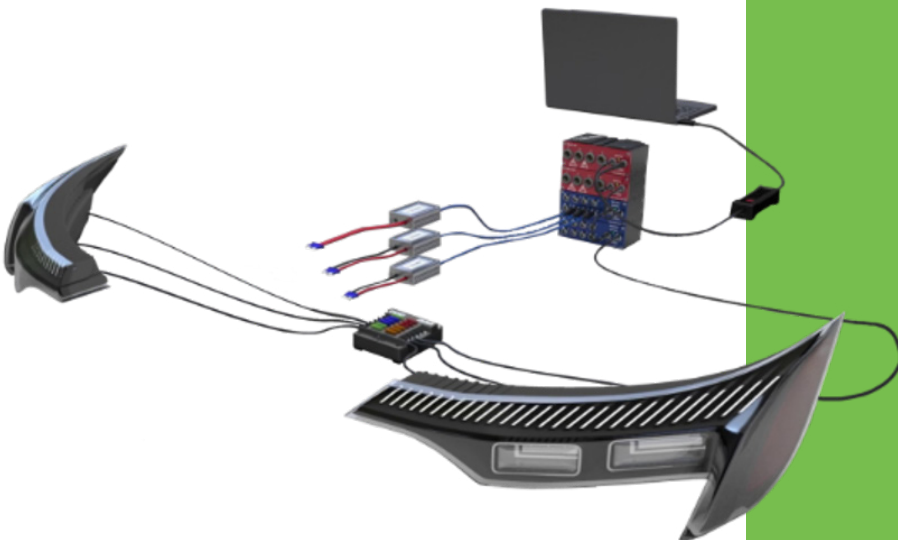
To support synchronized communication, Promwad integrated Microchip's KSZ9563R Ethernet switch, which is known for its exceptional stand-alone performance, integrated PHY, and minimal configuration needs. This chip enables IEEE 1588v2-compliant time synchronization, removes the need for external routers, simplifies module cascading and lays the foundation for future Gigabit Ethernet upgrades.

Promwad relied on industry-proven engineering tools like Altium Designer® and MPLAB X IDE to streamline development, ensure design accuracy and reduce integration time when working with Microchip's embedded components



The Result

By partnering with Promwad and adopting a design based on Microchip's embedded solutions, Klaric successfully transformed its automotive data acquisition capabilities. The newly developed LV-LOG subsystem delivers a rare combination of stand-alone operation, modular scalability and industrial-grade reliability, empowering engineers to conduct advanced testing with greater efficiency both in the lab and in the field.





The system enables:

- Full autonomy through on-board data logging and a responsive touchscreen interface, with no external PC required
- Streamlined deployment using a flexible, multi-source power input for reliable field operation
- Scalable design with modular I/O and interface extensions to adapt to evolving test requirements
- Reliable, synchronized communication via high-speed Ethernet with IEEE 1588v2 (PTP) support
- Compact, EMI-compliant hardware, purpose-built for demanding automotive environments

This result demonstrates the power of close engineering collaboration and proven component platforms, showing what's possible when a flexible design partner like Promwad employs Microchip's robust embedded ecosystem.

About Klaric



Based in Stuttgart, Germany, [Klaric GmbH & Co. KG](#) is a leading provider of high-precision measurement and diagnostic systems for the automotive industry. With deep expertise in current, voltage, and temperature monitoring—particularly in electric and hybrid vehicle testing—Klaric’s solutions are trusted by major OEMs, Tier 1 suppliers and testing laboratories worldwide. The company’s commitment to accuracy, reliability and innovation makes it a key technology partner in automotive development projects.

About Promwad



Based in Essen, Germany, [Promwad Engineering Company](#) specializes in custom hardware and embedded software development for the automotive, industrial and telecom sectors. As an official Microchip Design Partner, it helps technology companies accelerate product development, from concept to full-scale production. With deep expertise in system.

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