

i7090 Massively Parallel Board Test System



Introduction

The Keysight i7090 Board Test System is designed to test today's highly-panelized PCB in the fastest time and at the lowest cost per unit tested. With up to 20 parallel test cores, and 160 simultaneous flashing channels, the Keysight i7090 offers a custom to fit for your exact requirements. The systems can be expanded in both hardware and software capabilities to meet your future growth needs.

Keysight i7090 systems provide capacity for up to 2560 ICT test pins and a full 18-slot PXIe instrument chassis in an affordable testhead design. Module cards containing the tester hardware resources, DUT power supplies, and the system controller are all located in the 600mm testhead, minimizing floor space.

Keysight i7090 System Summary

Full System Node Capability

- 20 x 128-pin Parallel ICT Cores for Highest-Speed Panel Test user configured core combinations up to a single 2560 pin core

Full System Opens Test Capability

- NanoVTEP Vectorless Test EP
- Opens test for ICs, connectors, switches, fuses

Full System Analog Capability

- 2560 analog nodes
- Shorts test programmable threshold: 2-1000 Ω
- Resistance
- Capacitance
- Inductance
- Diode, transistor, FET, fuse, jumper, switch, potentiometer measurements
- NanoVTEP Vectorless test open detection

Controller

- PC Running Windows 10 64-bit (Professional Edition)

Optional System Accessories

- Laser bar code reader
- Programmable DUT power supply
- High-current and high-voltage power supplies
- Polarity Check Technology

- In-System Programming
 - Flash ISP
 - Microcontrollers
 - PLD ISP
- Pin Verification Fixture

