

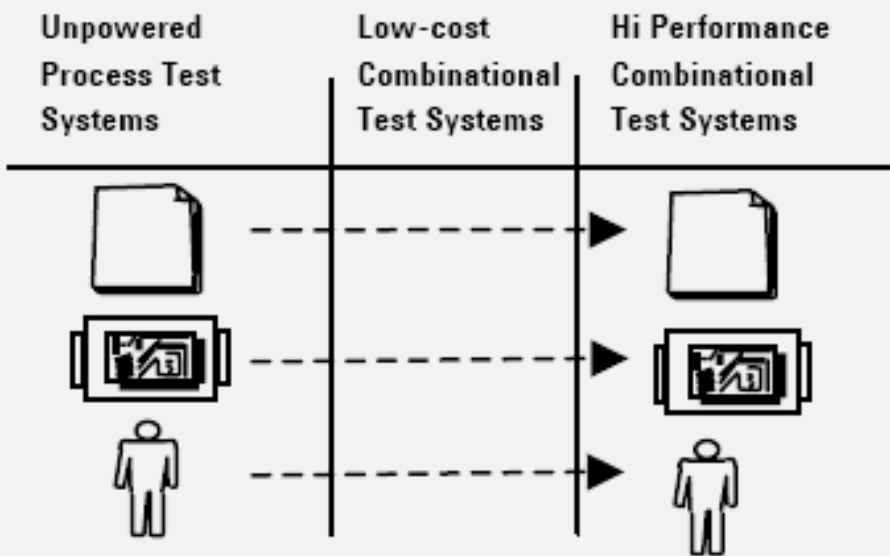
# i7090 Massively Parallel Board Test System



## Introduction

The Keysight i7090 Board Test System is the most efficient and most flexible family of board test systems available on the market today. Designed to handle a 20 cores parallel test strategies, technologies, PCBs, and budgets, the Keysight i7090 offers a specific test system to fit 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 nodes in an affordable testhead design. Module cards containing the tester hardware resources, DUT power supplies, and the system controller are all located in the testhead, minimizing floor space. This system is capable to test up to 20 DUT in parallel.



## Keysight i7090 System Summary

### Full System Node Capability

- Maximum of 2560 nodes

### Full System Opens Test Capability

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

### Full System Analog Capability

- 2560 analog nodes
- Shorts test programmable threshold: 2-1000  $\Omega$

- Resistance measurements: 1  $\Omega$  to 10 M $\Omega$
- Capacitance measurements: 10 pF to 150  $\mu$ F
- Inductance measurements: 20  $\mu$ H to 100 H
- Diode, transistor, FET, fuse, jumper, switch, potentiometer measurements

