U9403A
Mini In-Circuit Test System

Introduction

The U9403A Keysight Mini In-Circuit Tester (ICT) is designed as a modular in-circuit test unit in a 5U, 19-inch rack mount form. It can flexibly complement the existing tests in your manufacturing line to increase your test coverage and failure diagnostics capabilities.



KEYSIGHT

Overview

The electronics world is blooming with millions of printed circuit board assemblies, each with its own functionalities. Keysight Mini ICT provides you with scalable, modularized in-circuit tests to fit different types of test requirements with device-level failure diagnostics capability. Not all kinds of boards can go through standard in-circuit test procedures. Some of them can only be tested with simple functional tests due to constraints such as board size, test access, cost of the board, production yield, etc. However, common defects such as opens, shorts, or component failures are harder to find when only a functional test is used. The Keysight Mini ICT provides device-level failure information using ICT test technologies such as enhanced vectorless tests, boundary scans, on-board programming, and general digital tests for ease of deployment for a flexible test strategy.

Benefits of In-Circuit Test

In-circuit test (ICT) technologies are invented to provide in-depth failure information to reduce repair efforts, such as repair time and the required engineer qualification levels. It typically requires bed-of-nails fixtures and on-board test pads to provide test access to the individual components. ICT has been a successful tool in helping all electronics boards achieve a fast ramp-up with high quality in the manufacturing environment.

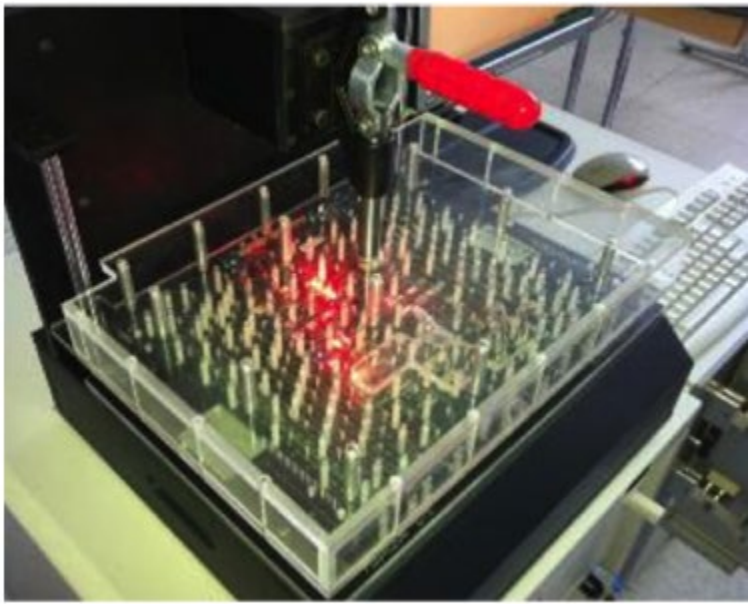


Figure 1. Functional test fixture with in-circuit test coverage

In-circuit test systems normally refer to floor-standing systems operated as a standalone, unique test process. Keysight Mini ICT packs the full power of an in-circuit tester into an instrument-sized box that can be easily and flexibly integrated into any existing test rack. The products tested on the test rack can immediately benefit from the ICT technologies to remove manufacturing defects early and quickly.

The basic in-circuit test features analog component tests, such as opens, shorts, resistors, capacitors, and inductor tests. The Keysight Mini ICT provides modern enhancements around familiar features, such as intelligent short learning, circuit analysis-based parallel component analysis, and user-friendly tools that show parallel and connecting devices. These help ensure that the basic in-circuit test is implemented easily and runs stably.

With Keysight's patented vectorless test suite, VTEP v2.0 Powered, tests such as functional tests will be boosted with significantly higher failure details and accurate results. With a simple sensor plate on top of the IC and connectors, the mini-ICT pumps a signal to your device and senses the signal back from those sensors. This is sufficient to tell if the solder joints are open. If boundary scan devices are available, VTEP v2.0 Powered test coverage can be extended to the connecting ICs and connectors without needing test probes or bed-of-nails fixtures.

