Electrical Structural Tester

A capacitive methodology to detect wire bonding defects in a molded IC in Microelectronics.

Introduction

Discover accuracy and reliability with the Keysight Electrical Structural Test solution, featuring advanced nano Vectorless Test Enhanced Performance (nVTEP) technology to detect subtle defects in wire-bonded packages. Elevate your wire bond testing standards to new heights, where precision meets innovation. Keysight EST supports up to 20 parallel test sites, making it ideal for integration into production-level testing processes and field return evaluations.

KEYSIGHT

Electrical Structural Tester Identifies A Wide Range of Wire Bond Defects with Higher Levels of Accuracy, Speed, and Technology.

Maximise throughput, minimize defects

The Keysight electrical structural tester represents an innovative advancement aimed at enhancing the detection of defects in integrated circuit (IC) wire bonds. This solution uses capacitive technology to identify a range of wire bond defects, including near-shorts, stray wires, wire sweep, wire sags, and more. It addresses challenges presented by Electrical Overstress (EOS) on chip integrity, assisting manufacturers in producing quality components, minimizing product returns, and ensuring the reliability and consistency of electronic products.

Optimized for production efficiency, the electrical structural tester supports up to twenty parallel test sites, making it ideal for integration into production-level testing processes and field return evaluations. This high level of parallelism enables the tester to achieve a unit per hour (UPH) rate of 72,000 ICs, significantly enhancing throughput in electronic package testing.

Comprehensive testing solution

The electrical structural tester is versatile in testing various package types, such as Quad Flat Package (QFP), Quad Flat No-lead (QFN), and wire-bonded Ball Grid Array (BGA), catering to a broad spectrum of applications. Its compatibility with both strip and singulated handlers and a built-in tester interface board offers a comprehensive solution. This solution demonstrates Keysight Technologies' commitment to maintaining high standards of electronic product quality and reliability, marking a notable advancement in the field of IC wire bond testing.

Keysight Electrical Structural Tester Summary

Full system capability

- Pin Resources: 2560 max
- Up to 20 Parallel Sites per System
- Communication: GPIB, LAN-Ethernet
- Built-in Tester Interface Board for Instrument core and DIB interconnect
- Equipment Interface Protocol: SECSGEM

Test methodology

- Opens and Shorts Test
- nVTEP

Yield improvement capability

- Retest Bin
- Marginal Retry Test (MaRT)
- Dynamic Part Averaging Test (DPAT)
- Realtime Part Averaging Test (RPAT)

Optional system accessories

- Diagnostic Interface Board
- Load board Stiffener
- Support Spare Kit

System Applications and Compatibility

- Tests IC in Form Factor: Singulated and Lead frame/Strip-based
- Testable Package Types: Single Die Wire Bonded Packages*
- Handler Compatibility: Strip and Singulated Handlers*

* For more information on the supported wire bond packages and handler vendors, please contact your local Keysight representative.

Configuration

Type	Typical Throughput (UPH)*	Includes
System Hardware with 4-sites	14,400	Electrical structural tester testhead, 2 VAM+ Cards, 4 nanoVTEPConditioner Cards
System Hardware with 8-sites	28,800	Electrical structural tester testhead, 4 VAM+ Cards, 8 nanoVTEPConditioner Cards
System Hardware with 16-sites	57,600	Electrical structural tester testhead, 8 VAM+ Cards, 16 nanoVTEPConditioner Cards
System Hardware with 20-sites	72,000	Electrical structural tester testhead, 10 VAM+ Cards, 20 nanoVTEPConditioner Cards

* The throughput refers to the capability of the test head alone (Test Time). This does not factor in the limitation and throughput of the integrated handlers (Handler Index Time).
* Throughput is based on 128 pins Single Die QFP.
* Throughput is calculated based on the UPH+ license. For more information on the applications & configuration, please contact your local Keysight representative.

System architecture

The electrical structural tester consists of a testhead and testhead controller. The system is designed with a modular, parallel architecture that provides flexibility for expansion and parallel test capability for optimum test speed. The system hardware architecture features:

- Up to 20 individually controllable pin cards (for up to 2560 pin resources or 20 test sites) and a variety of instrument cards for fast upgrades as test needs change
- Synchronous operation of instrument cards to test high-pin-count DUTs.
- Built-in testhead LAN for high-performance testhead-to-controller.

System Components

Testhead

The Testhead houses all the necessary instruments and cards, including the test interface. The pogo block is the main interface to the tester interface board and is located at the topmost of the test head. These pogo blocks are mounted on top of the card cage, which contains pin cards. For test measurement, the pin cards are connected to the VAM module and housed inside the PXIe chassis below the card cage.

