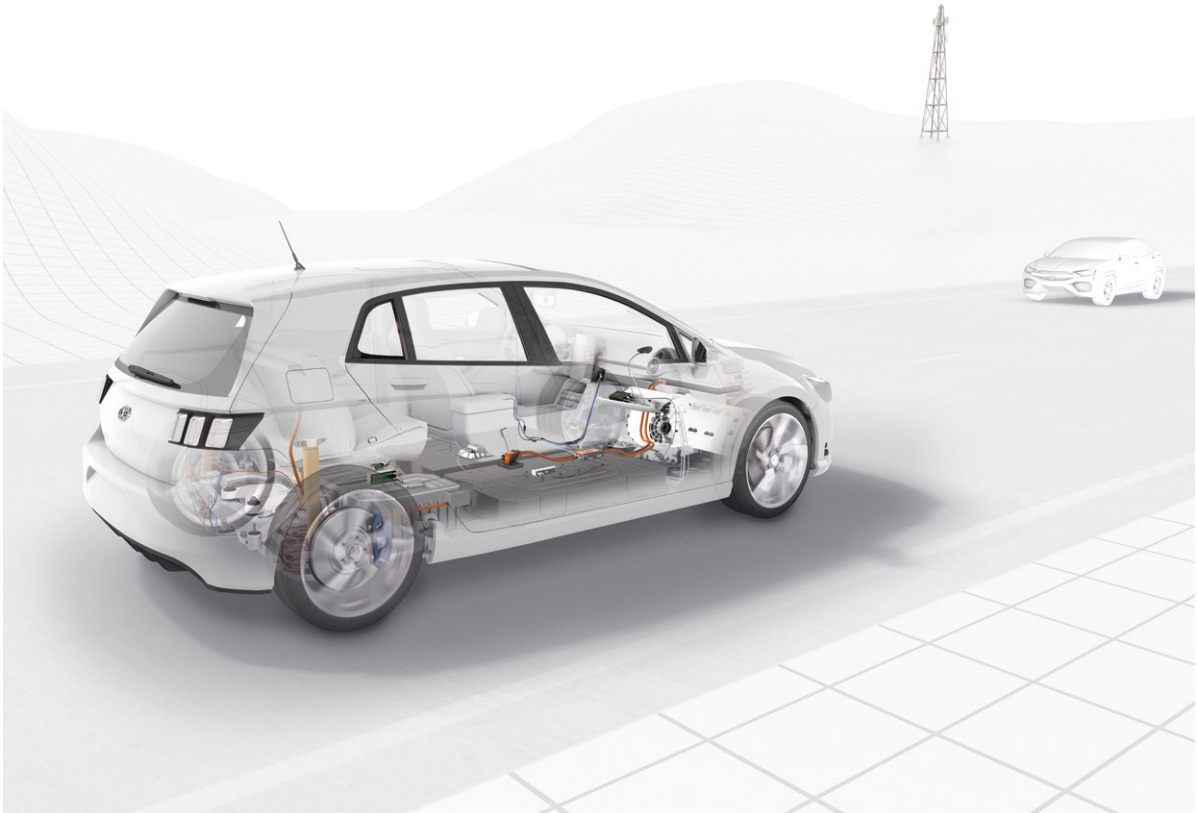
UniCAN 3 Data Logger

Real-life Fleet Testing: When Extreme Weather is improving Vehicle Development

Data recording

Intense sunlight and high temperatures mean stress for vehicles and components, and yet they are part of everyday life in many regions of the world. In order to test proper function under various conditions, cars are therefore driven worldwide by end customers in long-term tests during advanced development phases. In this way, data is collected under real conditions before the vehicles are released for series production, while at the same time they are also exposed to climatic conditions.

During a fleet test of electric vehicles in Asia, very high ambient temperatures of more than +50°C were encountered. For the analysis of the interior temperatures in interaction with the electric drive and the battery, the measurement results had to be reliably recorded despite the high load for the measurement technology used. With the UniCAN 3 data logger from CSM, the test could be carried out even during a heat wave without loss of function or interruptions.