#### Controller

- PC Running Windows 10 64-bit

#### 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

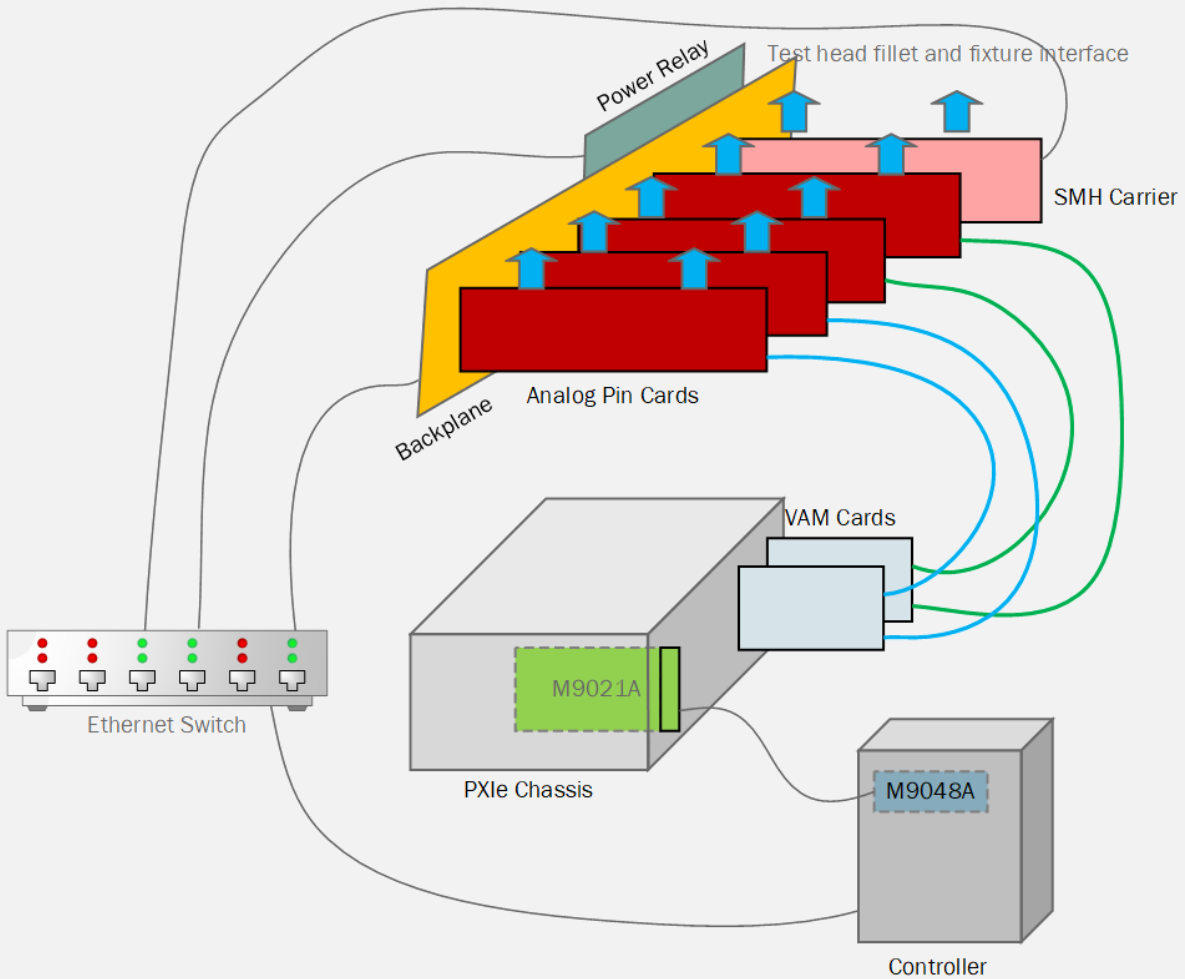
## System Architecture

i7090 system architecture provides:

- Tester resources located directly behind the fixture interface for optimum performance
- Long-wire fixture technology to deliver the tester specifications to the device under test (DUT) with superior test repeatability and transportability
- Short-wire fixture technology to deliver the tester specifications to the device under test (DUT) with superior test repeatability and transportability
- Controller and external equipment interfaces built on standards for seamless integration on the manufacturing floor

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:

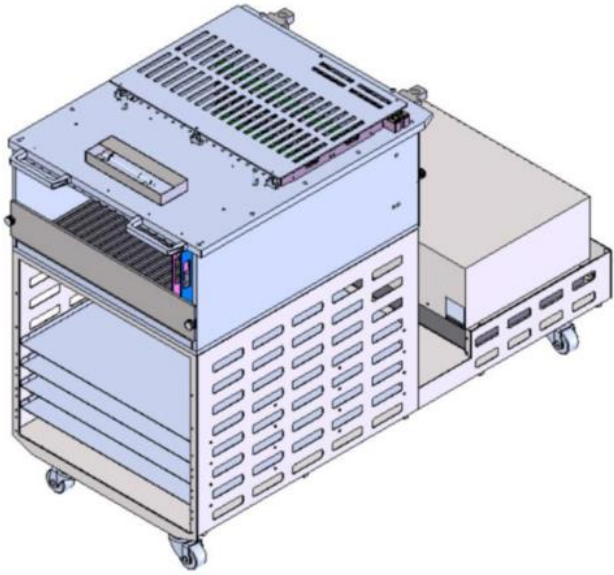
- Up to 20 individually controllable pin cards (for up to 2560 nodes or 20 cores) and a variety of module cards for fast upgrades as test needs change
- Synchronous operation of modules to test high-pin-count boards
- Asynchronous operation of modules for parallel testing of multiple boards on the same system, up to 20 parallel tests
- Built-in testhead LAN for high-performance testhead-to-controller communication



## System Components

### A. 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 VAM module which is housed inside PXIe chassis below the card cage.



