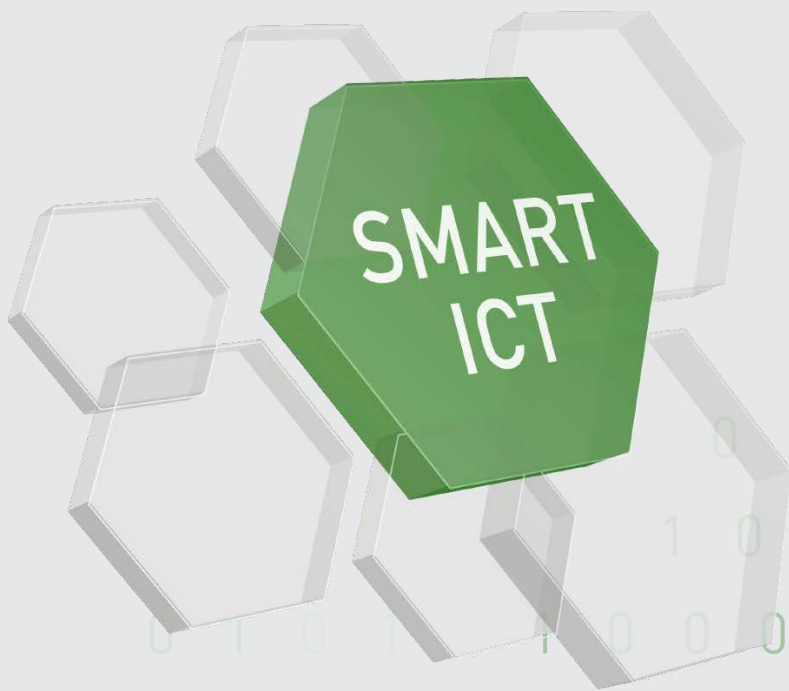


hello, whitepaper

# Test Methods in the Electronics Manufacturing: The Trend towards Miniaturization



Everything about test methods with and without test pads including the innovation SMART ICT, illustrative project descriptions and much more!

