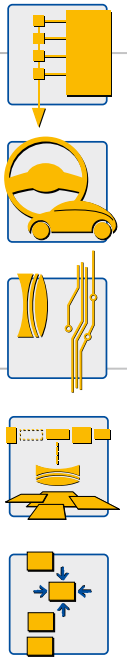
Product Guide

An Overview of Solutions from GOEPEL electronic

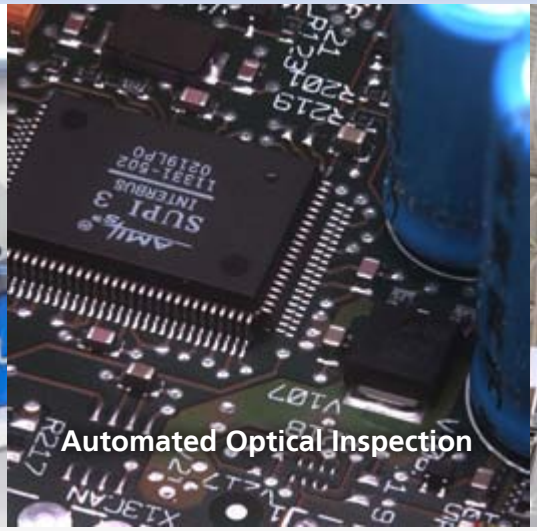


GOEPEL electronic

Get the total Coverage!

Welcome!

JTAG/Boundary Scan


Automated Optical Inspection

Automated X-Ray Inspectio

Welcome

to GOEPEL electronic's product guide which will provide you with an overview of our currently available product portfolio. You will discover a comprehensive selection of high-quality products to support you in finding the best solution for your fault and test coverage applications – of that we are convinced.

Get the total Coverage!

GOEPEL electronic is a global provider of innovative electronic and optical measurement and test systems for industrial electronics design and manufacture – including a comprehensive product support.

Established in 1991, GOEPEL electronic headquartered in Jena, Germany currently has 200 employees and achieved a turnover of 26 million EUR in 2011. In addition to subsidiaries in France, Great Britain, China, India and the United States, a global distribution network of more than 350 specialists ensures the local availability of the Company's products and services/support for many thousand installed systems.

Since 1996 GOEPEL electronic is continuously certified according to ISO-9001 and within the scope of the TOP-JOB programme, GOEPEL electronic has been awarded one of the Top 100 medium-sized innovative companies in Germany. During the last years, the company has received several renowned awareds for its innovative products. Most leading companies in the fields of e.g. telecommunications, automotive, aerospace, industrial control and medical engineering successfully use the company's products.

Additional information about the company and its products can be found at: **www.goepel.com**.

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Software: SYSTEM CASCON™

SYSTEM CASCON™

The quality of a JTAG/Boundary Scan system is significantly determined by the performance and architecture of the used software.
In 1991 GOEPEL electronic has been globally first to develop an integrated Boundary Scan software development environment named **SYSTEM CASCON**.
Since then the uniqueness of the Boundary Scan workbench has been continuously expanded through the integration of new intelligent tools, along with innovative system extensions and improvements of the user interface.

Today SYSTEM CASCON is available in its fourth generation. It is the only software package, which achieved the status of an open graphical JTAG/Boundary Scan operating system. Its architecture comprehensively supports the philosophy of Extended JTAG/Boundary Scan, which – compared to other solutions – provides a far superior test coverage and more diverse system functions by adding further test, programming and emulation methods to the native JTAG/Boundary Scan procedures.
Several thousand globally delivered system solutions confirm the market-leading position of SYSTEM CASCON in industrial applications. Software updates are globally available via our customer web site **GENESIS**.

To perfectly address the needs of development, production and customer service, the software packages are available in dedicated performance classes as **Development Stations** (DS) and **Test/Execution Stations** (TS/ES). In-system-programming (ISP) tasks can be executed with **CASCON POLARIS** editions. The **CASCON GALAXY** version supports ISP and test methods.

CASCON POLARIS™

CASCON GALAXY®

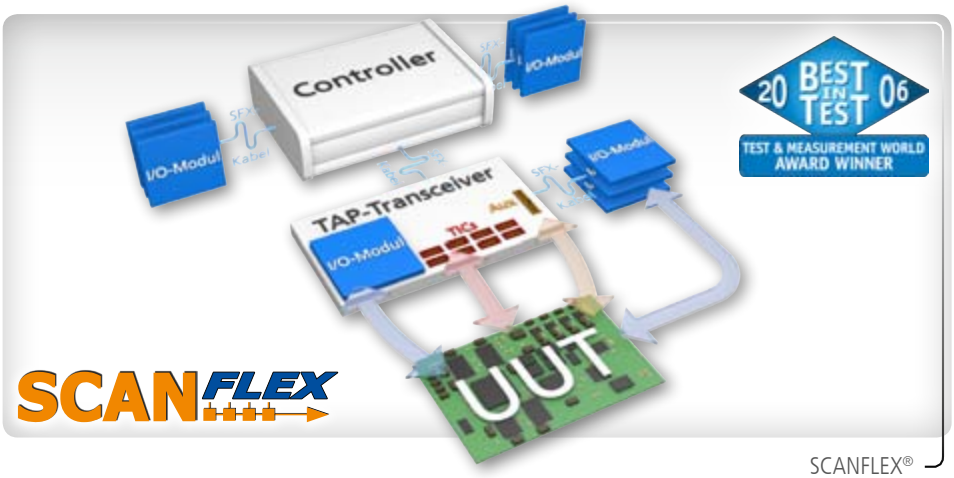
CASCON POLARIS™

CASCON POLARIS is a powerful, flexible and user-friendly development and operating environment for JTAG/Boundary Scan in-system-programming, which has proven in industry for 20 years. Application specific versions for special needs in laboratory, production and service environments are available. Combining CASCON POLARIS with GOEPEL electronic's controllers and accessories, users can configure high performance JTAG/Boundary Scan programmers for various performance classes.

CASCON GALAXY®

CASCON GALAXY is available in four different editions: Advanced, Classic, Standard and Base. The feature set is configurable according customer requirements and can be upgraded up to the most powerful edition. All software functions are accessible via an intuitive graphical user interface. CASCON GALAXY is based on software modules with an adaptable set of features, which are all integrated into a common software interface.

Hardware: SCANFLEX®



SCANFLEX®

SFX/PCI 1149

SCANFLEX®

SCANFLEX (SFX) is a revolutionary hardware platform, which supports a broad range of technological possibilities that arise from current and future standards. SCANFLEX Boundary Scan test systems are characterised by ultimate performance, flexibility and modularity. SCANFLEX goes even further adding new fields of application for analogue and mixed-signal tests, no competing solutions have been providing. A central Boundary Scan controller manages the entire control of the SCANFLEX system. Moreover, it handles the simultaneous generation and dynamic distribution of serial and parallel test vectors. All SCANFLEX controllers are available in three performance classes:

- **Performance class A:** 20 MHz test clock, scan architecture: Data Buffer
- **Performance class B:** 50 MHz test clock, scan architecture: SPACE II
- **Performance class C:** 80 MHz test clock, scan architecture: SPACE II-S

SFX/PCI 1149

Boundary Scan controller for **PCI** slot operation.

SFX/PCIe 1149

SFX/PXI 1149

SFX/PXIe 1149

SFX/PCIe 1149

Boundary Scan controller with **PCI Express** interface.

SFX/PXI 1149

Boundary Scan controller for **PXI** bus.

SFX/PXIe 1149

Boundary Scan controller for **PXI Express** bus.

SCANFLEX® Controllers

SFX/ASL 1149

SFX/LXI 1149

SFX/PEC 1149

SFX/ASL 1149

Boundary Scan controller for **Gigabit Ethernet**, **USB 2.0** and **Cabled PCI Express**.

SFX/LXI 1149

Boundary Scan controller for **LXI** bus, **USB 2.0** and **Gigabit-Ethernet**.

SFX/PEC 1149

Boundary Scan controller for **Cabled PCI Express**.

SFX/PXI 1149/C2

SFX/PXI 1149/C4

SFX/PXIe 1149/C2

SFX/PXI 1149/C2

Boundary Scan controller for **PXI** bus **with integrated** compact version of TAP Transceiver **SFX-TAP2**.

SFX/PXI 1149/C4

Boundary Scan controller for **PXI** bus **with integrated** compact version of TAP Transceiver **SFX-TAP4**.

SFX/PXIe 1149/C2

Boundary Scan controller for **PXI Express** bus **with integrated** compact version of TAP Transceiver **SFX-TAP2**.

SCANFLEX® Controllers • SCANFLEX® TAP Transceivers

SFX/PXIe 1149/C4

SFX/COMBO 1149

SFX/PXI 1149/C4-FXT

SFX/PXIe 1149/C4

Boundary Scan controller for **PXI Express** bus **with integrated** compact version of TAP Transceiver **SFX-TAP4**.

SFX/COMBO 1149

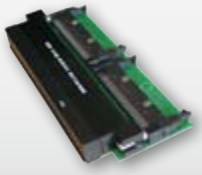
Boundary Scan controller for **Gigabit Ethernet** and **USB 2.0 with integrated** compact version of TAP Transceiver **SFX-TAP4**.

Additionally, the SFX/COMBO 1149 is equipped with **two analogue 10-bit I/O channels, three slots for SCANFLEX I/O Modules** and **four TIC slots,** whereby the first one is provided with a **TIC 020/ VarioTAP** by default.

SFX/PXI 1149/C4-FXT

Boundary Scan controller for **PXI** bus **with integrated** compact version of TAP Transceiver **SFX-TAP4/FXT**. The **distance** between controller and active external TIC modules may reach **up to 4 m** without performance loss.

Additionally, the interface receiver VPC 160/192 is available as an interface based on a 192-pin receiver from Virginia Panel.



SFX/PXIe 1149/C4-FXT

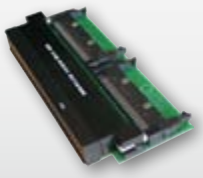
SFX-TAP2

SFX-TAP4

SFX/PXIe 1149/C4-FXT

Boundary Scan controller for **PXI Express** bus **with integrated** compact version of TAP Transceiver **SFX-TAP4/FXT**. The **distance** between controller and active external TIC modules may reach **up to 4 m** without performance loss.

Additionally, the interface receiver VPC 160/192 is available as an interface based on a 192-pin receiver from Virginia Panel.