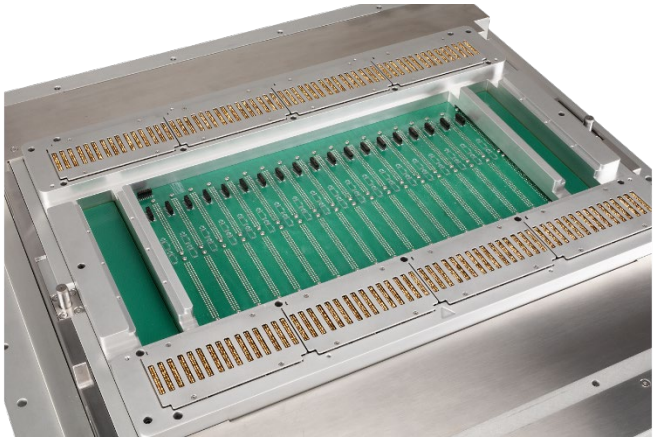

Figure 1. Keysight Electrical Structural Tester

VAM module

Feature and specification

- Two measurement channels on one VAM Module; thus, each channel can be tested concurrently.
- Each measurement channel can be paired with one or more Analog Pin Cards.
- Supports nVTEP test, Open/short test

Analog pin card

Feature and specifications

- 128 Analog Multiplexing
- Onboard DC source and detector for self-diagnostic
- Power supply: 12V and 5V input voltage

Unpowered Test Measurement Specifications

Opens and shorts test

Parameter	Specification
Programmable Threshold Range	
Short	2 - 1000 Ω
Open	2 - 1000 Ω
Programming Resolution	1.0 Ω
Programmable Settling Time	
Minimum	0 µs
Maximum	3.2768 s
Default	50 µs
Programming Resolution	50 µs
Test Voltage	0.1 V dc

nVTEP capacitive test

Parameter	Specification
Programmable Low Threshold	1 mV - 10,000 mV
Programmable High Threshold	1 mV - 10,000 mV
Programming Resolution	1 mV
Test Time (Typical) *	500 pins/second*
Source Voltage	250 mV
Test Frequency	8192 Hz

*Typical specifications are not warranted but are descriptions of performance determined by design or type testing.

Keysight Electrical Structural Tester Dimensions

	Dimension	
Electrical structural tester test engine	Width	700 mm (27.56 inches)
		780 mm (30.71 inches) with mounting bars
	Depth	840 mm (33.07 inches) main body
		915 mm (36.02 inches)
	Height	704.6 mm (27.76 inches)
		847.5 mm (33.39 inches) with castor wheels
	Weight	330 kg (727.52 lbs.)
Workstation	Width	650 mm (25.59 inches)
	Depth	290 mm (11.42 inches)
		646.5 mm (25.43 inches) with castor wheels
	Height	750 mm (29.53 inches)
		1460 mm with monitor (57.48 inches)
		1558 mm with castor wheels (61.46 inches)
	Weight	Approx. 80 kg (176.37 lbs.)