Why "Real World Tests"?

For vehicle tests under real conditions, they are driven over a longer period by people who are not test drivers - in other words, they are being tested by end customers. Through this everyday, consumer use, data can be collected on how the vehicle behaves outside of a professional environment, for example during prolonged city driving, after long periods of standing, or when it is subjected to irregular high stresses.

»With these fleet tests, vehicle manufacturers ensure that their passenger cars pass what's known as the 'real world test' - in other words, their use in the real world - and there's no one better to conduct them than end users in actual road traffic.«

David Löw, Product Manager
for UniCAN data loggers at CSM GmbH

At the same time, these tests take place in different regions so that climatic influences such as different temperatures, fluctuating humidity or high solar radiation can also be included in the evaluation. The requirement here is that the tested vehicles should function under real conditions worldwide. Therefore, the measured data must be collected as realistically as possible.

What are end user tests under real conditions?

To test their vehicles under real-life conditions, manufacturers at an advanced stage of development around the world rely on end customers as their test drivers.

The approach behind this is simple: large amounts of measurement data are recorded to show vehicle behavior in real road traffic. Insights can also be gained regarding how the car is used. The results are not only included in the optimization of the tested series but are also applied to improve future vehicles.

To this end, the test vehicles are equipped with data loggers and, if necessary, with additional sensors or measurement modules. It is important that the measurement technology used fits into the vehicle as inconspicuously as possible so as not to interfere with the test. Since a lot of data is required in a short period of time, people who use their vehicles intensively, such as employees of cab companies or freight forwarders, are often selected.

But it is also worthwhile for the participants or the companies to cooperate - because they can benefit from consideration, such as reduced purchase, leasing or service conditions.

What needs to be considered during implementation?

Since the required measured values, including temperatures in various areas of the vehicle, are to be recorded over a longer period of time, a robust data logging unit is required. Data from the control units, temperatures as well as other variables from different sensors are to be transferred and stored to this unit via CAN / EtherCAT® measurement modules.

The most important thing is that the corresponding data logger neither impairs nor influences the use of the vehicle by the end customer. This is the only way to ensure that the end customer can use the vehicle without restrictions and that the measurement results are not falsified by the presence of the device. For this purpose, it is necessary that the device has the smallest possible dimensions so that it can be installed in the vehicle without any problems.

In addition, since drivers should not be able to intervene in the measurement setup, for example to change settings, the data logger used must be remotely readable and configurable. Similarly, external influences, such as temperature fluctuations or vibrations, must not affect the function of the logger.

The data logger - an inconspicuous companion

The UniCAN 3 data logger was installed in several vehicles of the test fleet to record more than 300 signals - both temperatures from the vehicle's interior and CAN bus data from the vehicle control units (Fig. 1).

With its compact dimensions of approx. 11 x 16 cm and a height of only 4.5 cm (Fig. 2), it could be easily integrated into the glove compartment of the test cars.

Sensors were used to measure temperatures at a total of 16 measurement points throughout the vehicle interior over the entire test period. These were acquired with a CSM THMM pro module and transmitted via CAN to the UniCAN 3 data logger.

In parallel, also using CAN, the data from several vehicle control units were recorded by the data logger. Here, the ECU data documents what happens from the "vehicle point of view", for example, whether the engine is started or the battery is charged.

In order to identify correlations between the acquired temperatures and the processes in the vehicle, these were recorded in parallel with the interior temperatures. The data from the battery control unit, the electric drive and the cooling system were particularly relevant for the test evaluations. Among other things, the aim was to investigate in more detail whether there are correlations between the temperatures in the vehicle interior and the temperatures of the battery during daily use.