SFX-TAP2

Desktop TAP Transceiver

- two Test Access Ports (TAPs)
- one SFX I/O slot
- 32 PIP channels
- two analogue 10-bit I/O channels

SFX-TAP4

Desktop TAP Transceiver

- four Test Access Ports (TAPs)
- one SFX I/O slot
- 32 PIP channels
- two analogue 10-bit I/O channels

SCANFLEX® TAP Transceivers

SFX-TAP6

SFX-TAP7

SFX-TAP8-S & SFX-TAP8

SFX-TAP6

Desktop TAP Transceiver

- six Test Access Ports (TAPs)
- one SFX I/O slot
- 32 PIP channels
- two analogue 10-bit I/O channels

SFX-TAP7

Desktop TAP Transceiver

- seven Test Access Ports (TAPs)
- three SFX I/O slots
- 32 PIP channels
- two analogue 10-bit I/O channels

SFX-TAP8-S & SFX-TAP8

Desktop TAP Transceiver

- eight Test Access Ports (TAPs)
- two SFX I/O slots
- 32 PIP channels
- two analogue 10-bit I/O channels

SFX-TAP8 configurable with

- either eight TAPs and two SFX I/O slots
- or seven TAPs and three SFX I/O slots

SFX-TAP16/G-DT

SFX-TAP2/C

SFX-TAP4/C

SFX-TAP16/G-DT

Desktop TAP Transceiver

for gang test and programming tasks

- 16 slots for TAP slot cards
- 16 slots for power slot cards (PSCs)
- 19" housing

Test & Measurement World BEST IN TEST 2012 AWARD WINNER

SFX-TAP2/C

Compact TAP Transceiver

- for industrial applications
- two Test Access Ports (TAPs)

SFX-TAP4/C

Compact TAP Transceiver

- for industrial applications
- four Test Access Ports (TAPs)

SCANFLEX® TAP Transceivers

SFX-TAP4/CR

SFX-TAP8/C

SFX-TAP2/FXT

SFX-TAP4/CR

Compact TAP Transceiver

- specifically for the integration into flying probe testers
- four Test Access Ports (TAPs)

SFX-TAP8/C

TAP Transceiver

- for industrial applications
- eight Test Access Ports (TAPs)
- two SFX I/O slots
- 19″ housing

SFX-TAP2/FXT

Desktop TAP Transceiver

- distance between TAP Transceiver and active external TIC modules may reach up to 4 m
- two Test Access Ports (TAPs)
- one SFX I/O slot
- 32 PIP channels
- two analogue 10-bit I/O channels

SFX-TAP4/FXT

SFX-TAP6/FXT

SFX-TAP7/FXT

SFX-TAP4/FXT

Desktop TAP Transceiver

- distance between TAP Transceiver and active external TIC modules may reach up to 4 m
- four Test Access Ports (TAPs)
- one SFX I/O slot
- 32 PIP channels
- two analogue 10-bit I/O channels

SFX-TAP6/FXT

Desktop TAP Transceiver

- distance between TAP Transceiver and active external TIC modules may reach up to 4 m
- six Test Access Ports (TAPs)
- one SFX I/O slot
- 32 PIP channels
- two analogue 10-bit I/O channels

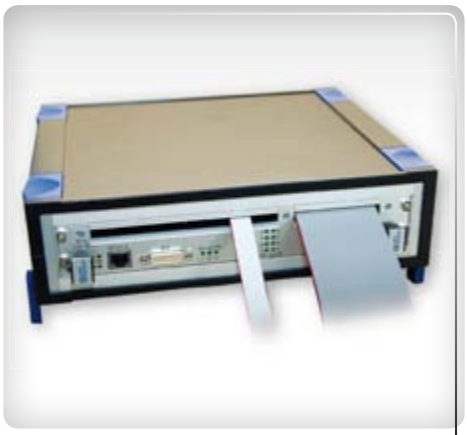
SFX-TAP7/FXT

Desktop TAP Transceiver

- distance between TAP Transceiver and active external TIC modules may reach up to 4 m
- seven Test Access Ports (TAPs)
- three SFX I/O slots
- 32 PIP channels
- two analogue 10-bit I/O channels

SCANFLEX® TAP Transceivers • Integration

SFX-TAP8-S/FXT



SFX-TAP8/FXT

SFX-TAP8/C/FXT

SFX-TAP8-S/FXT

Desktop TAP Transceiver

- distance between TAP Transceiver and active external TIC modules may reach up to 4 m
- eight Test Access Ports (TAPs)
- two SFX I/O slots
- 32 PIP channels
- two analogue 10-bit I/O channels

SFX-TAP8/FXT

Desktop TAP Transceiver

- distance between TAP Transceiver and active external TIC modules may reach up to 4 m
- either eight Test Access Ports (TAPs) and two SFX I/O slots
- or seven Test Access Ports (TAPs) and three SFX I/O slots

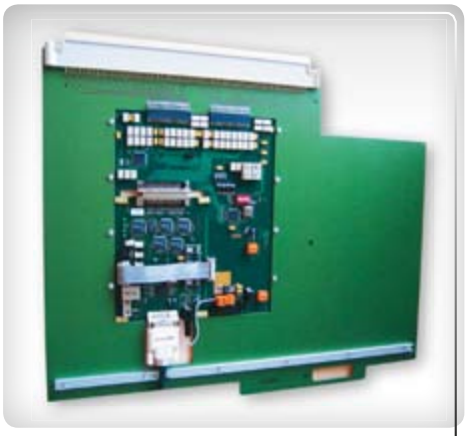
SFX-TAP8/C/FXT

TAP Transceiver

- for industrial applications
- distance between TAP Transceiver and active external TIC modules may reach up to 4 m
- either eight Test Access Ports (TAPs) and two SFX I/O slots
- or seven Test Access Ports (TAPs) and three SFX I/O slots
- 19" housing

SFX-TAPx/228x-XXX

SFX-TAPx/88xx-XXX



SFX-TAP4/3070-PIC

SFX-TAPx/228x-XXX

TAP Transceiver for **Teradyne TS 12x/LH/LX/228x** with up to eight TAPs and high-speed scan up to 80 MHz.

SFX-TAPx/88xx-XXX

TAP Transceiver for **Teradyne 88xx Spectrum TSSE** with up to eight TAPs and high-speed scan up to 80 MHz.

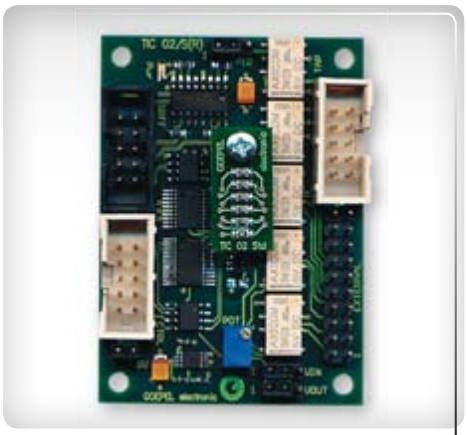
SFX-TAP4/3070-PIC

TAP Transceiver for **Agilent i3070** with four TAPs and high-speed scan up to 80 MHz; **slot card.**

Integration • TAP Interface Cards

SFX-TAP4/3070-PPC

TIC 01



TIC 02/S & TIC 02/SR

SFX-TAP4/3070-PPC

TAP Transceiver for **Agilent i3070** with four TAPs and high-speed scan up to 80 MHz; **Performance-Port card.**

TIC 01

TAP Interface Card

- programmable TAP input comparator level 0 to 3 V
- programmable TAP output voltage level 1.8 to 4.5 V
- programmable input and output impedance
- TAP read back function
- TAP interface protection
- relay switched 5 V output signal

TIC 02/S & TIC 02/SR

TAP Interface Card

- TAP input comparator level 0 to 3 V
- TAP output voltage level 1.2 to 3.65 V
- relay switched 5 V output signal
- test bus signals buffered close to UUT
- wire-wrap terminals included
- TAP interface protection

TIC 02/SR additionally includes

- disconnection of the test bus via relay

TIC 02/LV & TIC 02/LVR

TIC 020/VarioTAP

TIC 02/PMU

TIC 02/LV & TIC 02/LVR

TAP Interface Card

- TAP input comparator level 0 to 2 V
- TAP output voltage level 0.5 to 2 V
- relay switched 5 V output signal
- test bus signals buffered close to UUT
- wire-wrap terminals included
- TAP interface protection

TIC 02/LVR additionally includes

- disconnection of the test bus via relays
- Supply voltages +12 V and ± 5 V required

TIC 020/VarioTAP

TAP Interface Card

- with multi bus interface for extended VarioTAP support
- programmable TAP input comparator level 0 to 3 V
- programmable TAP output voltage level 1.8 to 4.5 V
- programmable input and output impedance
- TAP read back function
- TAP interface protection
- relay switched 5 V output signal

TIC 02/PMU

TAP Interface Card

- TAP input comparator level 0 to 3 V
- TAP output voltage level 1.65 to 3.6 V
- relay switched 5 V output signal
- test bus signals buffered close to UUT
- wire-wrap terminals included
- TAP interface protection
- disconnection of the test bus via relay
- additional precision measurement unit (PMU) for unpowered open/short tests

TAP Interface Cards • I/O Modules

TIC 03/S & TIC 03/SR

TIC 03/S & TIC 03/SR

TAP Interface Card

- TAP input comparator level 0 to 3 V
- TAP output voltage level 1.65 to 3.6 V
- relay switched 5 V output signal
- test bus signals buffered close to UUT
- wire-wrap terminals included
- TAP interface protection
- extended temperature range -40 °C to 80 °C

TIC 03/SR additionally includes

- disconnection of the test bus via relay

SFX-1000

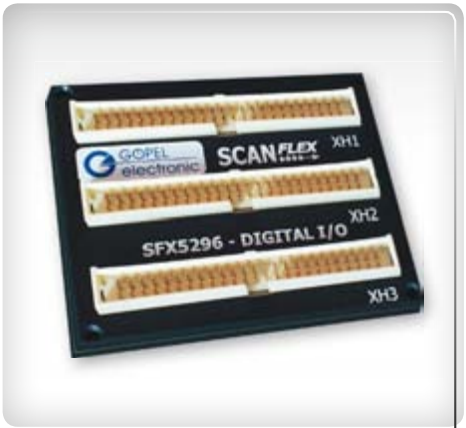
SFX-1000

The **prototype module** SFX-1000 features programmable functions and a perfboard area for customer specific circuits.

SFX-1149.4

SFX-1149.4

This **analogue test bus I/O module** has been developed to support analogue testing according to IEEE 1149.4.



SFX-5296

SFX-5296

Digital I/O module featuring 96 independent asymmetrical channels. I/O voltage levels between 1.8 V and 5 V can be assigned in three groups with 32 channels each. Channels can be synchronised via IEEE 1149.1 TAP.

SFX-5350

SFX-5350

The **differential I/O module** SFX-5350 features 50 channels. Due to its integrated VarioCore technology it is user configurable as onboard programmer, test instrument or verification tool.

SFX-5364

SFX-5364

The **digital I/O module** SFX-5364 features 64 freely programmable channels. Due to its integrated VarioCore technology it is flexibly configurable for structured Boundary Scan operation or for protocol-based full speed tests up to 100 MHz.

I/O Modules • Bus Access Cables

SFX-5704

SFX-5704

Mixed signal I/O module featuring four independent channels, configurable as input, output, bi-directional or tri-state mixed signal channels.

SFX-6216

SFX-6216

The **analogue input module** SFX-6216 features 16 channels (multiplexed 4x4). The module is provided with the flexible functionality of the integrated VarioCore technology.

SFX-6308

SFX-6308

The **analogue I/O module** SFX-6308 features four analogue inputs and outputs each. It is provided with the flexible functionality of the integrated VarioCore technology.

SFX-9305 & Bus Access Cables

SFX-9305

The **multi port bus I/O module** SFX-9305 features five ports. Each port can be equipped with an interface cable (**Bus Access Cables**: BAC 9305-x) and configured for various bus interfaces. The SFX-9305 includes the VarioCore technology.

BAC 9305-USB2.0/H

BAC 9305-USB2.0/H

Bus Access Cable with USB 2.0 signal conditioning (USB plug type A) for testing USB device interfaces.

BAC 9305-USB2.0/S

BAC 9305-USB2.0/S

Bus Access Cable with USB 2.0 signal conditioning (USB plug type B) for testing USB host interfaces.

Bus Access Cables

BAC 9305-LAN10/100

BAC 9305-LAN10/100

Bus Access Cable with 10/100 Mbit signal conditioning (RJ-45) for testing Ethernet interfaces.

BAC 9305-LAN1G

BAC 9305-LAN1G

Bus Access Cable with Gigabit signal conditioning (RJ-45) for testing Ethernet interfaces.

BAC 9305-Bluetooth

BAC 9305-Bluetooth

Bus Access Cable with Bluetooth interface in a mini desktop box for testing Bluetooth interfaces.

BAC 9305-RS232

BAC 9305-RS232

Bus Access Cable for testing RS232 interfaces.

BAC 9305-RS422/485

BAC 9305-RS422/485

Bus Access Cable for testing RS422/485 interfaces.

BAC 9305-CAN/HS

BAC 9305-CAN/HS

Bus Access Cable for testing CAN high-speed interfaces.

Bus Access Cables • SFX Carriers

BAC 9305-CAN/LS

BAC 9305-CAN/LS

Bus Access Cable for testing CAN low-speed interfaces.

BAC 9305-LIN

BAC 9305-LIN

Bus Access Cable for testing LIN interfaces.

SFX-Carrier5

SFX-Carrier5

Desktop multi module **carrier for** up to five **SFX I/O modules**. Each SFX I/O slot can be synchronised via IEEE 1149.1 TAP.

SFX-Carrier5/C

SFX-Carrier5/C

Multi module **carrier** in a 19" housing **for** up to five **SFX I/O modules**. Each SFX I/O slot can be synchronised via IEEE 1149.1 TAP.