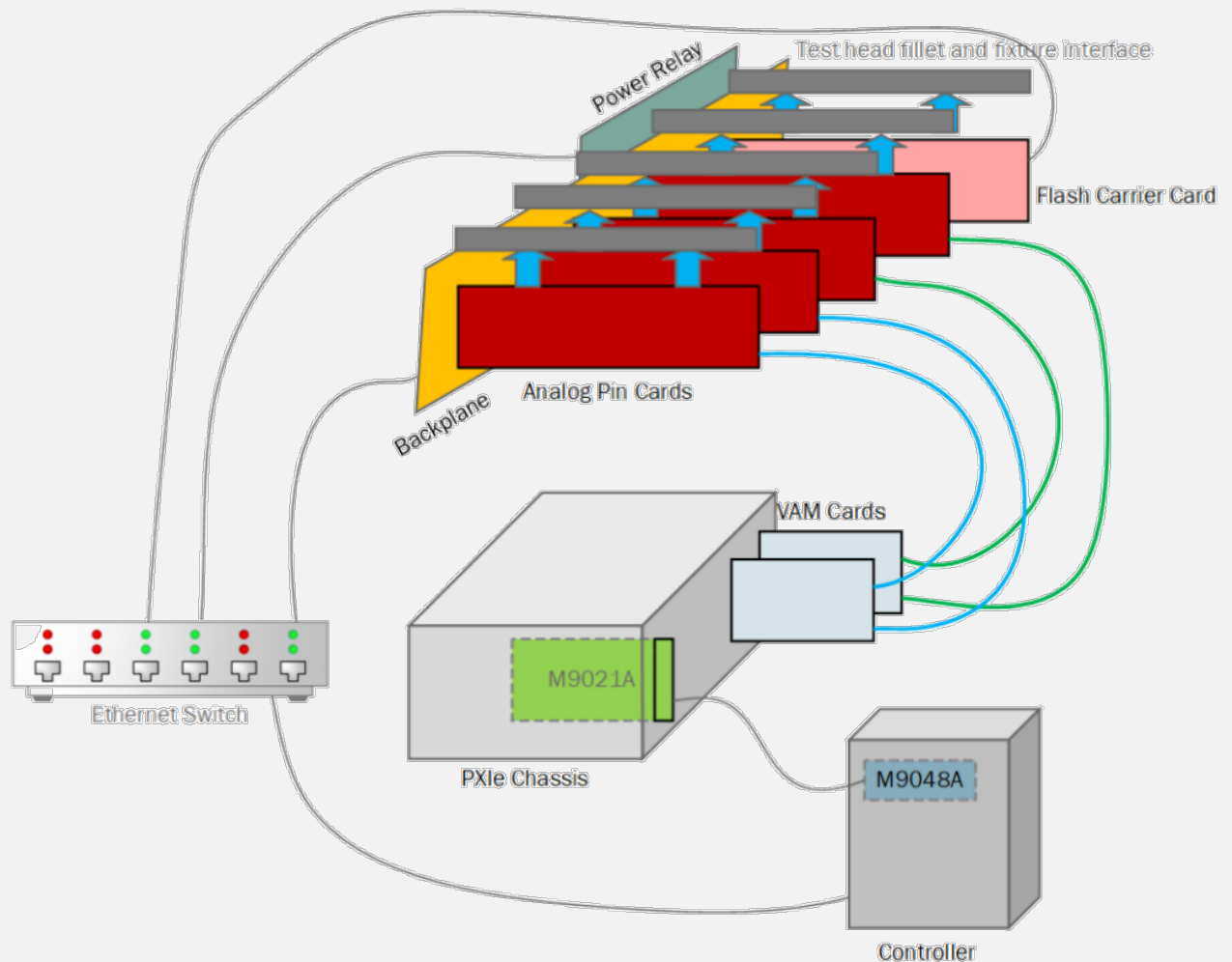
System Architecture

i7090 system architecture provides:

- Tester resources located directly behind the fixture interface for optimum performance
- A small system footprint, 600 mm in width, saves space and cycle time.
- High to ultra high-volume manufacturing reduces system investment and supports production test times as needed.
- Unpowered and vectorless test extended performance (Nano VTEP) technologies for rapid test throughput and high fault coverage.
- Instrument integration with Keysight OpenTAP software, within the same platform, for efficient functional test measurements and PXI support for Keysight and 3rd party instruments.
- Programming function integration provides in-system programming with 160 channels in parallel, increasing system throughput.
- Build on CFX/Hermes and Keysight Pathwave to target Industry 4.0

This board test system consists of a testhead, testhead controller, and a board handler. 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 nodes or 20 cores) and a variety of module cards for fast upgrades as test needs change
- Combine cores to test high-pin-count boards
- Run cores in parallel to test up to 20 PCBs simultaneously
- Built-in testhead LAN for high-performance testhead-to-controller communication



System Components

A. VAM (Vectorless Analog Measurement) Card

Feature and Specification

- Two independent ICT measurement modules reside on a single VAM card, and execute ICT tests concurrently
- AC source up to 200 kHz at +/- 2.4 V
- Detector
 - Always four wire measurement
 - Duel channels A and B bus run in parallel

- Voltage measurement (-9 V ~ 11 V)
- Auxiliary DC source output voltage up to ± 7.2 V
- Supports Nano VTEP test, Diode test, MOSFET test, Open/short test, Pin test and Voltage measurement
- Two Analog Pin Card control
- Active discharge circuit with constant current
 - Discharge current 0.125 A.
 - Max voltage to be discharged ± 25 V.
- On board Temperature Sensor

B. Analog Pin Card

Feature and Specification

- 128 pins with 6-wires measurement support
- Power supply: 12 V and 5 V input voltage

C. Flashing Carrier Card

Feature and Specification

- Each Flashing Carrier Card can dock maximum 2 programming modules
- Each SMH module can host up to 8 programming channels
- Built-in flashing relay isolation module ensures proper hardware isolation during ICT
- Maximum power supply: 12 V/5 A X 2
- On-board serial number storage for easy tracking

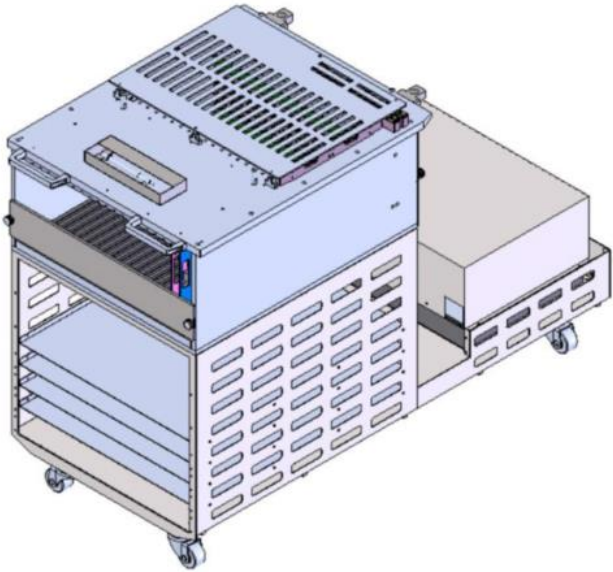
D. Backplane

Feature and Specification

- 20 card slots for massively parallel analog test
- On-board temperature sensor for dynamic monitoring
- Auto card type detection and fixed slot address assignment
- Serial number storage for easy product tracking