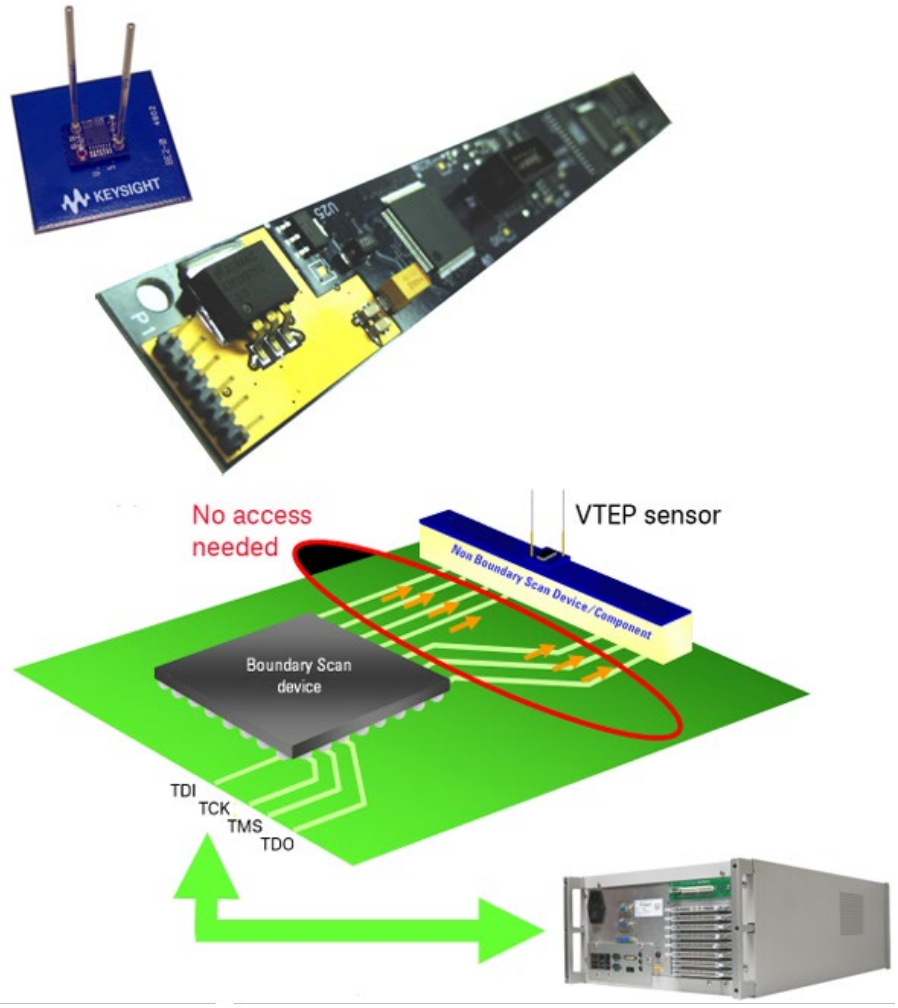


Figure 2. Keysight VTEP 2.0 powered technology

Mini But Strong

Furthermore, the Mini ICT supports true-powered digital tests with per-pin programmable digital drivers and receivers. With more than five times the back-driving capability compared to other platforms, the Mini ICT delivers the most stable digital tests. Digital channels from the Mini ICT are specially designed with signal-to-ground pairs that guarantee superior signal quality. The real-time driver monitoring mechanism removes the worries about damages from over-driving. Furthermore, the Mini ICT shares digital test libraries with the i3070 systems, enabling you to save time and effort by leveraging existing libraries that you may already have.

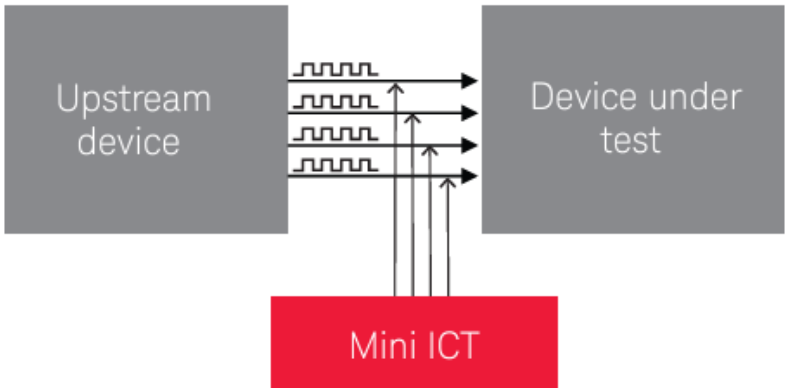


Figure 3. Back Driving when upper stream device cannot be disabled

For device programming capabilities, the Mini ICT provides Inter-Integrated Circuit (I 2C) and serial peripheral interface (SPI) serial programming capabilities as a standard offering, and it can be easily integrated with other external programming tools to expand the range of test coverage.

SCPI Command Support

Standard Commands for Programmable Instruments (SCPI) is a well-accepted industry standard for controlling instruments remotely. Keysight Mini ICT is an ICT-based instrument with SCPI command support to come with SCPI command support. This enables many integration opportunities for the Mini ICT to work with other instruments to complete the overall test required.

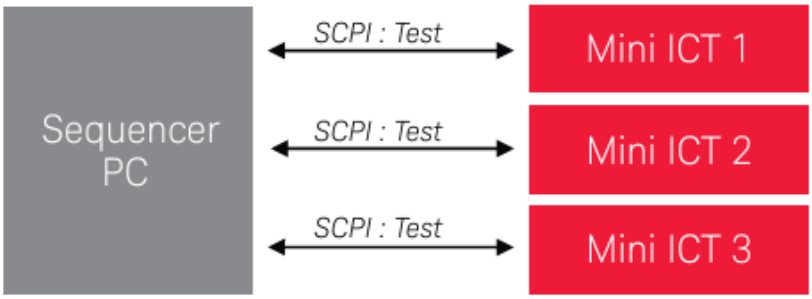


Figure 4. Controlling multiple Mini ICTs with SCPI at one time

Specifications

Keysight Mini ICT

Maximum node count	512
Maximum digital driver/receiver channels	256
SCPI command support	Yes
External power supply control	Yes
Keysight VTEP 2.0 powered	Yes
On board programming	Yes
Boundary scan	Yes, native with interconnect capabilities
Digital test library support	Keysight VCL/PCF
Analog component test	Resistors, capacitors, inductors, diodes, transistors/FET, and jumpers
Voltage measurement	Max 100 V
Frequency measurement	200 MHz, 12 sets with frequency MUX card

Digital test engine characteristics

Digital multiplexing	1:1; un-muxed
Per-pin programmable receiver	0 to 4.85 V
Per-pin programmable driver	0 to 5 V
Max sink current	Peak 500 mA
Max source current	Peak 500 mA
Pattern rate	Maximum 2 MPS
Programmable vector cycle	Programmable
Programmable vector cycle resolution	50 ns
Programmable receive delay	Programmable
Programmable receive delay resolution	10 ns
Dimensions	630 mm (L) x 482.7 mm (W) x 222.5 mm (H)

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KEYSIGHT

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