SFX-Carrier10 & SFX-Carrier10/C

SFX-Carrier10 & SFX-Carrier10/C

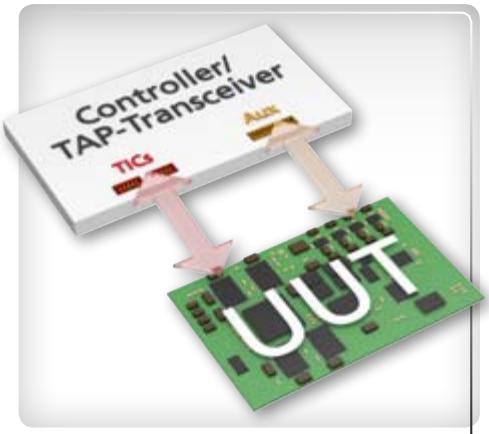
Multi module **carrier** in a desktop or 19" housing **for** up to ten **SFX I/O modules**. Each SFX I/O slot can be synchronised via IEEE 1149.1 TAP.

SFX-Carrier15 & SFX-Carrier15/C

SFX-Carrier15 & SFX-Carrier15/C

Multi module **carrier** in a desktop or 19" housing **for** up to 15 **SFX I/O modules**. Each SFX I/O slot can be synchronised via IEEE 1149.1 TAP.

SCANBOOSTER™ • PicoTAP



SCANBOOSTER™

SCANBOOSTER™/USB(-FXT)

SCANBOOSTER™/PEC(-FXT)

SCANBOOSTER™

The **SCANBOOSTER** family complements the available range of SCANFLEX solutions with a **self-contained product line in the lower and medium performance range.**

SCANBOOSTER™/USB(-FXT)

SCANBOOSTER/USB features two separate, programmable TAPs and supports a programmable TCK frequency of up to 16 MHz. Both TAPs are independently programmable concerning output voltage, input voltage comparator threshold, output impedance and input impedance.

The SCANBOOSTER/USB-FXT version uses active external test probes (exclusively). The distance between controller and TAP head may reach up to 4 m without performance loss.

SCANBOOSTER™/PEC(-FXT)

The SCANBOOSTER/PEC, which is controlled via cabled PCI Express, features two separate, programmable TAPs and supports a programmable TCK frequency of up to 16 MHz. Both TAPs are independently programmable concerning output voltage, input voltage comparator threshold, output impedance and input impedance.

The SCANBOOSTER/PEC-FXT version uses active external test probes (exclusively). The distance between controller and TAP head may reach up to 4 m without performance loss.

SCANBOOSTER™/PCI(e)-DT

UCM3070

PicoTAP

SCANBOOSTER™/PCI(e)-DT

SCANBOOSTER/PCI-DT and SCANBOOSTER/PCIe-DT consist of an external controller base unit and a PCI and PCI Express slot card, respectively.

Cabled PCI Express can bridge a distance of up to 5 m.

UCM3070

The UCM3070 card has been developed as plug-in module for the utility card of the Agilent i3070.

The module features two separate, programmable TAPs and supports a programmable TCK frequency of up to 16 MHz. Both TAPs are independently programmable concerning output voltage, input voltage comparator threshold, output impedance and input impedance.

PicoTAP

For newcomers: the smallest JTAG/Boundary Scan Controller in the world

- small, compact and portable
- includes USB 2.0 and a Test Access Port
- project development within a very short time
- suitable for development, production and service
- fully compatible with GOEPEL electronic's software and hardware
- no extra cabling: can be directly plugged onto the board to be tested (standard 10-pin connector)

accessories and kits see page 21

CION Module™

CION Module™/FXT48A / 96A / 192A

CION Module™/FXT48A / 96A / 192A

CION modules FXT48A / 96A / 192A with 48, 96 or 192 digital I/O channels have been developed for integration into test fixtures. The core part of the modules consists of several special CION ASICs and a comprehensive analogue circuitry. These modules allow for an extended JTAG/Boundary Scan test coverage for non Boundary Scan digital circuit clusters and connectors as well as numerous analogue tests and voltage measurements.

CION Module™/FXT96

CION Module™/FXT96

The CION Module/FXT96 is a test board with 96 bi-directional test channels. I/O voltage levels between 1.8 V and 5 V can be assigned in three groups with 32 channels each. The module has been designed for mixed voltage applications with single-ended signals.

CION Module™/FXT114S

CION Module™/FXT114S

The CION Module/FTX114S has been developed for integration into test fixtures and enables a structured test of serial high-speed interfaces according to IEEE 1149.6. The digital module features 114 parallel test channels for IEEE 1149.1, 50 of which do support even IEEE 1149.6.

CION Module™/DIMM168

CION Module™/DIMM168

The CION Module/DIMM168 has been designed to test DIMM168 interfaces according to JEDEC standard JESD21-C. The core part of the module consists of several special CION ASICs. The module enables an extended JTAG/Boundary Scan test coverage for all terminals including power and ground pins. It features an automatic voltage detection.

CION Module™/SO-DIMM200

CION Module™/SO-DIMM200

The CION Module/SO-DIMM200 has been designed to test DDR2-SO-DIMM200 interfaces. Using four CION assemblies and the automatic voltage detection it enables the test of all signal and power pins according to JEDEC standard JESD79-2C.

CION Module™/SO-DIMM200-1

CION Module™/SO-DIMM200-1

The CION Module/SO-DIMM200-1 has been designed to test DDR1-SO-DIMM200 interfaces. Using four CION assemblies and the automatic voltage detection it enables the test of all signal and power pins according to JEDEC standard JESD79-2C.

CION Module™

CION Module™/SO-DIMM204-3

CION Module™/SO-DIMM204-3

The CION Module/SO-DIMM204-3 has been designed to test DDR3-SO-DIMM204 interfaces according to JEDEC standard. The core part of the module consists of a special CION ASIC and an FPGA. The module enables an extended JTAG/Boundary Scan test coverage for all DDR3 interface signals including most of the power and ground pins.

CION Module™/DIMM240

CION Module™/DIMM240

The CION Module/DIMM240 extends JTAG/Boundary Scan test resources. Based on its CION ASIC it provides 192 Boundary Scan channels to test logic states.

CION Module™/DIMM240-3

CION Module™/DIMM240-3

The CION Module/DIMM240-3 has been designed to test DDR3-DIMM240 interfaces according to JEDEC standard. The core part of the module consists of a special CION ASIC and an FPGA. The module enables an extended JTAG/Boundary Scan test coverage for all DDR3 interface signals including most of the power and ground pins.

CION Module™/SO-DIMM244

CION Module™/SO-DIMM244

The CION Module/SO-DIMM244 has been designed to test DDR2-Mini-DIMM244 interfaces according to JEDEC standard JESD792C. The core part of the module consists of several special CION ASICs. The module facilitates an extended JTAG/Boundary Scan test coverage for all terminals including power and ground pins. It features an automatic voltage detection.

CION Module™/PCI32-64

CION Module™/PCI32-64

The CION Module/PCI32-64 has been designed to provide extended JTAG/Boundary Scan tests of 3.3 V and 5 V PCI sockets (e.g. on motherboards), including automatic voltage recognition. Each PCI signal can be switched to input, output, bi-directional or tri-state – independent of the other signals.

CION Module™/PCIe-x1

CION Module™/PCIe-x1

The CION Module/PCIe-x1 allows for the structural test of PCI-Express x1 slots as per IEEE 1149.1/6. The core part of the module is a CION ASIC, along with differential test channels. To run the test, the module is directly inserted into the PCI-Express slot to be tested and controlled via a TAP.

CION Module™ • CION Fixture™ • PXI Modules

CION Module™/PCIe-x4

CION Fixture™/AMC

CION Fixture™/PCI32-64

CION Module™/PCIe-x4

The CION Module/PCIe-x4 allows for the structural test of PCI-Express x4 slots as per IEEE 1149.1/6. The core part of the module is a CION ASIC, along with differential test channels. To run the test, the module is directly inserted into the PCI Express slot to be tested and controlled via a TAP.

CION Fixture™/AMC

The CION Fixture/AMC has been developed for AMC single slot modules. It can be installed on motherboards or in housings. Slot 1 is reserved for CION Module/FXT114S. This combination can be used to increase testability of boards with AMC interface.

CION Fixture™/PCI32-64

This fixture is a 3-slot PCI test adapter, which supports PCI boards with 32-bit and 64-bit data bus width. Slot 1 is reserved for CION Module/PCI32-64. The combination of both cards has been developed for JTAG/Boundary Scan test of PCI cards. The test is executed via the PCI interface.

CION Fixture™/PCIe-x16

PXI 5120 Boundary Scan Power Supply

PXI 5296

CION Fixture™/PCIe-x16

The CION Fixture/PCIe-x16 is a 2-slot PCI Express test adapter, which supports PCI Express cards with 1, 4, 8, 12 and 16 lanes. Slot 1 is reserved for CION Module/PCIe-x1 or CION Module/PCIe-x4. The combination of both cards has been developed for the JTAG/Boundary Scan test of PCI cards. The test is run via the PCI Express interface.

PXI 5120 Boundary Scan Power Supply

Power supply module supports 3.3 V and 5 V PXI and cPCI racks with two independent and galvanically insulated voltage outputs.

PXI 5296

Digital I/O module for PXI and cPCI racks featuring 96 independent asymmetrical channels. I/O voltage levels between 1.8 V and 5 V can be assigned in three groups with 32 channels each. Channels can be synchronised via IEEE 1149.1 TAP.

PXI Modules

PXI 52192

PXI 52192

Digital I/O module for PXI and cPCI racks featuring 192 independent asymmetrical channels. I/O voltage levels between 1.8 V and 5 V can be assigned in six groups with 32 channels each. Channels can be synchronised via IEEE 1149.1 TAP.

PXI 5350

PXI 5350

The module features 50 bi-directional, differential I/O channels. LVDS, BLVDS and LVPECL are supported.

PXI 5396

PXI 5396

Digital I/O module featuring 96 channels. Based on GOEPEL electronic's CION component the module runs in PXI and cPCI racks. The PXI 5396 module enables a combination of structural Boundary Scan test and functional tests up to 100 MHz clock rate.

PXI 5396-DT

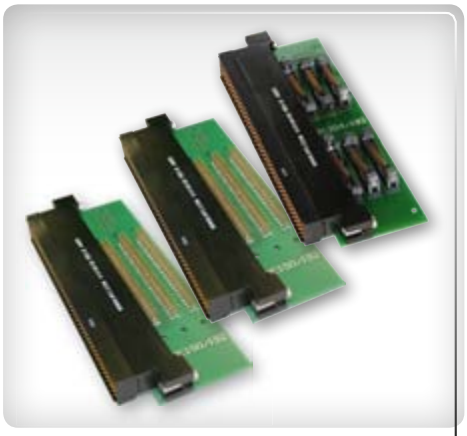
PXI 5396-DT

The two-component digital I/O module consists of a PXI based interface module and a remote desktop module featuring 96 channels with integrated VarioCore technology. The desktop module offers a Virginia Panel compatible interface. The distance between both modules may reach up to 5 m without performance loss. The PXI 5396-DT module enables a combination of structural Boundary Scan test and functional tests up to 100 MHz clock rate.

PXI 5396-FXT

PXI 5396-FXT

The two-component digital I/O module features 96 channels with integrated VarioCore technology to run fixture applications in PXI racks. The front-end module offers a Virginia Panel compatible interface. Its distance from the PXI interface may reach up to 5 m without performance loss. The PXI 5396-FXT module enables a combination of structural Boundary Scan test and functional tests up to 100 MHz clock rate.