E. Instrument Rack

Instrument rack houses all the instruments and cards needed, including DUT power supply and test interface. Testhead fillet is the main interface to the test fixture and is located at the topmost of the instrument rack. These fillets are mounted on the card cage which contains card (pin cards, programming cards, etc). For normal ICT unpowered measurement, the pin cards are connected to the VAM card which is housed inside PXIe chassis below the card cage.



Unpowered Test Measurement Specifications

Shorts and Opens

- Source Impedance: 100 Ω

Parameter	Specification
Programmable Threshold Range	
Short	2 - 1000 Ω
Open	2 - 1000 Ω
Programming Resolution	1.0 Ω
Accuracy	$\pm (0.25\% + 2.2 \Omega)$
Programmable Settling Time	
Minimum	0 μs
Maximum	3.2768 s
Default	50 μs
Programming Resolution	50 μs
Test Voltage	0.1 V dc

Resistor

- Source Voltage: 0.1 Vdc

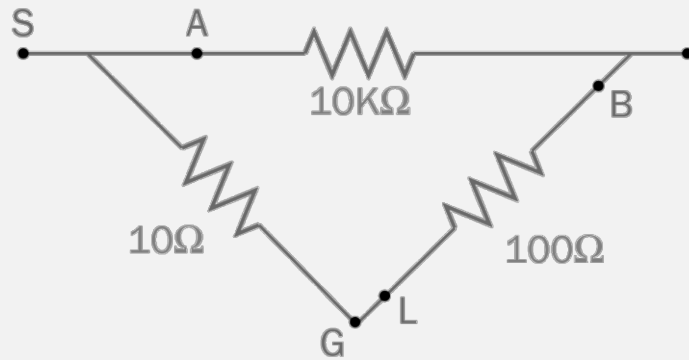
Range	Measurement type	Accuracy
1 – 300 Ω	4-wire (Using: ED option)	± 1.0%
300 Ω - 10 kΩ	4-wire (Using: ED option)	± 0.25%
	2-wire	± 1.0% ¹
10 - 100 kΩ	2-wire (Using: ED option)	± 0.25%
	2-wire	± 1.0%
100 kΩ -1 MΩ	2-wire (Using: ED option)	± 0.5%
	2-wire	± 2.5%
1.0 MΩ -10 MΩ	2-wire (Using: ED option)	± 5.0%

1. Plus system residual ≤ 3.5 Ω.

High Guard Ratio Tests

- Source Voltage: 1.0 Vdc
- Guard Ratio: 1000 to 1 on SG and 100 to 1 on IG of guard circuit

Value	Measurement type	Accuracy
10 kΩ	6-wire (Using: ED options)	± 5%



Capacitor

- Source Voltage: 0.1 Vac
- Dissipation Factor : ≤ 1.0

Range	Measurement type	Accuracy
10 pF - 0.5 μF	2-wire (using ED option)	± 2.0% ¹
0.5 μF - 150 μF	4-wire (using ED option)	± 2.0%

1. Plus system residual: ± 4.0 pF with capacitor compensation, 0 to +40 pF typical without capacitor compensation.

Inductor

- Source Voltage: 0.1 Vac
- Quality Factor: ≥ 1.0

Range	Measurement type	Accuracy
20 μ H - 50 mH	4 -wire	$\pm 2.0\%$ ¹
50 mH - 1.59 H	2-wire	$\pm 2.0\%$
1.59 H - 10 H	2-wire (Using ED option)	$\pm 2.0\%$
10 H- 100 H	4-wire (Using ED option)	$\pm 3.0\%$

1. Plus system residual: 1 μ H.

Diode

The diode test supplies a source with 100 ohm resistor in serial on the diode under test and measures the forward voltage drop. The test is appropriate for standard, Schottky, light emitting and can detect open, shorted, or backwards diodes.