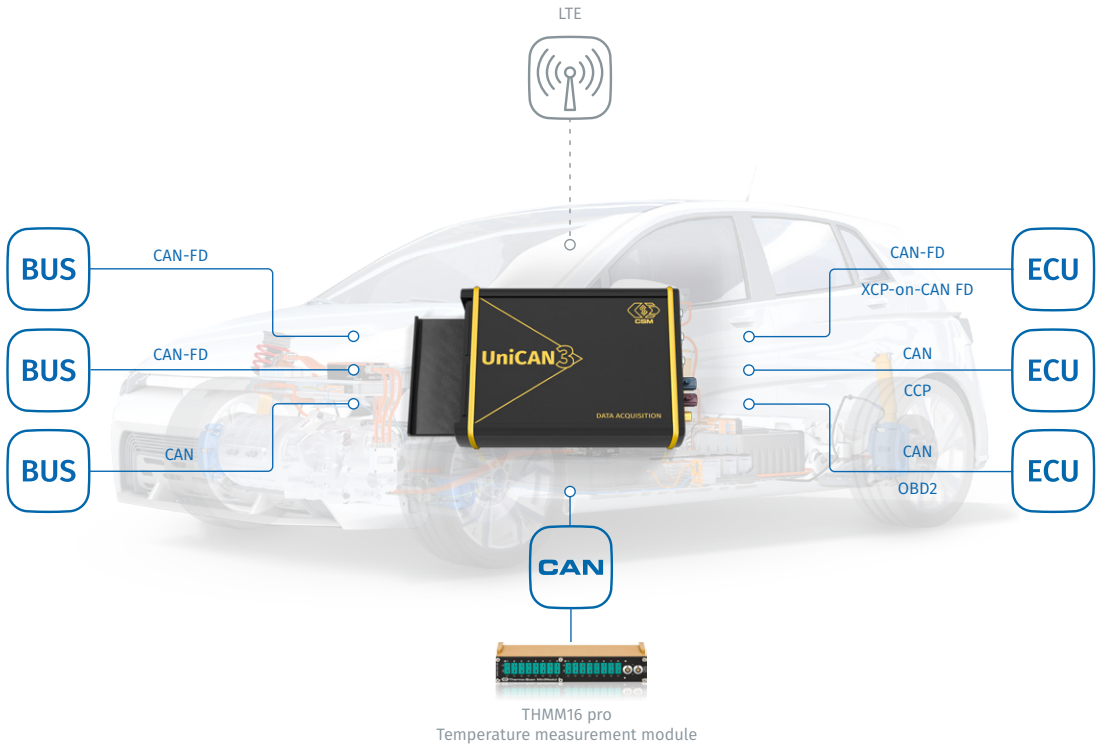


Fig. 1: Schematic measurement setup in a test vehicle.