# Inhalt

3

Relevance

4

Testing via Test pads

5

Fixtures

6

Testing without Test pads

7

Boundary Scan

8

SMART ICT

9

ProMik: Expert for Testing in the Electronics  
Manufacturing

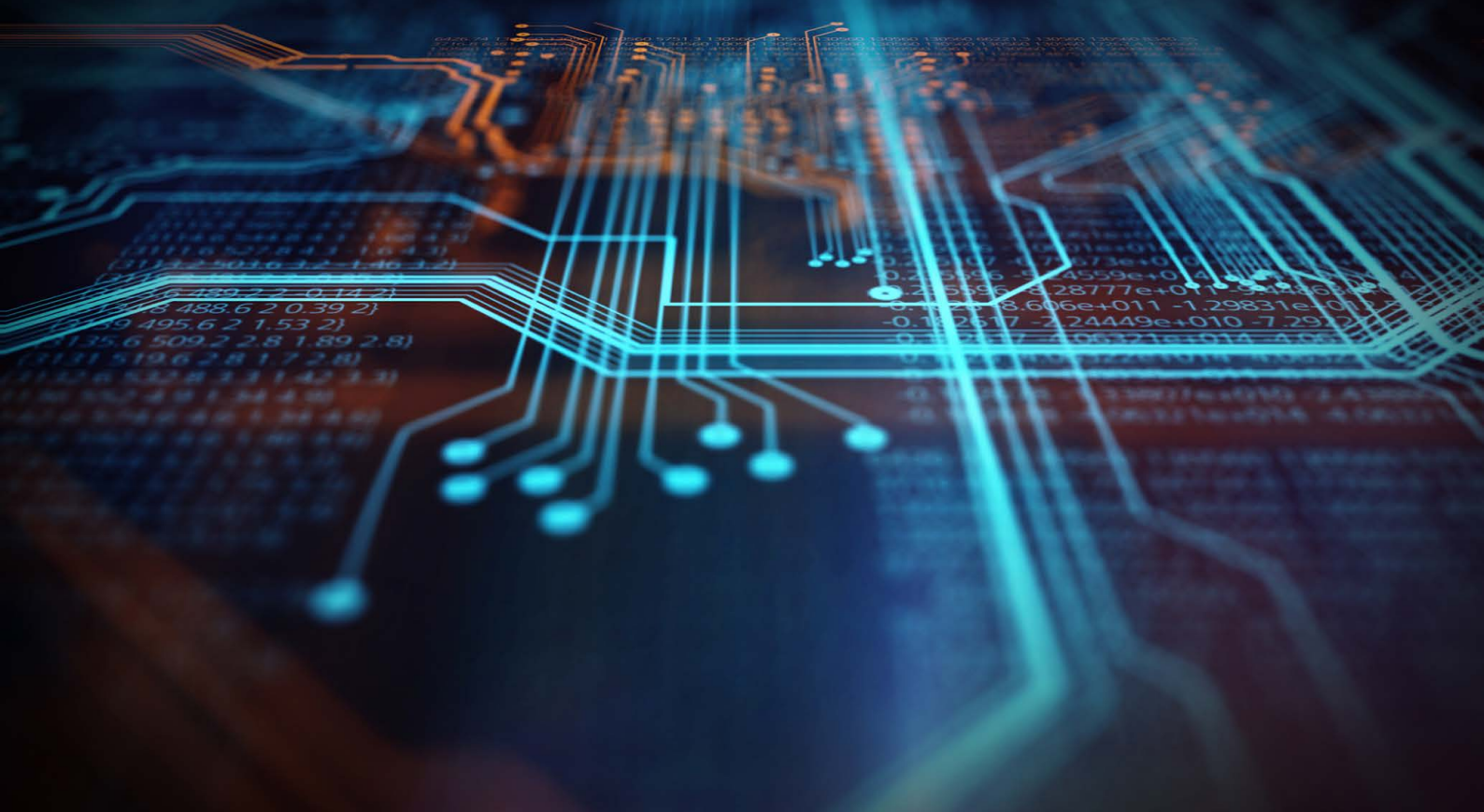
10

Use Case: SMART ICT – Verification of the interface  
communication

11

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Electronics Manufacturing





## Relevance

Increasing progress enables inspiring technologies that were formerly considered impossible. At the same time, however, applications are becoming more and more complex. As a result, even the smallest components can take months or even years to develop.

Because of this, it can be all the more exhausting to discover during production that components on the application are incorrectly assembled or even not functional at all.

For this reason, test procedures have been developed to check the function of devices. In microelectronics, a differentiation is made between various methods with which, for example, the pure functionality or also specific values can be tested.

ProMik's comprehensive product and service portfolio includes functional tests (FCTs) as well as testing without test points via Boundary Scan or SMART ICT.

# Testing via Test pads

Test pads are contacts on printed circuit boards (PCBs) or thickenings of tracks where the solder resist is left out. Thus, they form the connection point between the network node and the test needle of the adapter. They are used in procedures such as in circuit or functional tests to measure various properties.

## ICT

The In Circuit Test (ICT) is a test method in which both digital and analogue components can be tested. Examples are the testing of component parameters or polarities.

The advantage of ICTs is that both function and component values can be checked.

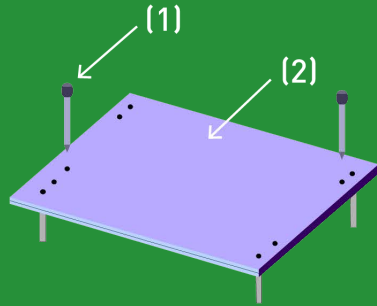
A disadvantage, however, is the need for test points, the contacting of which can cause additional costs because more space is needed on the PCB. In addition, electromagnetic compatibility must be guaranteed.

## FCT

The Functional Test (FCT) verifies what the name already reveals: the functionality. Examples are RAM or ADC tests.

