

Series 61 – a Test Tool that’s growing

The “joker in a test system” – today CAN, tomorrow LIN, the day after tomorrow FlexRay and next week all together?

The development and establishment of electronic components in vehicles has rapidly increased throughout the last few years. Where there was hardly any bus communication based on automobile electronics a couple of years ago, today it cannot be imagined without. Examples are window lifters, seat adjusters etc. which previously had been operated mechanically, later electro-mechanically and today mechatronically. The total number of electronic components or control units (ECU’s) is growing constantly. One of the reasons for example is the car consumers increasing demand of comfort and safety. From the quality assurance’s point of view, this means a massive increase in new challenges for test and measurement systems.

Quality Assurance Today

A close look to current electronic control units (ECU’s) unveils bus systems such as CAN, LIN, FlexRay, partly even K-line etc. Furthermore there is often a mixture of diverse analogue and digital signals. Recently it has become obvious that the “continuously repeated general test task” does not exist. Test engineers are constantly facing new or changing situations and tasks.

What does it mean for assuring requested quality? Is the “good old tester” disused, because it can’t cope with the changed situation any longer? If yes, what can be done?

Immediately, terms like ‘investment’, ‘costs’, ‘effort’ and the like enter the thought stage. Especially in economically tough times such topics are of highest concern and importance. Useful solutions that unites technological as well as economical benefits – a versatilely usable, modular and scalable technology. Virtually, “one for all” at acceptable purchase costs. The facts and thoughts were the main driving and leading motive to develop a completely new communication and test controller generation – Series 61.

Serie 61 – One for All

The Series 61 controllers are based on a modular and hence scalable test resource concept. It enables a flexible adaptation to the interface and resource architecture of the respective unit under test (UUT). It is possible to provide up to eight CAN, LIN or K-line interfaces and, additionally, two FlexRay interfaces as well as analogue and digital I/O on the Series 61 controller board. Specifically this means that one single module is sufficient where previously two, three or even more test technology components were required.

Even a completely project specific configurability by the user was considered. For example, exchangeable transceiver modules allow the formatting of CAN interfaces to high-speed, low-speed or single-wire topologies. In the case of possible defects they can be repaired very quickly. Also LIN users “will be thrilled” – for instance a trouble-free reconfiguration between LIN Master and Slave modes is possible any time and very simple per software access.

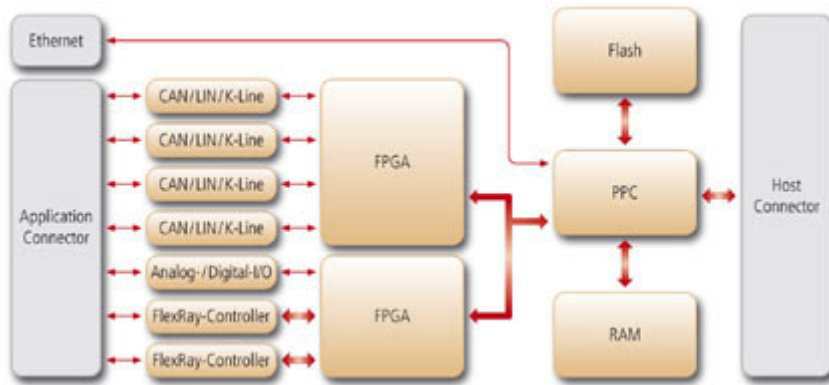


Image 1: block diagram Series 61 Multi bus controller architecture

The wide range of resources and functions is completed by a highly powerful Power PC architecture, paired with the real-time operating system QNX. It is beneficial that all resources in Series 61 can be used centrally and there with synchronously in time. Now there are no more obstacles for stable long-term or parallel tests of ECUs under real-time conditions.

However, these are not nearly all utilisation opportunities, because Series 61 offers far more: on-board functions such as rest bus simulation, provision of transport and diagnostic protocols or network management are functional elements just like the on-board processing of test codes generated by the user. A completely new feature is a "record" and "replay" mode. Through this, specific test scenarios can optionally be recorded, run or transferred to other Series 61 modules via existing Ethernet interface. Last but not least the test system's host PC is relieved and valuable band width for additional processes is obtained. Additionally unwanted latencies in the process are reduced.



Image 2: Series 61 PXI module

A Module helps to save Money

After taking a look at the technical facts, of course the commercial site must also be considered. In former times several test components were utilised due to test task and bus systems – today the new controller generation Series 61 meets numerous demands with only one module. On the one hand this primarily results in significant cost reductions (only one module instead of two, three or more). On the other hand another benefit is space saving because of the modules compactness. For example: if only one Series 61 module replaces three conventional PXI modules and a smaller PXI rack turns out to be sufficient additional secondary benefits namely further cost reduction potentials occur. If potential applicants continue this idea possibly further individual benefit potentials may be obvious.

Configuration				
Function	6153	6173	6181	6191
Port 1	CAN	LIN/K-Line	CAN	FlexRay
Port 2	CAN	LIN/K-Line	LIN/K-Line	FlexRay
Port 3	Option 1	Option 1	Option 1	Option 1
Port 4	Option 1	Option 1	Option 1	Option 1
Port 5	Option 2	Option 2	Option 2	Option 1
Port 6	Option 2	Option 2	Option 2	Option 1
analogue & digital I/O	Option 3 or Option 4	Option 3 or Option 4	Option 3 or Option 4	Option 3 or Option 4

Option 1: one additional CAN or LIN/K-Line port
Option 2: one additional FlexRay port
Option 3: eight digital inputs; eight digital outputs; six analogue inputs; six analogue outputs
Option 4: eight digital inputs; eight digital outputs; four analogue inputs; four analogue outputs; one SPI interface

Image 3: Configuration overview