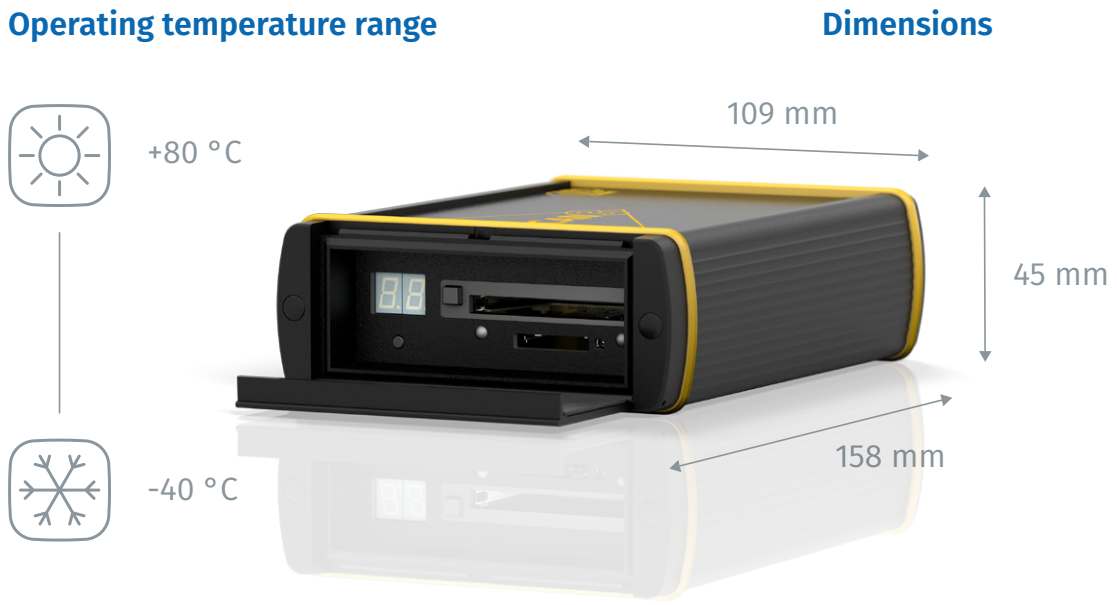


Fig. 2: With its small dimensions and large operating temperature range, the UniCAN 3 is especially convincing when used in test vehicles.

Extensive operating temperature range ensures successful fleet test

As the fleet test was carried out in Asia, the outside temperatures were almost +50 °C due to a heat wave and heated the area of the measurement technology in the vehicle to about +60 °C.

It was not only the temperature conditions in the interior under the aspect of passenger comfort that were of interest for the tests, but also, for example, how the high battery temperatures affect the interior during the charging process when no air conditioning is switched on and whether the cooling of the two areas is sufficiently scaled.

»For the flawless functioning of the UniCAN 3, the extreme temperatures were not a problem here: The operating temperature range is -40 °C up to +80 °C, thus ensuring reliable data recording. Therefore, the test could be carried out without any loss of function or interruptions.«

David Löw

The UniCAN 3 is also characterized by the fact that it generates almost no heat of its own, so that in addition the temperature effect of the device on the environment is negligible.

Lossless data transfer for reliable results

Another special feature of the UniCAN 3 is its built-in LTE modem, which saves space by eliminating the need to install an additional external modem. On the hardware side, only the external cellular antenna then needs to be connected so that the measurement setup is ready (Fig. 3).

The acquired data is recorded on the CF memory card and then sent via the mobile data provider at a specified interval. As a safety precaution to prevent data loss, the system independently checks whether the data packets have been transmitted correctly and completely - only then is the memory space on the card released again for new data. If mobile communications are interrupted at certain points, there is no need to worry about data loss - transmission will then be resumed at a later point in time.

Likewise, configuration settings can also be adjusted remotely with the modem without having to remove the data logger.