Various Interface Receivers

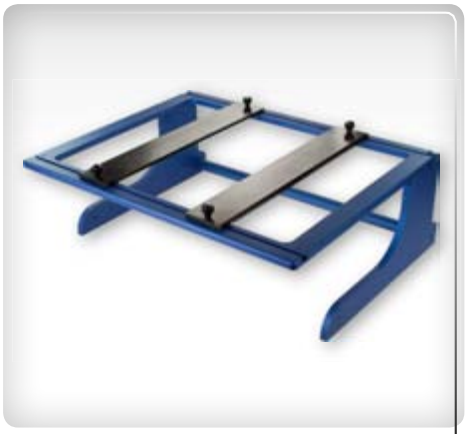
Interface Receivers

Based on 192-pin receiver from Virginia Panel:
VPC 50/192 for PXI 5350
VPC 150/192 for PXI 5296, PXI 52192 and PXI 5396
VPC 204/192 for PXI 5396

Accessories • Bundles

Boundary Scan Probe

CION™



SFX/Board Grabber

Boundary Scan Probe

The Boundary Scan Probe is a tool to debug boards and JTAG/Boundary Scan ICs. It can be used like a virtual Boundary Scan pin and provides a comprehensive feature-set for static and dynamic logic-shift functions.

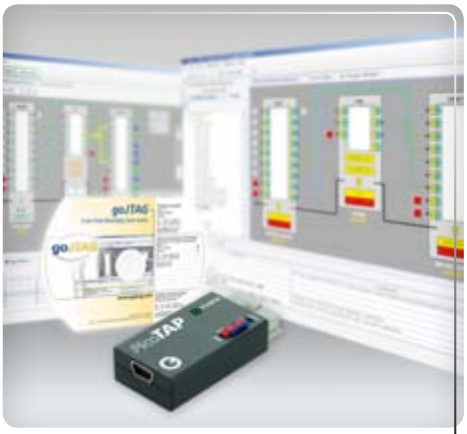
CION™

The development of CION technology (Configurable I/O Network) implemented a sum of customer requests regarding a new generation of JTAG/Boundary Scan modules to be installable in active test fixtures.

The unique CION ASIC enables GOEPEL electronic to offer remarkably efficient and flexible solutions. This CMOS ASIC offers configurable I/O features combined with excellent Boundary Scan functionality. Due to its wide range of operating voltages it supports many signal classes up to mixed level applications.

SFX/Board Grabber

The SFX/Board Grabber is a universal tool to adapt JTAG/Boundary Scan boards and modules. Signals can be flexibly probed via clips, connectors or freely positionable magnetic test nails. Additional magnetic contact probes can be arranged to access every board position. They can be used as additional Boundary Scan pins or to contact measurement equipment and provide a simple and reliable means to contact smallest pads or component pins. The board grabber is available in sizes L, XL and XXL.



goJTAG Kit

goJTAG Demo Board

goJTAG Demo Kit

goJTAG Kit

This bundle consists of the **goJTAG** software and the **PicoTAP** controller including a USB cable. Windows XP, Windows Vista and Windows 7 are supported.

goJTAG Demo Board

The simple access into Boundary Scan.

- two Boundary Scan components (buffer, PLD)
- failure switch
- push button
- serial flash memory
- RAM
- LED

goJTAG Demo Kit

Bundle, consisting of **goJTAG Kit** and **goJTAG Demo Board**.

Bundles • Desktop Tester JULIET

SCANBOOSTER™ Designer Studio

Scan Coach Board

Scan Coach Kit/USB

SCANBOOSTER™ Designer Studio

The SCANBOOSTER Designer Studio has been developed for rapid verification of prototypes at design, production and service level. System delivery includes hardware and software tools which are immediately ready to use.

Scan Coach Board

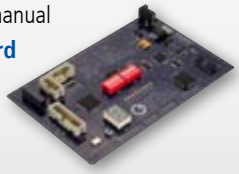
Simple Boundary Scan training board.

- two Boundary Scan components (PLDs)
- failure switch
- RAM
- LED

Scan Coach Kit/USB

Bundle consists of

- **PicoTAP** controller
- **CASCON GALAXY** Advanced Edition (restricted to Scan Coach Board)
- TAP cable
- USB dongle
- tutorial and user manual
- **Scan Coach Board**



ESA Coach

ESA Coach Kit/PCI

JULIET

ESA Coach

Complex training board for Boundary Scan, VarioTAP and chip-embedded instruments.

- Atmel AT91SAM9G45 MCU (ARM)
- Xilinx FPGA
- I2C-Flash
- NOR-Flash
- NAND-Flash
- SD-DDR2-RAM
- graphics display
- analogue potentiometer
- digital I/Os
- LAN
- USB
- RS232
- temperature sensor
- failure switch

ESA Coach Kit

Bundle consists of

- **SCANBOOSTER/PCI-DT** controller
- **CASCON GALAXY** Advanced Edition (restricted to VarioTAP Coach II)
- TAP cable
- USB dongle
- tutorial and user manual
- **ESA Coach**

JULIET

A professional JTAG/Boundary Scan tester, suitable for production environment. It integrates the entire system electronics and the UUT adaptation in a singe device. The tester features a mechanical interface for interchangeable fixtures to adapt UUTs via probes or connectors. In addition, an exchangeable, unpopulated fixture without probes or cables, the **JULIET Bare Cassette**, is available and prepared for UUT adaptation.

Communication Modules

basicMOST / PCI / PXI / USB 3060

basicMOST / PCI / PXI / USB 3060

MOST25 Controller

- MOST protocol, up to 25 Mbit/s
- real-time capable through intelligent MOST controller
- sends and receives application protocols via MOST High Protocol
- sends and receives MOST data packets
- sends and receives MOST control messages
- diagnosis via MOST High Protocol
- LED status indicator
- analogue audio inputs and outputs
- detection of UNLOCK states
- bypass mode

basicCAR 3085

basicCAR 3085

Multi Bus Controller

Preferred applications:

- CAN/LIN applications and test systems for the automotive industry
- test solutions for multi bus systems

basicFlexScope 3095

basicFlexScope 3095

FlexRay Bus Analyser

Preferred applications:

- validation of control units (timing, compliance)
- test with FlexRay network error tolerance

basicCON 4105

basicCON 4105

LVDS Splitter

- 1:8 splitter for LVDS signals up to 1.5 Gbit/s with nine terminals
- distribution of LVDS signals according to ANSI /TIA EIA-644-1995 to eight outputs simultaneously
- signal repeater
- cascadable

basicCON / PXI / USB 4112

basicCON / PXI / USB 4112

LVDS Multiplexer

- 4:1 multiplexer for LVDS signals up to 1.5 Gbit/s with five terminals
- distribution of LVDS signals according to ANSI / TIA EIA-644-1995
- signal repeater
- cascadable

basicCON / PXI / USB 4113

basicCON / PXI / USB 4113

LVDS Splitter

- 1:4 splitter for LVDS signals up to 1.5 Gbit/s with five terminals
- distribution of LVDS signals according to ANSI / TIA EIA-644-1995
- signal repeater
- cascadable

Communication Modules

basicCON 4115

basicCON 4120

basicCAN 61 PLUS

basicCON 4115

LVDS Frame Generator

- USB 2.0 interface
- generates 20 bmp/s at 800 px x 480 px at 24 bits
- 32 MB onboard image memory
- onboard microcontroller allows for interlacing two individual images to generate an overall image
- generates LVDS signals according to ANSI /TIA EIA-644-1995
- changeable serialiser modules
  - MAX9247 (18 bits colour, 3 bits control)
  - MAX9209 (18 bits colour, 3 bits control)
  - customer specific modules

basicCON 4120

LVDS Frame Grabber

- 2 x 4 MB onboard image memory for reference images and live-captured images
- analysis of LVDS signals according to ANSI /TIA EIA-644-1995
- changeable de-serialiser modules

basicCAN 61 PLUS

CAN Controller

- see basicCAN 6153, additionally the UUT power supply can be fed in via two 4 mm banana jacks
- break-out panel with separate 9 pin D-Sub connectors for each communication I/O and analogue/digital I/O
- four 4 mm banana jacks at the front of the module (2 x Kl.30, 1 x Kl.31, 1 x Kl.15 – to be switched on/off per relay with max. 5 A)
- nine status LEDs at the device front

basicCAN / PCI / PXI / USB 6153

basicMOST / PXI / USB 6161

basicLIN / PCI / PXI / USB 6173

basicCAN / PCI / PXI / USB 6153

CAN Controller

- CAN applications in the automotive industry
- up to four independent Full-CAN controllers
- CAN protocol according to specification 2.0 A / 2.0 B
- real-time simulation of ECUs through "intelligent" CAN interface, based on PowerPC
- transceiver freely selectable per CAN interface (high-speed, low-speed, single-wire)
- provision of net management functions
- automated read of CAN data base (*.dbc)

basicMOST / PXI / USB 6161

MOST150 Controller

- MOST protocol, 150 Mbit/s oPHY
- selectable frame rate 44.1 kHz or 48 kHz
- MOST High Protocol V2.2 on packet and control channel
- onboard diagnosis: MOST High Protocol V2.2 / TP2.0
- ring break diagnosis
- additional front side Ethernet port
- S/PDIF input/output
- DVI output
- additional front side trigger input/output
- two optional CAN and/or LIN interfaces

basicLIN / PCI / PXI / USB 6173

LIN/K-Line Controller

- LIN and K-Line applications, test systems in the automotive industry
- up to four independent LIN/K-Line interfaces
- LIN protocol according to specification 2.0 / 2.1
- K-Line according to ISO 9141
- variable transceiver supply
- each LIN interface configurable as master or slave
- output of arbitrary LIN messages
- automated read of LIN data base (*.ldf)
- onboard diagnosis function for K-Line
- all interfaces galvanically insulated

Communication Modules • Switching Modules

basicCAR / PCI / PXI / USB 6181

basicFLEX / PCI / PXI / USB 6191

USB 3104

basicCAR / PCI / PXI / USB 6181

Multi Bus Controller

- CAN and LIN applications and test systems in the automotive industry
- test solutions for multi bus systems
- 2 x CAN and 2 x LIN or K-Line
- CAN protocols:
  KWP 2000 on TP 1.6 and TP 2.0, KWP 2000 on CAN-ISO-TP, UDS on CAN-ISO-TP, GMLAN
- K-Line protocols:
  KWP 1281, KWP 2000, ISO 9141
- all interfaces galvanically insulated

basicFLEX / PCI / PXI / USB 6191

FlexRay Controller

- FlexRay applications in the automotive industry
- test systems with FlexRay in the automotive industry
- two independent FlexRay knots with two channels each (cold-start capable)
- cyclic sending of FlexRay messages
- event driven sending of FlexRay messages
- monitoring of bus data and events with time stamp
- all interfaces galvanically insulated

USB 3104

Four Single Relays

- general measurement and test systems
- power switch matrix
- matrix application
- four relays (NO)
- max. switched current 40 A each
- max. switched voltage 16 V
- 15 ms switching time

basicCON / USB 3108

PXI / USB 3116

USB 3118

basicCON / USB 3108

Eight Single Relays

- general measurement and test systems
- power switch matrix
- matrix application
- eight relays (NO)
- max. switched current 40 A each
- max. switched voltage 16 V
- 15 ms switching time

PXI / USB 3116

16 Double-Throw Contact Relays

- general measurement and test systems
- power switch matrix
- matrix application
- 16 relays (double-throw contact)
- three terminals per relay are routed to the connector
- max. DC switched current/relay 5 A at 40 V
- max. AC switched current/relay at 230 V
- max. switched voltage 100 VDC or 250 VAC
- max. DC switched power 240 W
- max. AC switched power 1000 VA
- 15 ms switching time

USB 3118

16 + 2 Single Relays

- general measurement and test systems
- power switch matrix
- matrix application
- 18 relays (NO)
  - 16 relays
    max. DC switched current 5 A at 40 V
    max. AC switched current 2 A at 230 V
  - 2 relays
    max. switched current 16 A at 15 V

Switching Modules • Load Switching Controllers

basicCON / PXI / USB 3132(-5A)

PXI 3156

PXI 3164

basicCON / PXI / USB 3132(-5A)

32 Single Relays

- general measurement and test systems
- measurement multiplexer LF
- matrix LF
- 32 relays (NO)
- two terminals per relay are routed to the connector
- max. DC switched current/channel 1 A at 30 V
- switched voltage 10 mV to 100 VDC
- max. switched power 30 W
- min. switched current 10 µA
- 10 ms switching time

PXI 3156

14 Multiplexers

- general measuring technique
- measurement multiplexer LF
- matrix up to 2 A
- 14 multiplexer channels
- max. DC switched current/channel 2 A at 30 V
- switched voltage 10 mV to 100 VDC
- max. switched power 60 W
- min. switched current 10 µA
- total current for COM_H or COM_L max. 4 A
- 10 ms switching time