## B. VAM Module

### Feature and Specification

- Two ICT measurement modules on one card. Two modules are able to run ICT concurrently.
- RCL analog measurement feature
- The module is made of
  - New measurement unit
    - With 20 MHz Bandwidth
  - Source
    - Up to 200 KHz
    - Source output voltage up to  $\pm 2.4$  V
  - Detector
    - Always four wire measurement
    - Detector AB and Detector IO run in parallel
- 16:1 active attenuator for voltage measurement (-9 V ~ 11 V)
- Auxiliary source output voltage up to  $\pm 7.2$  V
- Support Nano VTEP test, Diode test, MOSFET test, Open/short test, Pin test and Voltage measurement
- Two channel Nano VTEP function with 6 V/0.5 A supply for VTEP Mux card
- Two Analog Pin Card control
- Active discharge circuit with constant current
  - Discharge current 0.125 A.
  - Max voltage to be discharged  $\pm 25$  V.
- On board Temperature Sensor

## C. Analog Pin Card

### Feature and Specification

- 1 SIGLAB bus to 128 channel MUX
- On board DC source and detector for self-diagnostic
- Power supply: 12 V and 5 V input voltage
- On-board MCU for additional computing/control capability

## D. SMH Programming Card

### Feature and Specification

- Each SMH card can dock maximum 2 SMH FlashRunner 2.0 programming modules
- Each SMH module can host up to 8 programming channels
- All programming channels are connected to DUT through relays for signals isolation
- Maximum power supply: 12 V/5 A X 2
- On-board serial number storage for easy tracking

## E. Backplane

### Feature and Specification

- 20 daughter card slots to increase test resource for massive parallel analog test
- On-board MPU with Ethernet and RS485 for flexible communication and control
- On-board temperature sensor for dynamic monitoring
- High input power rating up to 12 V X 120 A and 5 V X 60 A for distribution to each slot
- Auto daughter card type detection and fixed slot address assignment
- Serial number storage for easy product tracking

## Unpowered Test Measurement Specifications

### Shorts and Opens

- Source Impedance: 100  $\Omega$

Parameter	Specification
<b>Programmable Threshold Range</b>	
Short	2 - 1000 $\Omega$
Open	2 - 1000 $\Omega$
Programming Resolution	1.0 $\Omega$
Accuracy	$\pm (0.25\% + 2.2 \Omega)$
<b>Programmable Settling Time</b>	
Minimum	0 $\mu\text{s}$
Maximum	3.2768 s
Default	50 $\mu\text{s}$
Programming Resolution	50 $\mu\text{s}$
Test Voltage	0.1 V dc

### Resistor

- Source Voltage: 0.1 Vdc

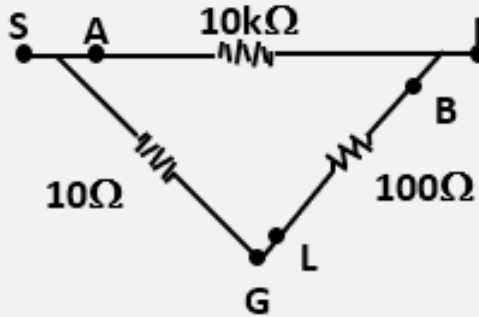
Range	Measurement type	Accuracy
1 – 300 $\Omega$	4-wire (Using: ED option)	$\pm 1.0\%$
300 $\Omega$ - 10 k $\Omega$	4-wire (Using: ED option)	$\pm 0.25\%$
	2-wire	$\pm 1.0\%$ <sup>1</sup>
10 - 100 k $\Omega$	2-wire (Using: ED option)	$\pm 0.25\%$
	2-wire	$\pm 1.0\%$
100 k $\Omega$ -1 M $\Omega$	2-wire (Using: ED option)	$\pm 0.5\%$
	2-wire	$\pm 2.5\%$
1.0 M $\Omega$ -10 M $\Omega$	2-wire (Using: ED option)	$\pm 5.0\%$

