

Universal Test System for Automotive ECUs



Customer: Leading automotive supplier
Final product: ECU for an automated closing aid for boot/trunk lids
Industry: Automotive

Description:

Development of a universal functional test system for the testing of automotive control units with two independent manual drawer adapters and exchangeable fixture kits.

The instrumentation is set-up in accordance with typical automotive requirements.

Customer Requirements:

- Manual DUT handling in two independent drawer adapters
- Integrated exchangeable fixture kit with top and bottom inlays
- Contacting from the top, bottom and from the left and right side of the Device under Test (DUT)
- 2D scanner for DUT verification built into the fixture kit
- Monitored drawer for sorting out the FAIL parts
- Label printer for PASS parts
- Manual 2D data matrix code scanner for tracking of DUT label
- Instrumentation based on PXI and Konrad HiPex system
- Redundant design of test system hardware for independent operation of both drawer adapters

Implemented Solution:

The universal test system for automotive ECUs has been developed to perform a functional test of a control device for an automated closing aid for boot/trunk lids. The device is handled manually using two independent drawer adapters with integrated fixture kits, allowing you to test different products on the same test system. After inserting the DUT and closing of the adapters, the unique label, with a 2D data matrix code, is automatically scanned and contacted from three sides. Faulty devices are put into a dedicated drawer whose opening and closing is monitored by the system. For faulty DUTs, a special label is printed by a thermo transfer printer and later verified by a manual scanner.

The instrumentation is based on a PXI system with integrated analog I/O and digital I/O boards as well as the HiPex system extension from Konrad Technologies. HiPex stands for High Power Extension for PXI - a standard system for signal conditioning and power switching as well as a load box especially designed for the high power requirements in the automotive industry.

The HiPex system uses standard boards for the signal conditioning and optical isolation for PXI measurement boards and DUT specific boards, including high power switching matrices and load boards. In this particular case Konrad developed an application specific board for analog I/O up to 30V, optically isolated digital I/O and an electronic load up to 100W.

The instrumentation of the test system is built redundantly for independent operation of the two test adapters. This includes two independent GPIB power supplies for powering the DUTs and two application specific boards.

One PXI chassis carries one analog input board with 32 channels and one board with 8 parallel analog output waveform channels. Both boards are connected with the HiPex rack.

The test application has been developed using NI TestStand and the functional test modules in NI LabVIEW. All test steps are part of the Konrad test step library as part of the tool box for solving diverse functional test tasks. A state-of-the-art industrial computer acts as the system controller, and by using an uninterruptable power supply, the system offers the necessary high dependability.

Software:

NI TestStand:	Control of test run Editor, Debugger
NI LabVIEW:	Test step libraries
KT-Operator Interface:	Graphical user interface Debugging
KT-Project:	Test step libraries Functional test

Hardware:

PXI based test system with HiPex extension

Instrumentation:	1x NI PXI-6254 32-channel AI, 16Bit, 48 digital I/O 1x NI PXI-6722 8-channel AO, 13Bit 2x HiPex DUT-Power board: Supply and current measurement (Ranges: 1mA, 10mA, 100mA, 1A, 10A, 50A) 1x HiPex Analog-In board (Isolation and conditioning to $\pm 30V$) 1x HiPex Analog-Out board (Isolation and conditioning to 0...30V) 2x HiPex DUT application boards (8x $\pm 30V$ AI, 4x 0...30V AO, 8x isolated digital outputs, 4x isolated digital inputs, 100W E-load, CAN, LIN)
Communication:	Digital I/O, LAN
Power supply:	Konrad power supply unit 2x Agilent N5765A 30V/50A
Adaptation:	Tandem adapter with two independent drawers Top and bottom fixtures are each built as exchangeable inlays
Interface:	Compact unit, test system integrated with mechanical interfaces



Summary:

Through implementation of this universal test system the customer received a powerful and flexible solution for a wide variety of automotive engine control units.

Using the flexible tandem adapters, a DUT can be tested while another DUT is removed and a new one is being placed into the system.

No interruption or delay can occur in the test run due to the redundant implementation of the instrumentation.

Picture: HiPex rack with integrated load modules and power relay cards



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