



New tools for vehicle electronics

High data transfer rate allows universal use

By Dr. Ulrich Lauff, Senior Expert Marketing Communication, Christoph Müller, Senior Product Manager FETK and Florian Schmid, Solution Manager Interactive Measurement and Calibration at ETAS GmbH

With the market launch of the new high-speed FETK ECU interface, the ES89x ECU and bus interface modules, and the ES820 drive recorder module, ETAS is introducing a new solution for validating and calibrating electronic systems. Thanks to a significantly higher payload data transfer rate, the new tools meet the requirements of the most demanding testing in vehicles and on test benches.

A great many factors are making calibrating and validating electronically controlled systems in vehicles more and more complex. In addition to the growing number of model versions available worldwide, the key drivers are a tightening of emissions and safety standards, electromobility, and advances in driver assistance systems and automated driving. To ensure that the increasingly extensive vehicle electronics and software function properly, developers and calibration engineers require powerful tools for acquiring and calibrating ECU data. In combination with INCA and the ES89x and ES820 modules, ETAS' FETK ECU interface provides a new way to collect and calibrate large numbers of parameters and characteristics in electronic systems at a high rate of data transfer (graphic) and low latencies (table).

ECU interface for high data rates with low latency

In contrast to series interfaces such as CAN, the FETK interface requires virtually no computing power for external communication. It acquires data from the ECU via a dedicated microcontroller interface and transmits it to the ES89x module, which then transfers the



Gathering data from the ECU using the FETK interface: the FETK is offered in two versions, the FETK-S (below left) and the FETK-T (below right). Both versions use a microcontroller-specific debugging interface of production devices (μ C-PD) – for instance JTAG (Joint Test Action Group), DAP, or LFAST – to access the control unit (A). The FETK-T also supports the particularly powerful μ C trace interfaces of emulation devices (μ C-ED), as well as transferring trace data from the ECU with great effectiveness using the serial Aurora interface (B).

Feature	FETK-S	FETK-T
Microcontroller Support (μ C)	<ul style="list-style-type: none"> Infineon AURIX-μC 32-Bit automotive μC families Freescale MPC560/MPC563xx and STMicroelectronics SPC560xx/SPC563xx 	<ul style="list-style-type: none"> Infineon AURIX-μC
Data transfer rate between μ C and host application	<ul style="list-style-type: none"> 2 MB/s (standard) 	<ul style="list-style-type: none"> 20 MB/s (at present using INCA V7.2)
Transfer time for a 128-byte signal between FETK and prototyping module (latency)	<ul style="list-style-type: none"> Via Ethernet (ES910 module): 220 μs Via PCI-Express: less than 100 μs 	
Smallest measurement frame	<ul style="list-style-type: none"> 50 μs 	<ul style="list-style-type: none"> 5 μs
Flash programming time	<ul style="list-style-type: none"> 8 MB/s 	

The properties of the two versions FETK-S and FETK-T of ETAS' new FETK high-speed ECU interface.

data to a PC, laptop, or ES820 module for further processing and logging together with data from other sources. Data transfer rates can reach as much as 120 MB/s, making full use of the speed of the Gigabit Ethernet connection. Using the most recent version 7.2 of ETAS' INCA software, the FETK interface is capable of relaying up to 56,000 ECU signals in parallel at a rate of up to 20 MB/s (table).

The compact FETK interface is electrical, thermally, and mechanically designed for use in the vehicle. Since the interface has its own power supply, tests can be performed regardless of the ECU operating mode. The FETK hardware can acquire signals from control functions with high time precision, even in the case of control cycles of 10 µs and less. What is more, the FETK interface can be used to program ECU flash memories as quickly and efficiently as with a debugger.

Thanks to a high data transfer rate and a small surface area that makes it easy to integrate into ECUs, the FETK interface can be used almost anywhere. ETAS enjoys excellent partnerships with chip manufacturers such as Freescale, Infineon, and Renesas, making it possible to flexibly adapt the interface to new microcontrollers. The FETK hardware offers users the utmost in operating convenience: since the Gigabit Ethernet connection to the ES89x modules is generic,

these modules can be integrated in all FETK ECU projects.

Next generation interface and drive recorder modules

The ES891 and ES892 modules offer two connection points for FETK interfaces and additional ports for an XETK interface as well as for Ethernet, FlexRay (1x, ES891 only), CAN / CAN FD (5x), and LIN (1x) vehicle buses. In the case that more than two ECUs are to be monitored via the FETK interface, it is possible to stack multiple ES89x modules one on top of the other. All measurement values are registered with time stamps exact to the microsecond.

With its high-speed FETK interface and ES89x interface modules, ETAS offers ECU access that is ideally suited for validating and calibrating extremely high performance control units. This can be supplemented with the ES820 drive recorder module for autonomous data logging. By using the module, it is possible to record signals from ECUs, vehicle buses, and sensors in the vehicle's environment over a period of twelve hours without pause.

Outlook

In their bid to make the most efficient use of resources possible, more and more OEMs

and Tier 1s are looking to collect and analyze as much measurement data as possible with as little testing as possible. Drawing on powerful techniques from the realms of big data and using meta-information to describe test parameters, the measurement data from many different users can be employed for a wide range of purposes, including vehicle validation or the precalibration of simulations.

ETAS and Bosch's Diesel Gasoline Systems – Electronic Controls product division are currently working on a scalable data management system that is able to make very large measurement data volumes usable for rapid searches and complex analyses. ■

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