PXI 3164

4 x 16:1-Multiplexers

- general measurement and test systems
- matrix for functional tests
- 64 relays in four blocks (16 rows, 1 column)
- max. DC switched current 1 A at 30 V each
- max. total current per column per block 1 A at 30 V
- switched voltage 10 mV to 100 VDC
- max. switched power 30 W
- min. switched current 10 µA
- 10 ms switching time

PXI 3181

basicCON / PXI / USB 31128

USB M-48

PXI 3181

40 x 2:1-Multiplexers

- general measuring technique
- switch simulation
- measurement multiplexer
- 40 multiplexer channels (2:1, locked)
- max. DC switched current/channel 1 A at 30 V
- switched voltage 10 mV to 100 VDC
- max. switched power 60 W
- min. switched current 10 µA
- total current for COM_H or COM_L max. 4 A
- 10 ms switching time

basicCON / PXI / USB 31128

Variable Multiplexer

- switch simulation
- measurement multiplexer
- 64 or 128 switch relays
- 64 or 128 relays in 8 and 16 blocks, respectively (eight rows, one column)
- max. DC switched current 400 mA at 60 V
- max. switched voltage 60 V
- max. switched power 24 W
- 10 ms switching time

USB M-48

Load Switching Controller

- relay actuator module to control power relays
- USB master controller with 48 open collector outputs
- up to 500 mA primary current per channel at 24 V
- euroboard form factor for backplane installation

Load Switching • Digital I/O Modules • Analogue Modules

USB S-48

PXI 3013

PXI 3014

USB S-48

Load Switching Controller

- relay actuator module to control power relays
- for extension of the USB M-48 module up to 128 outputs:
  - use one USB S-48 module to add 48 outputs, to get 96 outputs in total
  - use two USB S-48 modules to add 80 outputs, to get 128 outputs in total
- euroboard form factor for backplane installation

PXI 3013

Digital Output

- low-cost module
- 32 digital outputs
- 5 to 30 V output supply voltage
- outputs are galvanically insulated
- ≤ 400 mA output current per channel
- ≤ 4 A total current

PXI 3014

Digital Input

- low-cost module
- 64 digital inputs
- 5 to 60 V output supply voltage
- inputs are galvanically insulated
- ≤ 15 µs signal detection time at inputs

PXI 3015

USB 3016

PXI 3216

PXI 3015

Digital I/O

- 24 bi-directional channels
- 16 digital inputs
- 5 to 25 V output supply voltage
- application side is insulated (potential-free or free-of-ground)
- ≤ 350 mA output current per channel
- ≤ 6 A total current
- ≤ 500 µs update time for all channels
- 24 outputs
- 24 and 16 inputs

USB 3016

Digital I/O

- general control and feedback control systems (sensor and actuator signals)
- 40 bi-directional channels (FET outputs and opto-couplers)
- switched voltage up to 30 V AC/DC
- switched current up to 1 A AC/DC

PXI 3216

16 Analogue Channels

- general signal generation
- arbitrary waveform generator
- 16 channels arbitraty voltage output
- 12 bit resolution
- update rate up to 100 kHz
- 512 kbit memory per channel
- max. output current 5 mA
- 16 channel synchronised analogue output

Analogue Modules • Resistance Modules • Simulation

PXI 3220

PXI 3240

PXI 3250

PXI 3220

8 Analogue Channels

- general signal generation
- arbitrary waveform generator
- eight channels arbitrary voltage output (-10 to +10 V)
- 12 bit resolution
- update rate up to 500 kHz
- 1024 kbit memory per channel
- update timing accuracy 100 ns
- max. output current 5 mA
- eight channel synchronised analogue output

PXI 3240

16 Comparator Channels

- general measurement and test systems
- functional test
- signal monitoring
- 16 input channels
- input voltage range -70 to +70 V
- digital evaluation by means of two levels per channel
- analogue measuring function

PXI 3250

CVT Meter

- general measurement and test systems
- functional test
- signal monitoring
- measurement of current, voltage and temperature (PT1000), resolution 5½ digits
- auto range function
- up to four independent and galvanically insulated measuring channels
- broad range of measuring probes available

basicCON / PXI / USB 4008

basicCON / PCI / PXI / USB 4009

PXI / USB 4010

basicCON / PXI / USB 4008

Resistance Simulator

- general measurement and test systems
- simulation of resistors
- eight resistor channels
- four fixed resistance values per channel – customer specific configurable
- switched voltage 10 mV to 100 VDC
- max. switched power 500 mW
- 10 ms settling time

basicCON / PCI / PXI / USB 4009

Resistance Simulator / Decade

- general measurement and test systems
- simulation of resistors or potentiometers with centre tap
- two programmable resistance channels
- range 1 Ω to 1 MΩ
- accuracy ± 1%
- max. power dissipation 0.5 W

PXI / USB 4010

Incremental Encoder

- general measurement and test systems
- test of encoder interfaces
- two ports with selectable output levels (5 to 25 V single-ended (referenced to ground) or 5 V differential), can be configured as: incremental encoder, SSI encoder, DIO with integrated pulse counters

Power Supply / Simulation Modules • Compact Systems

PXI 4011

PXI 4011

Incremental Encoder

- general measurement and test systems
- test of encoder interfaces
- 4 channels
- output voltage 5 to 30 V
- frequency 0.5 Hz to 200 kHz
- application side insulated (potential-free/free-of-ground)
- open collector or push-pull output driver
- different modes of operation
- continuous, single-shot or cyclic signal output
- error simulation by dropping of individual increments
- 3 signals per channel (A, B, index)

PXI 5120

PXI 5120

Power Supply

- operates in 3.3 V and 5 V PXI and cPCI racks
- two independent and galvanically insulated voltage outputs
- programmable current limit 0 to 10 A
- setting of output voltage, output current and over-current flag
- use of trigger signals for event control
- interconnection via trigger bus, star trigger, local bus and external signal

USB 5301

USB 5301

Load Simulation

Preferred applications:

- measurement and test systems for electronic assemblies
- automotive test
- industrial electronics
- automation technology

USB 5305

USB 5305

Temperature Simulation

Preferred applications:

- general measurement and test systems
- end-of-line test
- industrial electronics
- automation technology

smartCAR

smartCAR

Modular Communications

Applications:

- mobile applications
- test systems
- hardware interface for diagnostics applications

Supported interfaces:

- Support of CAN 2.0A and 2.0B (high-speed, low-speed, single-wire), LIN 2.1 and K-Line according to ISO 9141

magicCAR³

magicCAR³

Compact Automotive Tester

- cost-effective test environment for development and quality assurance of automotive devices
- suitable for endurance test systems, parallel test systems and screening test systems due to flexible structure
- technologically based on the Series 61 controller
- support of e.g. CAN, LIN, FlexRay, K-Line, digital and analogue I/Os, transport and diagnosis protocols

Compact Systems • Additional Systems

smartCommander

SoundChecker™

TESSY

smartCommander

Handheld Terminal

Preferred applications:

- manufacture of automotive assemblies
- final car assembly
- replacement for control and operator units

SoundChecker™

Structure-Borne Noise Analysis

Applications:

- cost-effective analysis of structure-borne and air-borne noise
- detection of assembly faults in mechanical systems by spectral analysis

Supported sensors:

- structure-borne noise sensors with/without own power supply
- microphones with/without own power supply
- linear displacement and angle sensors

TESSY

TESSY is a configurable, modular functional test system. It meets the specific requirements of UUTs like vehicle control devices in automotive technology, SPC units for industrial electronics or other electronic or mechatronic assemblies. TESSY supports all required input signals and can characterise the behaviour of the specimen based on a broad range of measurement resources. The system is equipped with communication interfaces which can be configured according to vehicle type and manufacturer. TESSY is available in various customer and application specific variants. Learn **more about TESSY in chapter Functional Test Systems.**

USB 1016, USB 1008, USB 1004

USB 1016, USB 1008, USB 1004

USB Rack Systems/USB Chassis

Preferred applications:

- measurement and control setups
- test systems for automotive applications (end-of-line test, parallel and endurance test, validation and quality assurance)

Software

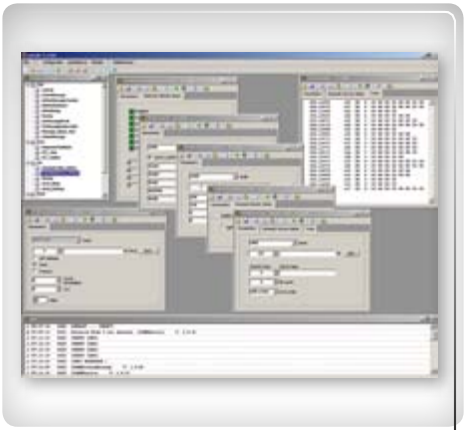
myCAR™

myCAR™

Modular Software Suite for ECU Tests

myCAR is an innovative and easy-to-use software suite for practical and interactive handling of GOEPEL electronic's hardware products. It allows for simple action and reaction concerning vehicle interfaces. Simulation and monitoring are supported for various bus systems. In line with the respective bus system myCAR supports comprehensive diagnostic functions. Combining simulation and validation methods the software suite permits a flexible use ranging from user specific applications to vehicle-related verification.

Net2Run



Program Generator

PROGRESS

Net2Run

Restbus Simulation and Gateway

Net2Run is an efficient solution for signal based restbus simulation of heterogeneous vehicle networks.

It implements the AUTOSAR approach of unified signal access and the PDU concept for CAN bus, LIN bus and FlexRay bus. Besides classical restbus simulation, this concept also implements gateways at the signal and PDU level.

The configuration is done via the Net2Run Configurator based on CAN, LIN or FIBEX message catalogue databases (.dbc, .ldf, .xml).

Program Generator

Test Sequencer Software

The Program Generator is used to create test sequences from pre-programmed test steps of a macro library. Each macro is accessible via a graphical interface. Comprehensive automation functions (scripting, XSLT, SQL) simplify programming and allow for flexible designs of test sequences and protocols.

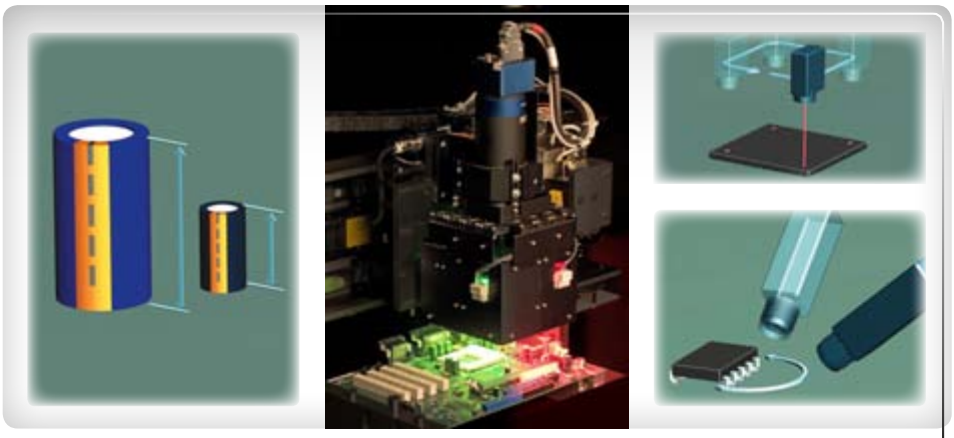
PROGRESS

Test Sequencer Software

PROGRESS is a hardware independent test sequencer software, which helps users to rapidly create test sequences in a test environment (e.g. end-of-line or run-in systems).

It excels in easy handling, arbitrary expandability and open interfaces.

Automated Optical Inspection



OptiCon Camera Concept

Rotating Angled-View Module **Chameleon**

OptiCon systems – modular, flexible and powerful

The modular and flexible system concept ensures highest performance parameters:

Custom Camera Configuration – according to available budget and required performance. The modular concept allows upgrading at a later date.

High Fault Detection at Minimal False Call Rate – enabled by flexible illumination, modular camera configuration, powerful OCR functions and precise laser height measurement.