By applying digital or analogue stimuli to the inputs and then testing the output parameters, the function of the assembly can be verified. For this, FCTs also need test points to contact the PCB in some cases.

# Fixtures



- (1) Stacking Screw
- (2) Pressure frame unit (NDH)

Needle bed adapters are required to contact test pads. For this, they obtain fine needles or pins for contacting.

ProMik manufactures its own fixtures based on many years of experience. The needle bed adapters are characterised by maximum quality and a high degree of customisation.



High speed data transmission rates



Customer individual adaptations

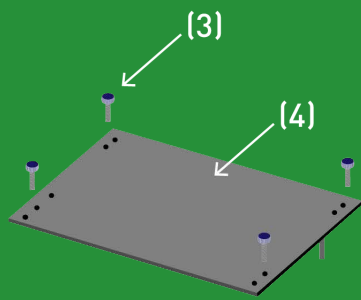


Highest signal integrity



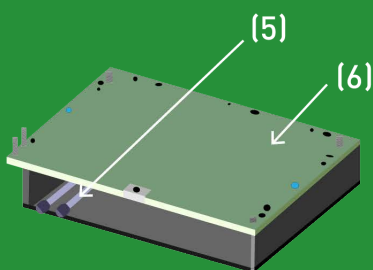
Plug & play

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- (3) Knurled-head screw
- (4) Pressure plate (ADP)

The fixtures represent a fully comprehensive system with which both flash programming and tests can be carried out. This allows customers to save valuable time and therefore costs.



- (5) Stacking screw (in park position)
- (6) Probe plate unit (KTE)

Structure of a ProMik Fixture

# Testing without Test pads

Applications are becoming increasingly smaller, and likewise the PCBs installed in them - the consequence: less and less space for test points. For this reason, conventional test methods are being replaced by new ones. Modern methods can comprehensively test even the smallest assemblies - and with a minimum number of test points.

The beginnings of this are represented by the Boundary Scan test method, which was specified in 1990 with the IEEE Std 1149.1 standard. ProMik revolutionises the electronics industry one step further with an innovative Boundary Scan alternative: SMART ICT.

In contrast to ICTs, SMART ICT or Boundary Scan do not measure the exact quantities. The focus is on testing functionality and finding errors.

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# Boundary Scan

Boundary Scan is also known under the IEEE Std 1149.1 standard. The procedure can test both analogue and digital devices, provided the Boundary Scan logic is present. The test procedure uses the JTAG interface of the microcontroller to send commands for switching the pins. If the debug interface is contacted via plug-in connections during development, fewer test points are required.

Since there are no longer any conventional plug connections in series production, the interface must be contacted via test points in this case.



## Disadvantages

Time for sending the commands for the switching of the pins and the subsequent reading out is required.



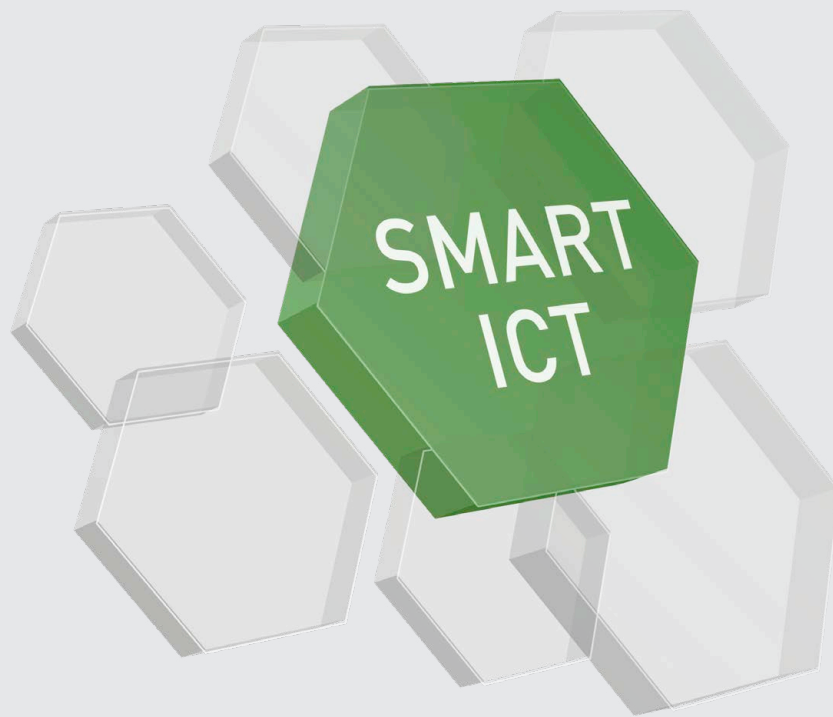
Boundary Scan can only be run on applications that contain the Boundary Scan logic, which is a limited number of devices.