1. Plus system residual  $\leq 3.5 \Omega$ .

## 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% <sup>1</sup>
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 μH - 50 mH	4 -wire	± 2.0% <sup>1</sup>
50 mH - 1.59 H	2-wire	± 2.0%
1.59 H - 10 H	2-wire (Using ED option)	± 2.0%
10 H- 100 H	4-wire (Using ED option)	± 3.0%

1. Plus system residual: 1 μH.



## 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, or zener diodes, 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 -  $\pm 2.4$  V in serial Resistor 100 ohm applied on Drain-Source
- Auxiliary source: 0 -  $\pm 7.2$  V applied on Gate-Source
- Measure the Drain-Source voltage to verify the switch function

## TestJet and Nano VTEP

- Source Voltage: 200 mV
- Test Frequency: 8192 Hz

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

- Source Voltage: 200 mV

Parameter	Specification <sup>1</sup>
Test Range (total parallel capacitance)	Up to 2,000 $\mu$ F
Test Range (stand-alone capacitance)	Up to 4,000 $\mu$ 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

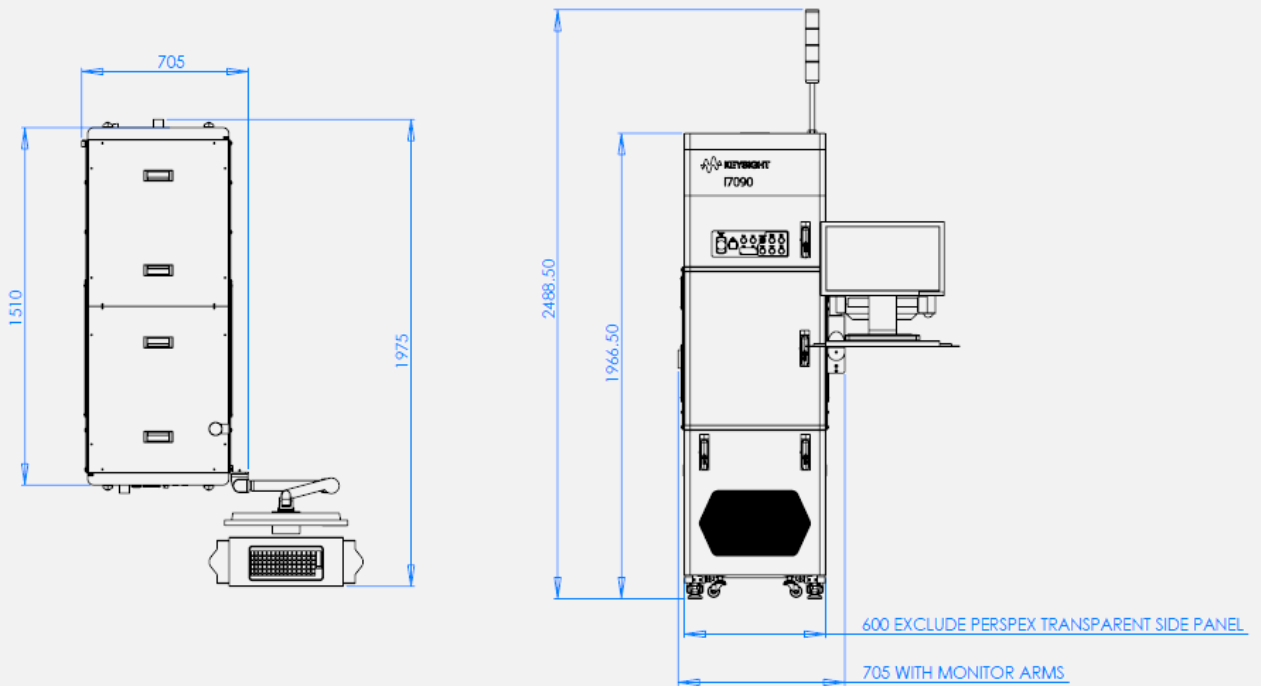
- DC measurement: Range from -9 V to +11 V