- Source: 0 - 2.5 V
- Resistor: 100 ohm

Bipolar Transistor

- Two diode tests, one is between B and E, the other is between B and C.
- Transistor ON/OFF test

Depletion and Enhancement mode FETs

- Main Source: 0 - ± 2.4 V in serial Resistor 100 ohm applied on Drain-Source
- Auxiliary source: 0 - ± 7.2 V applied on Gate-Source
- Measure the Drain-Source voltage to verify the switch function

Nano VTEP

Parameter	Specification
Programmable Low Threshold	1 fF - 1000 pF
Programmable High Threshold	1 fF - 1000 pF
Programming Resolution	1 fF
Test Speed (typical)	500 pins/second

Polarity Check

Parameter	Specification ¹
Test Range (total parallel capacitance)	Up to 2,000 μ F
Test Range (stand-alone capacitance)	Up to 4,000 μ F
Test Speed (typical)	10-15 capacitors per second

1. Range varies with types of packaging used for capacitors.

Powered Test Measurement Specifications

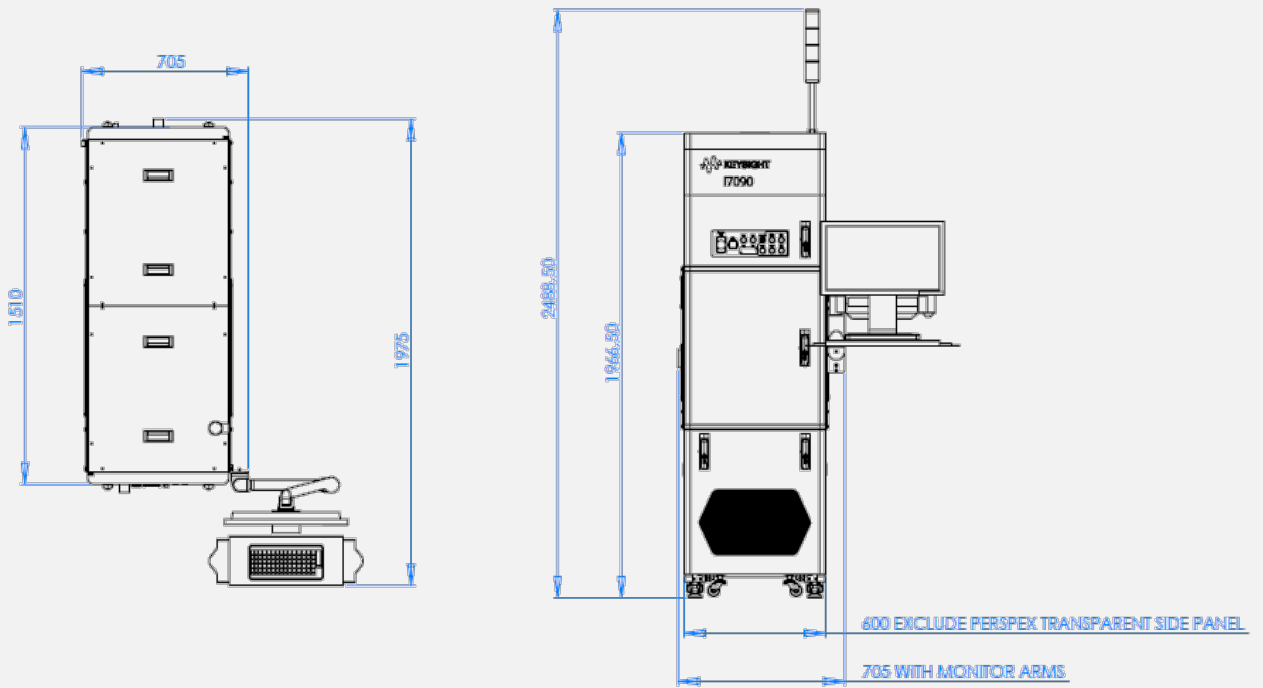
Voltage measurement

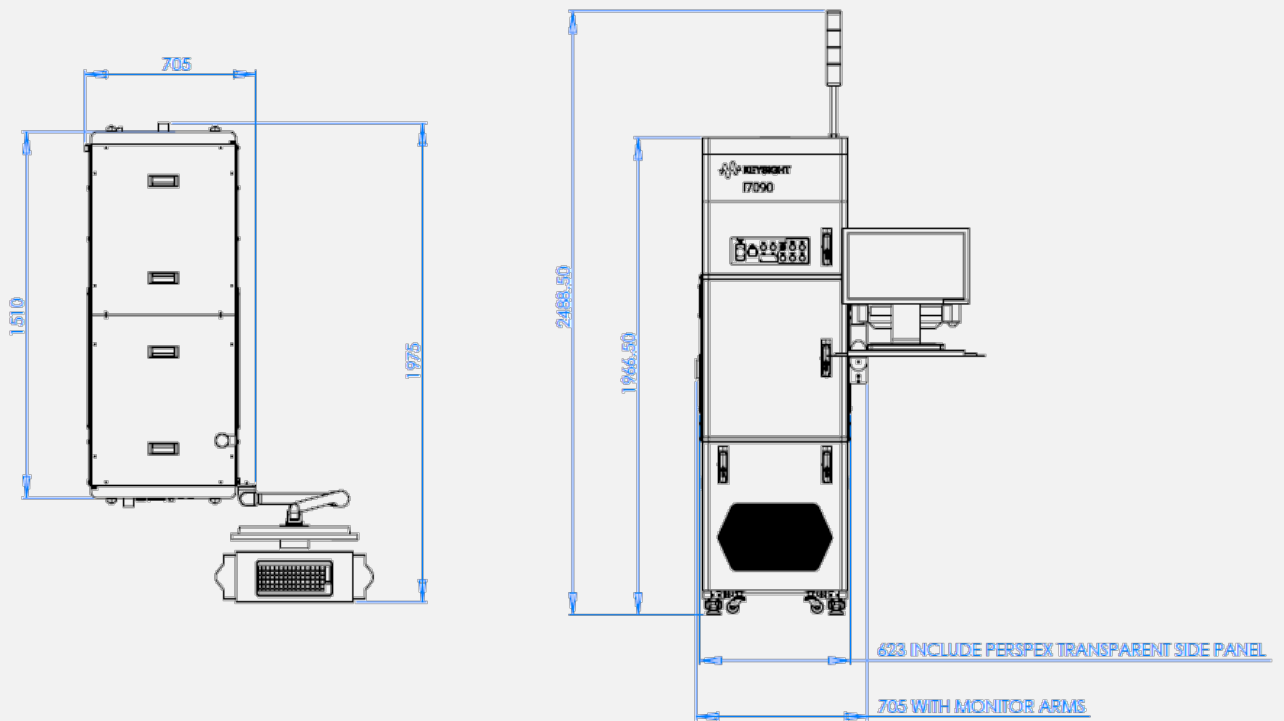
- DC measurement: Range from -9 V to +11 V

Automated Inline handler Specifications

Parameter	Units	Specification