Minimised Debug Time – due to extraordinary image quality, telecentric lens and comfortable debug tools.

Rapid Test Program Generation – by means of manufacturing-oriented library structure and handling of alternative components as well as powerful import modules for various placement data formats.

Full System Compatibility – by identical image capturing concepts and consistent system software.

Main Camera – the camera module enables high-contrast grey value image acquisition as well as high-resolution colour images based on the Extended Colour Technology™.

Add-on camera and laser height measurement system are available for the following test applications:

- angled-view inspection
- inspection of very high components
- height measurement and co-planarity check

Chameleon – the powerful 360° angled-view inspection ensures maximum fault detection, independent of board layout and placement situation. This module is available in addition to the main camera.

OptiCon SmartLine

OptiCon BasicLine

OptiCon AdvancedLine

OptiCon SmartLine

Desktop AOI system for the efficient testing of small batches and single assemblies.

The compact design enables the space-saving use at various places in the production environment.

OptiCon BasicLine

Stand-alone AOI system for manual loading and flexible adaptation of different boards, single components and complex assemblies.

OptiCon BasicLine can be configured to suit various test cycle time requirements.

OptiCon AdvancedLine

Inline AOI system, featuring flexible integration options into production lines as well as use as stand-alone solution with automated loading and sorting.

OptiCon AdvancedLine can be configured to suit various test cycle time requirements.

20 BEST IN TEST 07

TEST & MEASUREMENT WORLD AWARD WINNER

OptiCon TurboLine

OptiCon TurboLine

BEST in TEST 20 09
TEST & MEASUREMENT WORLD Award Winner

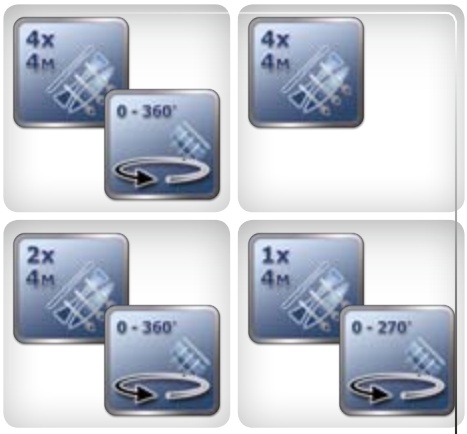
OptiCon TurboLine – AOI System for High-End Inspection

The modular system concept allows for a broad range of configurations to perfectly adopt the system to the required production use. In addition to modules for orthogonal view inspection of the top side, several camera configurations for angled-view inspection are available.

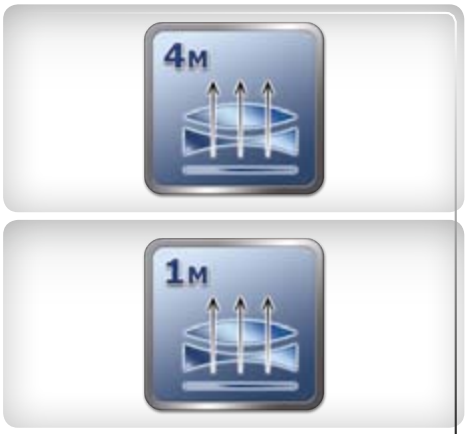
The inspection of the bottom side of assemblies – in conjunction with the segmented conveyor module – features drastic benefits regarding minimisation of test cycle time. Additional flip stations for PCBs can be saved.

1. Platz Best Product Award E&E

Variants of Orthogonal Inspection from Top Side



Variants of Angled-View Inspection from Top Side



Variants of Orthogonal Inspection from Bottom Side

Orthogonal Inspection from Top Side

The dual path lens, specifically developed for OptiCon TurboLine, forms the centrepiece of the orthogonal camera module. Assuming a configuration with two cameras, grey value images as well as colour images with a different solution can be taken from the same test position. In addition to the telecentric optical path, the Extended Optical Resolution™ test technology can be used to perform tests with microscopic image solution on future generations of components.

Angled-View Inspection from Top Side

The cameras which are integrated in the angled-view inspection modules permit image acquisitions of the full field of view of the orthogonal camera under an angle of 45 degrees. Also these camera modules will provide grey-scale images and high-resolution colour images for inspection tasks at components down to 01005 size or 0.3 mm pitch. Depending on the required inspection throughput, one to four camera modules can be chosen for angled-view inspection. An additional rotary drive enables angled-view images from arbitrary angular positions.

Orthogonal Inspection from Bottom Side

Depending on speed requirements, two camera configurations are available for the inspection of the board bottom side. They feature a telecentric optical path and enable grey-value images and high-resolution colour-images as well.

OptiCon PILOT – The AOI System Software

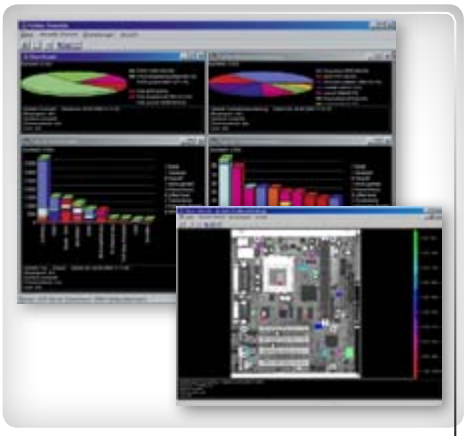
OptiCon PILOT

Repair Station Software

OptiCon PILOT™

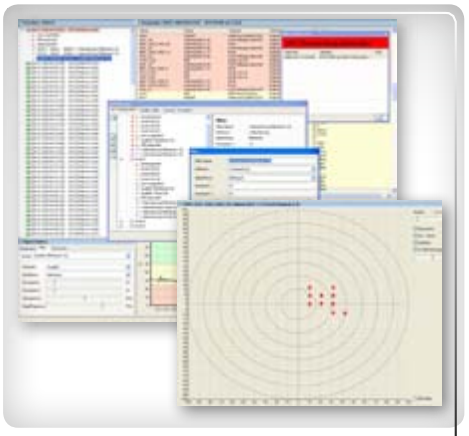
Repair Station Software

By means of a coloured display of the detected faults and the overview image and by different angled-views the Repair Station Software offers a convenient operation at the inline verification process and at the offline repair station as well. Moreover, it allows for programme optimisation during the ongoing production process.



Fault Statistics

Offline Programming Software



SPC Module

Fault Statistics

Extensive statistics evaluations with numerous filter settings enable the fast detection of main faults as well as an objective evaluation of production quality and throughput.

Offline Programming Software

In addition to inspection programme generation, the Offline Programming Software allows programme optimisation including adjustment of illumination settings at a separate PC without affecting the test throughput at the AOI system.

SPC Module

The SPC Module (statistics process control) enables an effective optimisation of the production process of electronics assemblies. Warning and action limits can be defined for selected process parameters. Trend analyses allow for taking predictive measures before a fault occurs.

Automated X-Ray Inspection

OptiCon X-Line 3D

Concept of OptiCon X-Line 3D Image Acquisition

OptiCon X-Line 3D – The System Concept

OptiCon X-Line 3D is based on a detector concept, which has been developed in-house by GOEPEL electronic. Together with the maintenance-free micro focus X-ray tube it allows for **real-time multi-angle image capturing**. The system is based on a revolutionary GigaPixel technology, which enables an **inspection speed of up to 40 cm²/s with full 3D acquisition**.

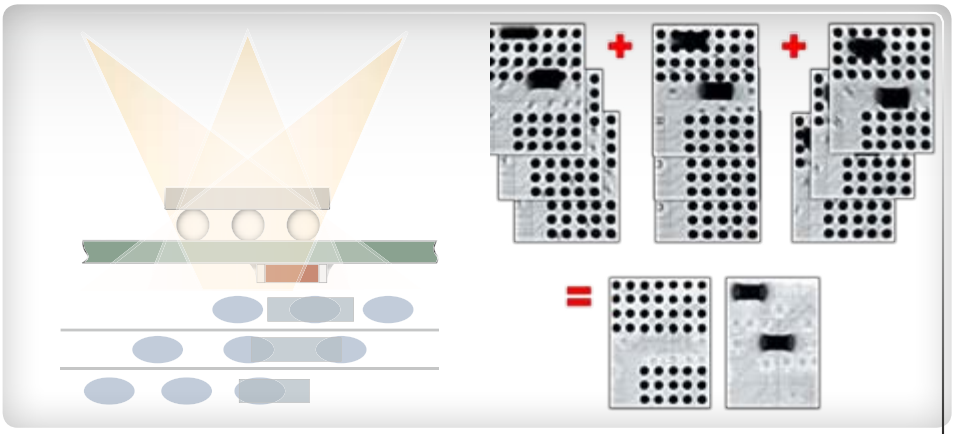
Reconstruction methods based on tomosynthesis allow the analysis of different layers of the assembly. As a result, **both sides of a board with components on both sides can be inspected simultaneously**.

The **XI-PILOT software** is an **open concept for a maximum fault-coverage** and optimised adaptation to future component packages and manufacturing requirements. This is based on an algorithm library suitable for all common component packages. The measured values and features extracted by the algorithms will be automatically classified. Based on this auto-learning technology, **programme generation time will be kept to a minimum**.

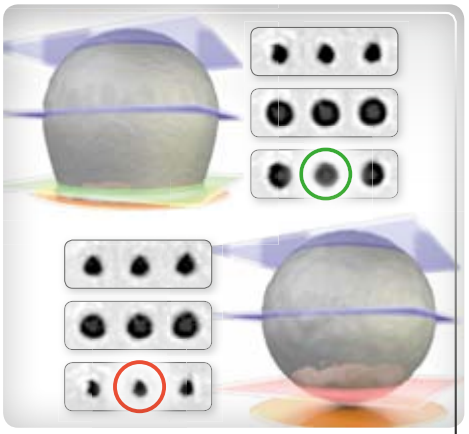
Unparalleled in Fault-Coverage and Ease of Use

Rapid Inspection Programme Generation through Effective use of Libraries

Due to the reconstruction of components and solder joints layer-by-layer, test programme generation and actual inspection processes are executed with geometrically calibrated, distortion free imaging of the actual inspection objects. This enables a rapid and effective inspection programme generation based on CAD data and the use of a component library with pre-defined inspection algorithms and classifiers.



Different Projections of a Board with Components on both Sides during 3D X-Ray Inspection



Maximised Fault Recognition due to Reconstruction Layer-by-Layer

3D X-Ray Inspection with OptiCon X-Line 3D

Principle of Image Acquisition:

The assembly is radiated from different angles. Based on generated projections distinct layers can be reconstructed.

Benefits of 3D X-ray Inspection:

- safe inspection of assemblies with components on both sides
- reconstruction of arbitrary layers
- spatial assignment of recognised faults
- rapid and comfortable inspection programme generation through use of a unified library

Fields of Application:

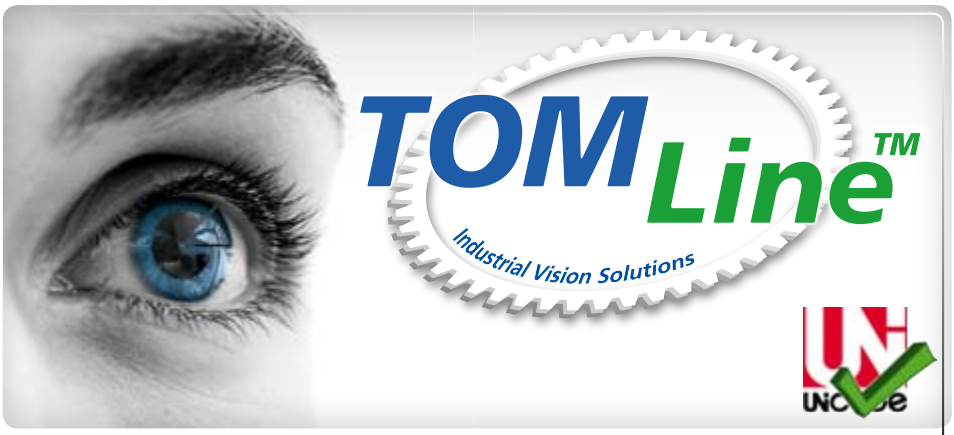
- 3D X-ray inspection in inline production
- inspection of assemblies with components on both sides
- qualitative inspection of all solder joints (e.g. BGA, QFN)
- components check for presence, offset and shorts
- measurement of voids in different layers
- inspection of complex board assemblies with superimposed soldering layers and assembled heat sinks
- measurement of the hole-fill in THT solder joints
- optional AOI module to inspect visible features on the top or bottom side of the PCB

Maximum Fault-Coverage at Outstanding Inspection Speed

The all over 3D X-ray inspection permits analysis of all solder joints of an assembly layer-by-layer at inline speed.