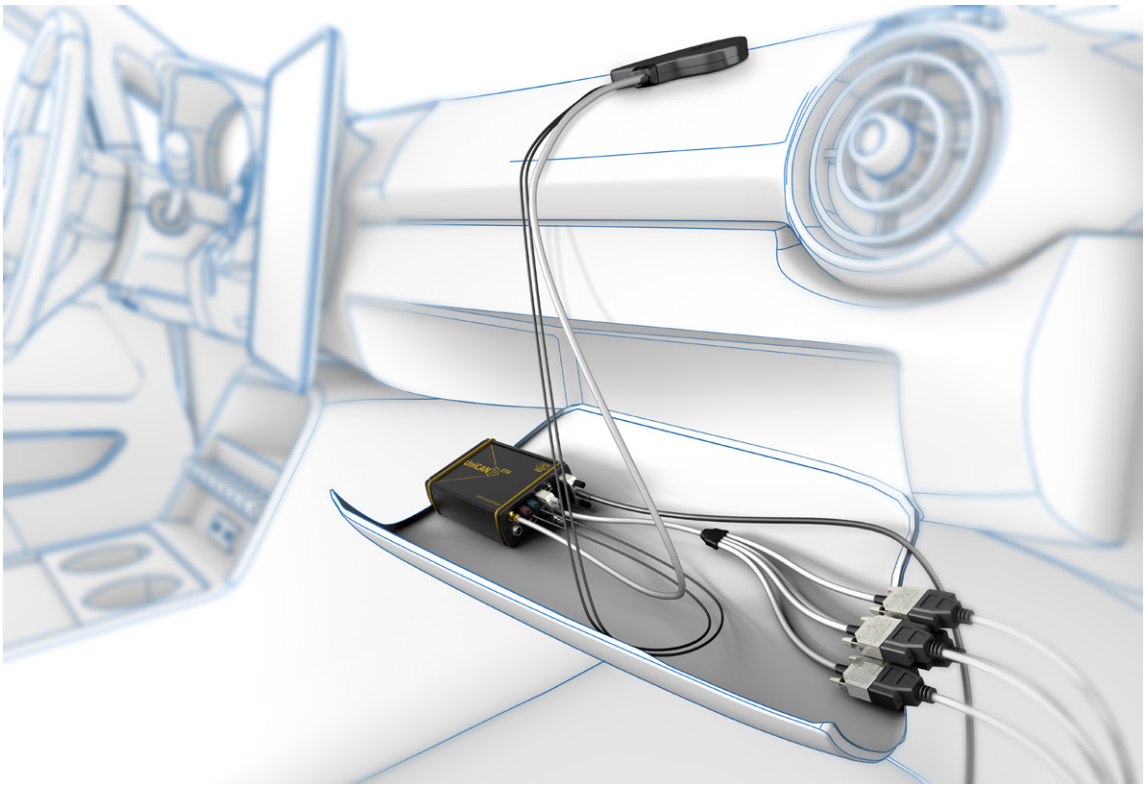


Fig. 3: Once the external antenna has been connected, the already integrated LTE modem can be used.

Spotlight on energy consumption

The data logger is also characterized by very low power consumption in stand-by mode. This is an important feature because the UniCAN 3 does not have its own electricity source, but is powered by the vehicle's battery. Therefore, the power consumption has to be low and must not cause the vehicle's battery to be completely discharged, even in stand-by.

"An important feature of our UniCAN 3 is therefore the so-called Wake-on-CAN function. It ensures that data recording starts as soon as activities take place on the CAN bus, for example when the vehicle is unlocked. In this way, a good balance of energy-saving standby and reliable data recording can be achieved. If measurements are to be taken even earlier, the UniCAN 3 can also be supplemented on the software side with the so-called 'Wake-on-CAN No Message Lost' function. This capability ensures that recording starts from the first incoming message and no CAN message is lost. With the expandable software features, our data loggers can be equipped with additional functions at any time," explains David Löw.

At a glance

The UniCAN 3 performs even under extreme external influences with reliable data recording during long-term test drives. The built-in LTE modem and the secured data transmission ensure that the collected measurement data is reliably transmitted.

At the same time, the small dimensions allow the data logger to be discreetly integrated into the vehicle without interfering with operation.

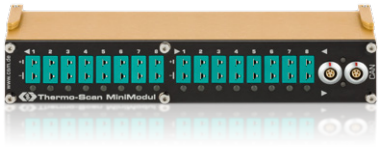
Featured Products

UniCAN 3

The data logger UniCAN 3 was developed especially for the use in the automotive sector: Up to 12 CAN interfaces, freely configurable inputs and outputs, Wake-on-CAN, LAN and WLAN, support of CAN FD. In addition, data transmission via LTE modem or WLAN allows worldwide use.

THMM 16 pro

THMM 16 pro enables precise distributed temperature measurements with K, J or T type thermocouples. Thanks to its low temperature drift, it delivers very accurate measurement results over the entire operating temperature range.



Complete solutions from a single source:

CSM provides you with comprehensive complete packages consisting of measurement modules, sensors, connecting cables and software - customized to your individual needs.

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CSM GmbH Headquarters (Germany)

Raiffeisenstraße 36 • 70794 Filderstadt
+49 711-77 96 40 sales@csm.de

CSM Office Southern Europe (France, Italy)

Site d´Archamps
60, rue Douglas Engelbart • Immeuble ABC 1, Entrée A – 1er étage
74160 Archamps, France
+33 450-95 86 44 info@csm-produits.fr

CSM Products, Inc. USA (USA, Canada, Mexico)

1920 Opdyke Court, Suite 200 • Auburn Hills, MI 48326
+1 248 836-4995 sales@csmproductsinc.com

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