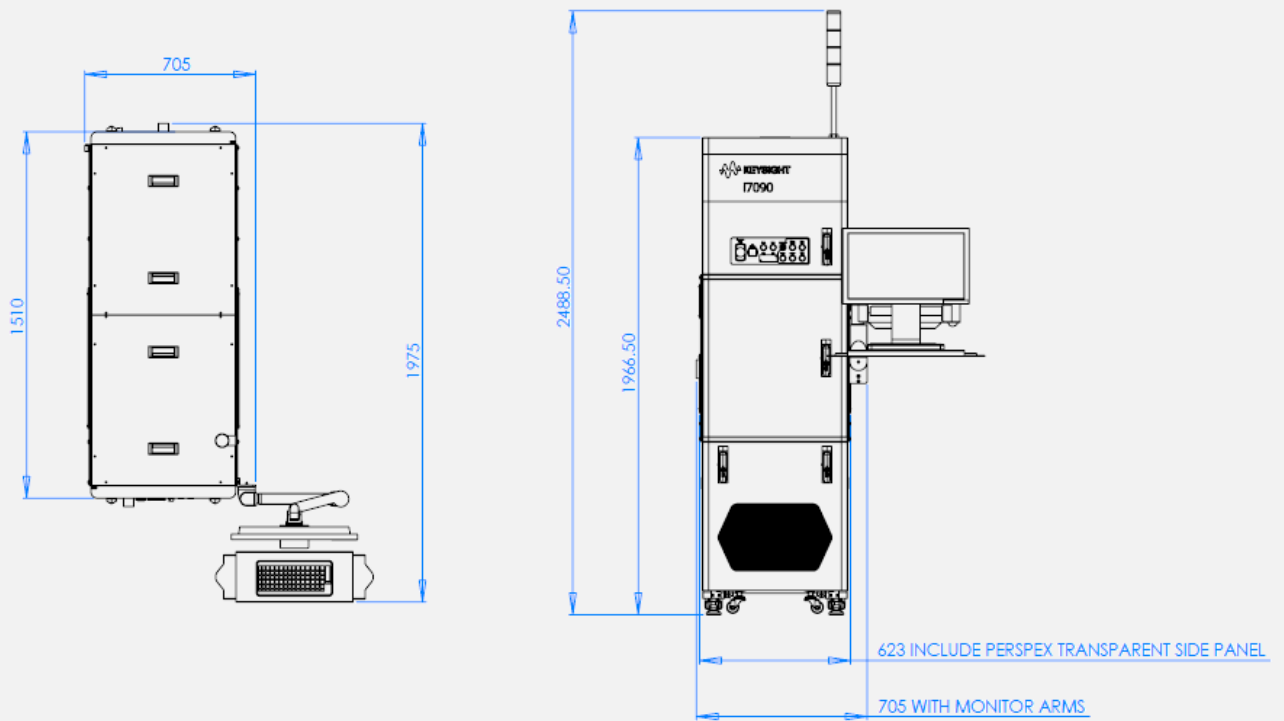
## Automated Inline handler Specifications

Parameter	Specification
Very fast PCBA exchange time	
600 mm width frame with standard 19" rack configuration	
System dimension	W600 x D1480 x H1980 (w/o tower light)
Max. Test points	128 x 20 = 2560
Max. UUT dimension	430 mm x 460 mm
Min. UUT dimension	50 mm x 50 mm
Fixture type	Long-wire
Industry 4.0 ready	IPC-CFX, Hermes, PMA
SMEMA compliant	Yes
Secondary conveyor	Yes (bypass) – optional
Dual Board stopper	Yes -- optional
Dynamic core configuration	

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 nodes		Up to 2560
PCB size	mm	430 x 460 (max)
		50 x 50 (min)
	inches	16.9 x 18.1 (max)
		2 x 2 (min)
PCB thickness	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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