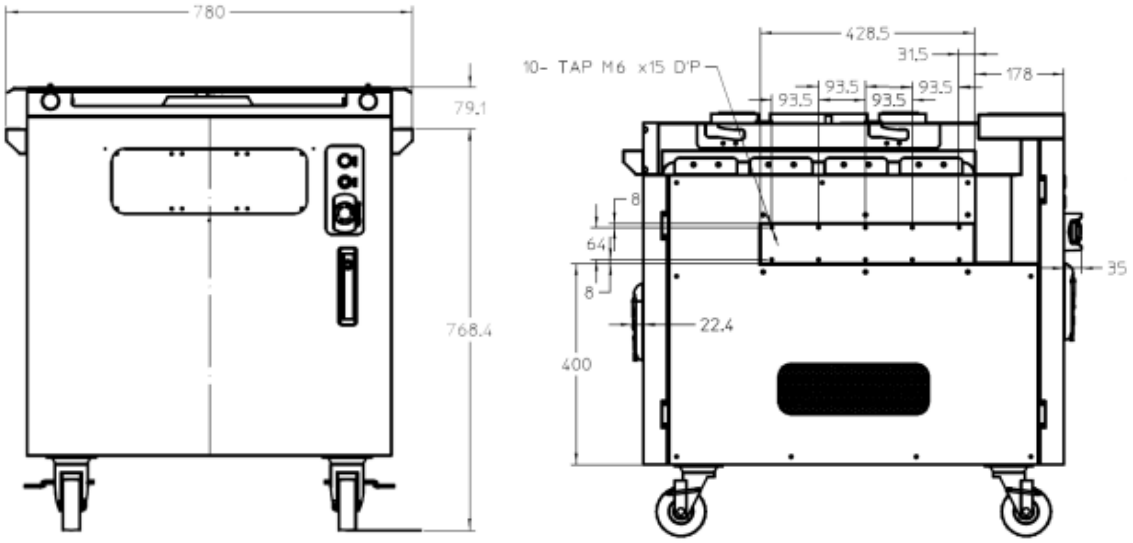

Figure 2. Electrical structural tester test engine dimension

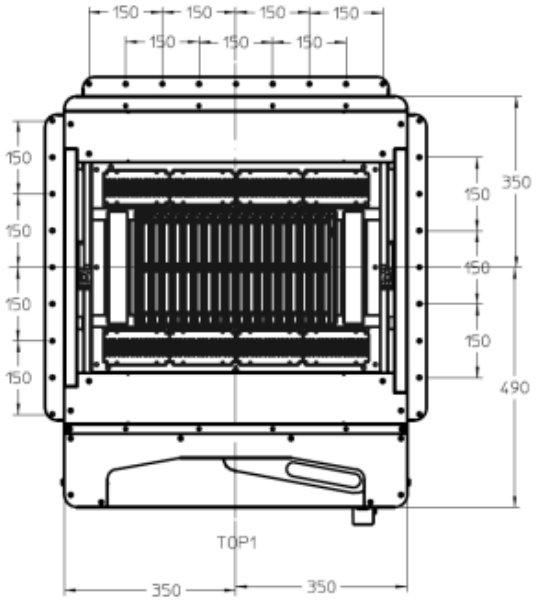

Figure 3. Electrical structural tester test engine dimension

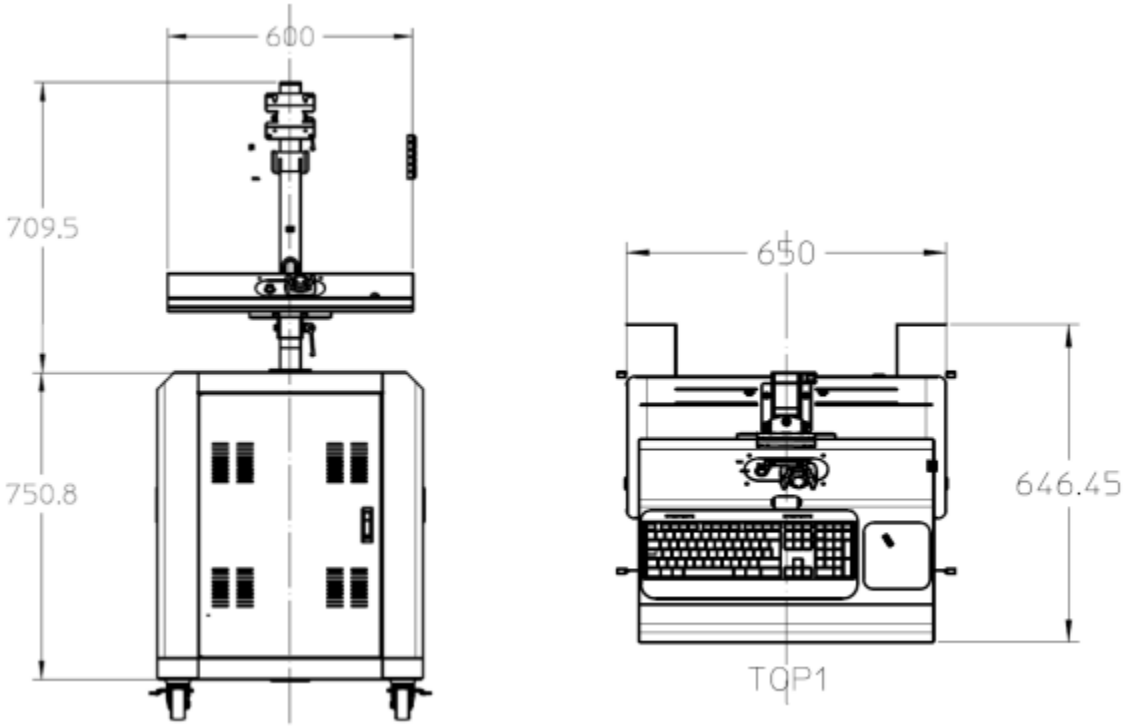

Figure 4. Electrical structural tester test engine dimension

For more information

Read this white paper wire bond structural test methodologies to learn how the Keysight's Electrical Structural Test solution can revolutionize your wire bond inspection process.

For more information about Electrical Structural Tester, go to www.keysight.com/find/EST