# SMART ICT

Based on ProMik's proven bootloader technology, SMART ICT enables new ways to maximise productivity in manufacturing. The test innovation uses the functions of the circuit to enable tests to be carried out via MCU functionalities.

A major advantage is that SMART ICT is executed at the same time as the initial flash programming.



To load the test software onto the application, SMART ICT also uses the debug interface of the MCU, although any interfaces are supported (JTAG, SPI, I2C etc.).

In addition, the component does not need to have any boundary scan logic.

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## Advantages



Due to the parallelism of test and flash programming, cycle times are maintained and additional equipment is saved.



Function tests can also be carried out with the same hardware.



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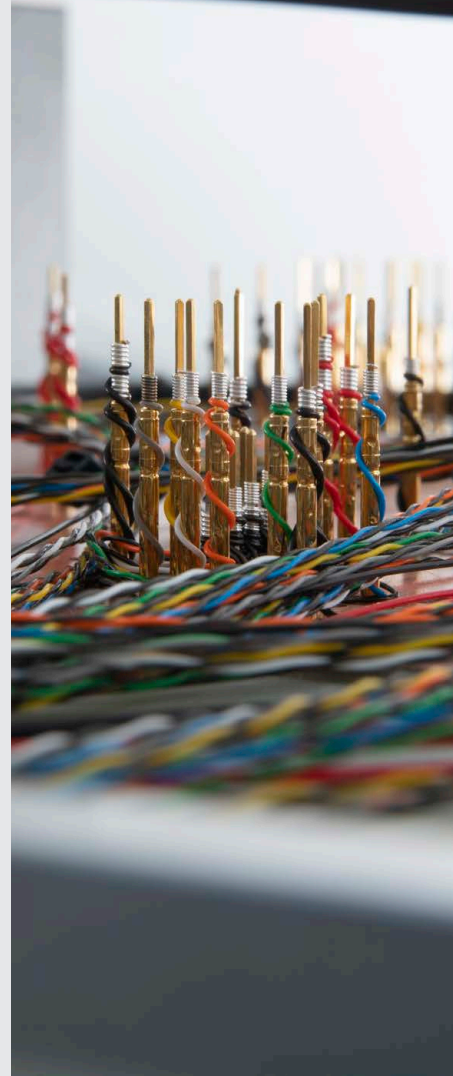
ProMik has been convincing as a system supplier for flash and test solutions in microelectronics for over 25 years. Especially with regard to customer-specific and complex projects, the company is the ideal partner.

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In the field of testing, ProMik offers a wide range of tools to solve any task: From high-quality fixtures to the test innovation SMART ICT, the customer is given complete flexibility for the implementation in production.

Solutions are tested through reliable failure analysis. The system supplier's products also give customers the advantage of space and cost savings as well as the elimination of additional equipment for test procedures.

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## Use Case: SMART ICT – Validation of the interface communication

Among other things, SMART ICT is ideal for testing the communication of interfaces on the application.

During the initial flash programming, the test software is loaded into the MCU of the device under test. Subsequently, the functionality of the circuit allows various test functions to be executed directly via the MCU.

### The difference in production

- Maximum test coverage
- Increased production throughput
- Balanced cycle times

[↓ DATASHEET](#)

# Get to know more about Test Methods in the Electronics Manufacturing