This ensures a safe detection of critical fault types and the spatial assignment of the recognised faults.

TOM Software and Options



TOM Line™ Image Processing Software

Software Package

Image Processing Software TOM Line™

TOM Line software is a powerful, yet easy-to-use programme environment to implement image processing applications.
The software package enables users to generate complex test programs rapidly and intuitively without without prior programming knowledge. TOM Line covers a broad range of industrial vision solutions. Due to its flexible expandability to multi camera applications it provides the implementation of complex test tasks in the field of automated optical quality inspection.

Proven

- since 1996 more than 500 TOM Line systems are globally in industrial use

Efficient

- rapid, intuitive inspection program generation without any programming knowledge

Modular

- compatible with all common camera interfaces
- freely extendable for multi camera applications

PC based

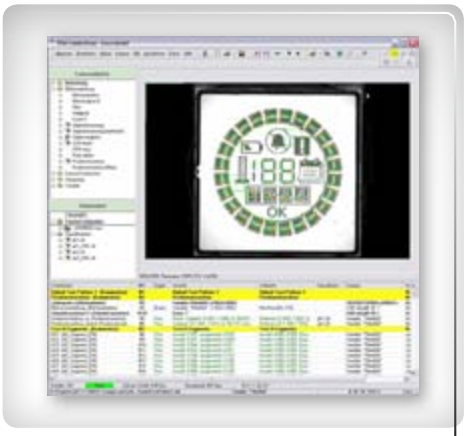
- Windows compatible image processing software
- optimised for multi threading

Flexible

- customer programmed software algorithms via user interface
- remote controllable per RS232, Ethernet or DIO

Universal

- comprehensive range of practical test functions



TOM Line™ LC Display Test

TOM Automotive Package

Card Inspection

TOM Line™ Options

easyOCR™ Europe

unique algorithm for intelligent pre-processing and reading of European fonts with no need for pre-training of any classifier

easyOCR™ Asia

unique algorithm for intelligent pre-processing and reading of Asian fonts with no need for pre-training of any classifier

easySymbolMatch™

tool for automated generation of symbol recognition classifiers based on synthetic image data (e.g. layout from a Photoshop file)

easyPhotoMatch™

tool to compare passport photographs and hologram images on identification documents with image data from a database

Automotive Package

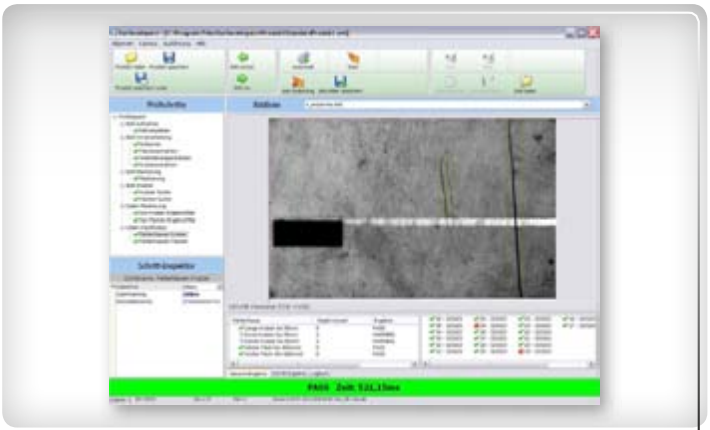
includes powerful test functions to inspect instrument clusters and head units: static/dynamic recognition of tachometer needles, switching time of symbols, interaction with the CAN bus system

TOM – Areas of Application

automotive and supplier industries, electronics industry, medical engineering, solar industry, telecommunications, and production of ID cards, bank cards and customer cards

Card and Paper Inspection • surfaceInspect™

Card Inspection of German Identity Card

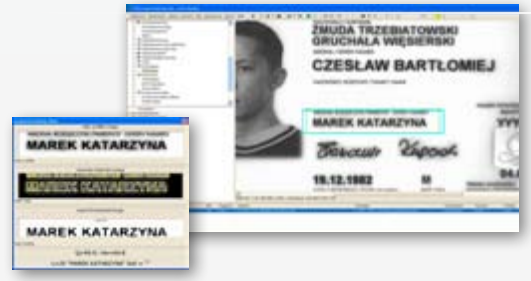


Screenshot of the Working Environment

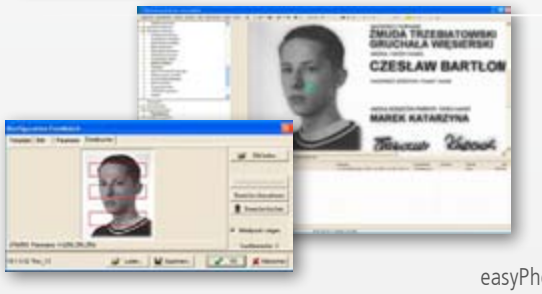
Card and Paper Inspection

Image Processing Solutions for the Inspection of Personalised Documents, ID Cards, Bank Cards and Customer Cards

The ident image processing solutions for ID cards, bank cards, customer cards and shipping documents cover verification of personalisation (OCR), signature check and the verification of photos (easyPhotoMatch) and holograms. For optical character recognition (OCR) the straightforward easyOCR function is used. easyOCR reads handwriting and typescript, as well as special fonts such as OCRA, OCRB, F7B, CMC7 or E13B independent of character size. Proven classifiers for all common languages with Latin, Cyrillic and Greek character sets are used. Even East Asian fonts (simplified Chinese, traditional Chinese, Korean, Japanese) are supported. The powerful reading algorithms are enhanced by an innovative, automated image pre-processing tool.



easyOCR™



easyPhotoMatch™

System Parameters for Ident Image Processing Solutions

Camera Technology	mono or multi camera system (colour, monochrome) with various resolutions up to five megapixels
Lighting	LED white, infrared (coaxial or incident light)
Communication	Ethernet socket-server, named pipe, DIO
Software	TOM Line with additional modules easyOCR and easyPhotoMatch
Miscellaneous	customer specific configuration on request

surfaceInspect™

The **surfaceInspect** system has been developed for the surface check of cards. Based on the **SmartScratchVision™** technology (patent pending), even the smallest damages of the card surface, like scratches, nicks and inclusions, are reproducibly recognised.

System Configuration

The PC based systems are pre-configured on delivery and can be easily integrated into various card and paper handling systems. The image processing hardware consists of modern Gigabit Ethernet cameras and optimised lightings. Powerful software modules round out the systems.

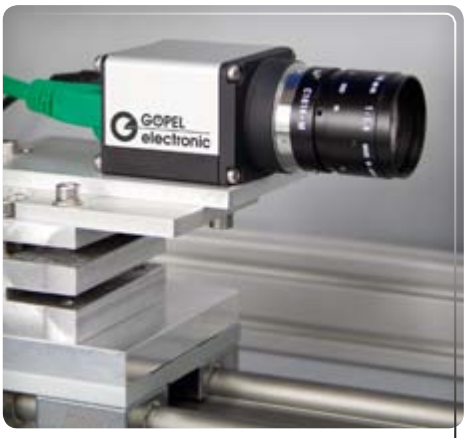
Image of the ID Card without Scratches

SmartScratchVision™ Image with clearly visible Scratches

surfaceInspect System Parameters

Camera Technology	high-speed monochrome camera with 1.2 megapixels and 50 fps
Lighting	area lighting (striped pattern)
FOV size	85 mm x 55 mm
Min. Defect Size	width of scratches > 0.1 mm nicks, indentations > 0.3 mm
Communication	Ethernet socket-server
Software	surfaceInspect™
Size of Camera/ Illumination Module	250 mm (W) x 500 mm (D) x 300 mm (H)

TOM Combi-Line™



High-Resolution 5-Megapixel Camera on Variable Positioning Unit

Flexible UUT Holder

TOM Combi-Line

TOM Combi-Line™

Optical Inspection System for Instrument Clusters

TOM Combi-Line is a compact desktop system for inspection of prototypes and evaluation samples of instrument clusters. The TOM Combi-Line has been designed to inspect display contents like symbols and characters.

The innovative easyOCR function allows inspection of Latin, Cyrillic, Greek and East Asian characters without teaching processes. The easySymbolMatch function enables the automated generation of highly efficient classifiers used for symbol detection and highly efficient object recognition. Furthermore, the TOM system can be used to check backlight brightness and indicator positions in instrument clusters.

Easy Reading of Inverted Texts through Intelligent Image Pre-Processing

Automated Elimination of Border Objects

Reading of Asian Fonts

System Configuration

Images of the instrument clusters are not viewed directly but through an integrated mirror system to ensure the system's compactness. The flexible UUT fixture enables the optical inspection of instrument clusters of any type. Delivery of the test system includes a PC and the image processing software TOM Line. Depending on the inspection application the system can be equipped with up to three 5-megapixel cameras. UUT control including restbus simulation is optionally available.

Fully Automated Teaching of Symbol Classifiers

TOM Combi-Line System Parameters

Camera Technology	1 to 3 5-megapixel colour cameras; other configurations on request
UUT Holder	flexible clamping elements for vehicle instrument clusters; max. width approx. 400 mm
Options	LED lighting; UUT control including restbus simulation
Dimensions	620 mm (W) x 690 mm (D) x 450 mm (H)

TOM Selective-Line™

Board Assembly with THT Components

TOM Selective-Line™

TOM Selective-Line™

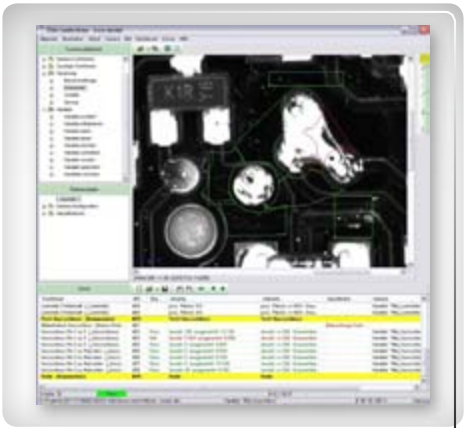
Easy-to-Integrate Module for Selective Inspection of THT Solder Joints

TOM Selective-Line is a powerful, yet cost-efficient module for the inspection of THT solder joints on electronic circuit board assemblies.

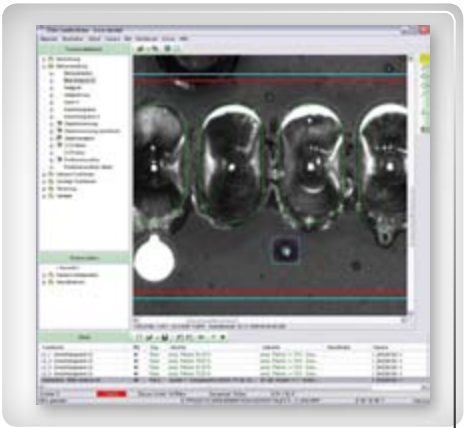
Combining modular lighting, a telecentric lens and an intuitively usable system software enables safe and reproducible evaluation of THT solder joints according to the requirements of IPC-A-610. The easily integrable module suits the requirements of inline inspection and offline verification as well.

The max. area of inspection of the TOM Selective-Line is 48 mm x 48 mm. Combined with an axis system or a pneumatic positioning unit, larger inspection areas are achievable.