Dimensions (excluding Transparent Side Panel))	mm	1510 mm (L) x 600 mm (W) x 1966 mm (H)
	inches	59 (L) x 24 (W) x 78 (H)
Dimensions (including Transparent Side Panel)	mm	1510 mm (L) x 623 mm (W) x 1966 mm (H)
	inches	59 (L) x 25 (W) x 78 (H)
System Weight	kg	Without Crate: 1150
		With Crate: 1550
Number of test pins		Up to 2560
PCB size	mm	430 (L) x 460 (D) (max)
		50 (L) x 50 (D) (min)
	inches	16.9 (L) x 18.1 (D) (max)
		2 (L) x 2 (D) (min)
PCB thickness (maximum)	mm	3
PCB weight (maximum)	kg	3
PCB edge support (minimum)	mm	3
PCB exchange time	sec	4.5
Fixture type		Long wire
Fixture actuation		Press down
Transport method and direction		Belt transfer, L to R, R to L, L to L, R to R (Configurable)
Transport speed	mm/sec	500
	in/sec	19.7
Transport height	mm	940 to 965 mm
Bottom fixture height	mm	90
Press force	kN	5

Air pressure	psi	72.5 to 145 psi.
		The system will generate alarm if the air pressure is below 72.5 psi (5 bar)
Power		3-phase, DELTA; supports 200-240 VAC
		3-phase, WYE; supports 208-220 VAC
		3-phase, WYE with neutral; supports 220/380
		240/415 VAC (Line-to-neutral/Line-to-line)





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