Solder Joint Inspection



Shorts Inspection



Solder Splashes

TOM Selective-Line System Parameters

Camera Technology	monochrome/colour, 5-megapixel	
Lighting	multi-spectral TopFlash (incident light) – LED: red, green, blue, ultra-violet (UV), infra-red QuattroFlash (dark field) – LED: red, segmentally controllable	perfect contrast – even under changing substrate colours; segmentally controllable side-lighting eliminates the impact of flux and solder resist
Lens	telecentric lens; field of view up to 48 mm x 48 mm*	distortion-free, sharp image of the board; *move the module pneumatically or electrically to cover larger fields of view
Software	TOM Line software package remote control: Ethernet, RS232, digital I/O scope of inspection, which conforms to IPC-A-610: THT solder joints, THT shorts, solder splashes	easy to operate image processing software with special functions for evaluation of solder joints, shorts and solder splashes
Supply	230 VAC / 0.2 kVA	
Size / Weight	200 mm (W) x 450 mm (H) x 180 mm (D)** / < 5 kg	**depends on used lens type

TOM In-Line™

Broad Range of executable Tests

TOM In-Line

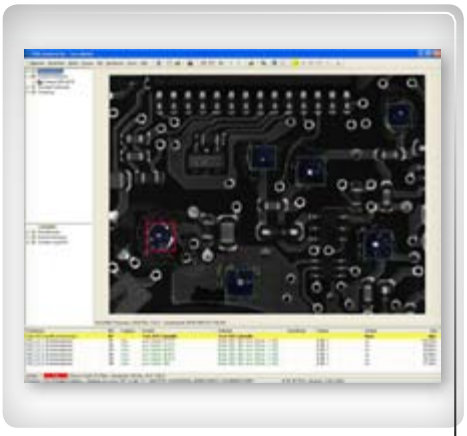
TOM In-Line™ – Cost Efficient Optical In-line Test System

System Concept

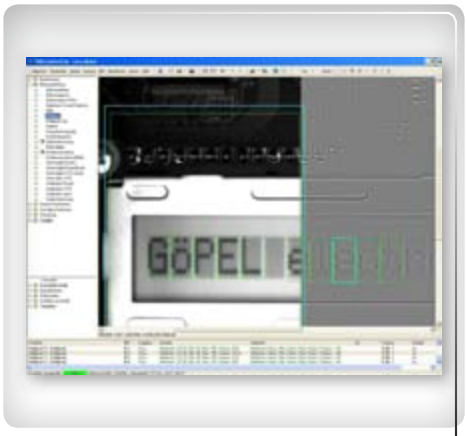
TOM In-Line systems have been designed for selected automatic optical and electrical test tasks on electronic board assemblies. The range of optical inspection tasks includes component presence and polarity check, inspection of selective solder joints, test of displays and LEDs as well as the inspection of fluorescent conformal coating. Moreover, the optical inspections can be combined with Boundary Scan test methods.

Test & Measurement World BEST IN TEST 2011 AWARD WINNER

Boundary Scan ready



Solder Joint Inspection



Display Inspection

Conformal Coat Inspection

System Versions

Due to the modular system design, the system can easily be modified to suit specific test requirements. Standard camera configurations range from single- to multi-camera versions (1 to 5 megapixel) in monochrome or colour implementation. Various lightings using visible or UV light (conformal coating) are available. For the inspection of selective solder joints the system can be upgraded with the powerful camera and lighting modules of the OptiCon series.

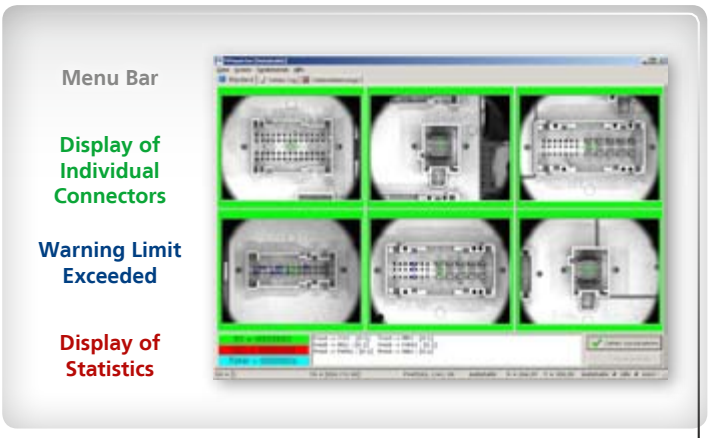
If apart from optical inspections a functional test, based on the Boundary Scan technology, shall be run, a GOEPEL electronic Boundary Scan controller and a suitable bed-of-nails fixture must be added.

TOM In-Line System Parameters

Camera Technology	1 to 4 colour or monochrome cameras with 1 to 4 megapixels; other configurations on request
Lighting	LED: white RGB UV
Board Size/Weight	max. board size 460 mm x 400 mm max. board weight: 5 kg
Miscellaneous	inline interface: SMEMA, Siemens system supply: 240 V / 0.5 kVA compressed air: 0.6 MPa < 20 l/h dimensions: 1 000 mm (W) x 1 150 mm (D) x 1 800 mm (H)

PINspector™

Test Cell



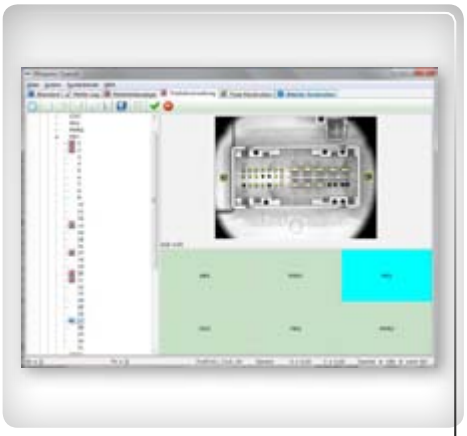
User Interface of the Runtime Environment

PINspector™

PINspector is designed to check the correct geometrical position of connector pins (tolerance circle test). Combining an axis system, camera and lighting head and a PC with powerful software, the check of high pin-count automotive connectors is simple and comfortable. The module can be integrated into various test cells. Core feature of the software algorithm is the sub-pixel-accurate recognition of pins based on their contour.

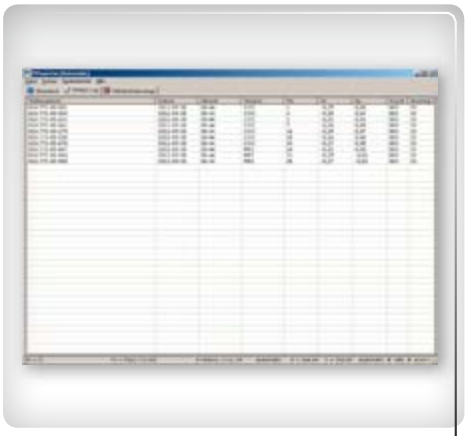
Software Features

- selectable/password protected user levels
- video view of individual connector modules
- simple generation of product variants
- results are stored in a log file
- automatically saves fault images (can be switched on/off)
- individual images zoomable
- display of target/actual deviations highlighted by directional arrows
- communication interface: Ethernet socket-server



Teaching Module: Teaching of individual Connectors

Axis System Camera Head/Carrier Pusher



Fault Protocol

PINspector System Parameters

Camera Technology	monochrome, 1.2 inch CCD, 8 megapixels, 17 fps
Lens	telecentric measurement lens, β = 0.28
Camera Resolution	19.6 µm/px
FOV Size	64 mm x 48 mm
Lightings	LED top light with integrated flash controller and four bar-shaped LED side lightings (can be optionally switched on/off)
Axis System	range of travel 550 mm x 450 mm (other travel ranges on request)
Communication Interface	Ethernet socket-server
Inspection Time for Eight Connectors	< 5 s (incl. handling of workpiece carrier)
Test Cell	integrable into various test cells (figures illustrate integration into a Pematech test cell)

Functional Test Systems

Test Sequencer Software PROGRESS

Functional Test Systems

During the production of electronic assemblies it is necessary to check the manufactured products' quality. Normally, this is done after various process steps in the production of an assembly. One step is the final assembly of complex boards where multiple electronic and mechanical components "meet" for the first time. At this point faults can occur which affect the functionality of the products.

It is possible that wrong electronic components get into the housing or electronic components may be destroyed during the final assembly. To recognise these and other faults, a functional test of the manufactured products is performed at the end of the line.

GOEPEL electronic has designed and manufactured functional testers particularly for the needs of the electronics industry. The products to be tested are digital and analogue assemblies. Various functional test systems have been created for the arising test tasks.

GOEPEL electronic develops customer specific functional testers for the following areas:

- acoustics analysis (**see also**: SoundChecker, page 30)
- avionics
- engineering
- mechanics
- network test (**see also**: basicCAR 3085, page 23)
- screening test
- seat test

GOEPEL electronic's test sequencer tool **PROGRESS** is used as test management tool.

Network Testers

Screening Testers

Network Testers

The network tester is a specially configured system for the test of CAN, LIN, and K-Line network characteristics of control units to ensure the reliable operation of bus systems in vehicles.

In addition to essential test tasks (e.g. network management, data definition, diagnosis or node configuration via CAN and LIN) for various vehicle manufacturers, the test of the physical layer and the simulation of transmission errors are also supported.

Screening Testers

Screening is a quality control method using ongoing continuous functional tests on manufactured devices. A defined number of units is taken from the production lot and fed into the screening test equipment. To achieve the highest possible fault detection, the control devices are subjected to temperature cycles between the low and high limits of the operating temperature during the test. Using simple statistics methods the failure rate of the entire production lot can be inferred from the number of failures of the screening test. Conversely, the number of control devices that should be subjected to the screening test results from the definition of the maximum failure rate. The test methods used in the screening test physically equal the run-in-test. Hence the used test equipment is identical.

Benefits of using a screening tester:

- parallel testing
- pass/fail evaluation
- reduces time-to-market up to 50 percent
- minimises failure rate of shipped control units
- optimisation of production process and product design

Seat Tester OsCAR • Test of Industrial Electronics

Seat Tester OsCAR

OsCAR Test Stand with Seat Tester

TESSY acoustics

OsCAR
– Universal Tester for all Seats

GOEPEL electronic's seat tester **OsCAR** is a **universal platform**, which can be used across a wide range of requirements and units under test (UUT) without complex reconfiguration or re-programming due to standardised hardware. Its basic configuration is capable of testing all standard seats. To test special UUTs, OsCAR can be **arbitrarily configured**. The highly modular PC based system is conveniently operated per touch screen. GOEPEL electronic's standard modules such as the variable multiplexer USB 31128 or the resistance simulator USB 4009 are included. Furthermore, OsCAR is **expandable**: multicontour seat test, structure-borne noise analysis, pneumatics test, inspection of optical features or the expansion as a double seat tester to test seat sets are possible. Using the test sequencer PROGRESS as system software, the complex **test run generation** can be executed **without any programming know-how**. Extensive macro libraries are available. Additionally, OsCAR can be used offline for programming, parameter setup or for the simulation of test runs.

TESSY acoustics

Acoustic Test of Motor Components

Noise measurements have become indispensable for quality testing of vehicle components. Noise or vibration of electromotive devices is transmitted via built-in chassis components (e.g. doors, rear flaps, seats). After final assembly, structure-borne noise can be induced for further analysis by the acoustic test system only at this stage. Structure-borne noise or engine speed are used as input signals for the sound test system. Results of the acoustic test are evaluated, visualised and documented.

CARMEN

TESSY extended advanced

TESSY extended basic

CARMEN

Test of Mechatronic Components in Test Labs and in Production

Loading equipment is used to test the quality of mechatronic vehicle components. This equipment determines the values of electrical and mechanical parameters and examines the noise within the vehicle. In addition, the UUTs must be controllable via various bus systems (CAN/LIN/K-Line) during the test runs, because functional properties are often electronically set.

TESSY extended

End-of-Line Test for Mass Production of Automotive Electronic Assemblies

UUTs in high volume put demanding requirements to automated electronic functional test systems in the production of automotive electronic assemblies. Alongside a rigid design of the electromechanical production line, sophisticated test concepts of the functional testers with powerful hardware and software architecture are required to achieve short program execution times.

"TESSY extended" supports EOL tester lines (End-of-Line) with cross-linked test cells. Features range from ident scan of 2D codes via multiple parallel tests of board panels to marking of UUTs using a laser marker. Finally, faulty assemblies are sorted out. And all of that in quantities of more than one million assemblies per year.

Product Guide GOEPEL electronic

GOEPEL electronic

Get the total Coverage!

ISO 9001 certified

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