



KEYSIGHT
WORLD 2019

Factors to Consider for Inline ICT Automation

Keysight Technologies

Quek Keng Kiang



Consistent Market Leader

The Trusted Partner in Test

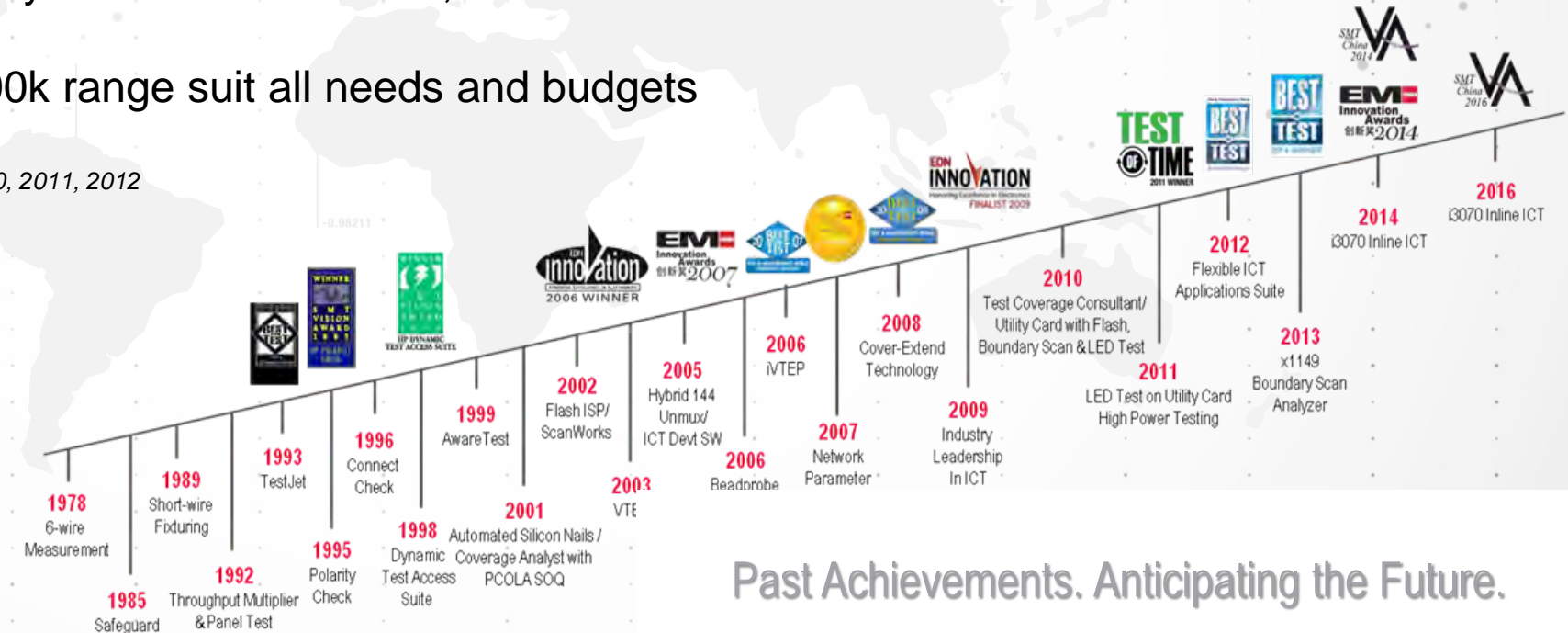
#1 in Market Share*

Over 6000 Systems deployed Globally

Preferred Supplier For many of the Global OEMs, CEMs and ODMs

Products in the \$75k - \$500k range suit all needs and budgets

* Market Leader as per Prime Research in 2010, 2011, 2012



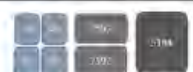











Past Achievements. Anticipating the Future.

Full Options for Inline ICT Applications



Customization proposal

	i3070 S5i	i3070 S5i Lean	i3070 S5i 4Mod		i1000SPF offline	i1000SPF inline	i1000SPF inline 4Core	i1000 inline 8Core
Max Node Counts	2592	2592	5184		1664	1664	2560	5120(option)
Parallel Testing	2 Cores	2 Cores	4 Cores		1 core	1 core	4 cores	8 cores
	2x1296	2x1296	4x1296, 2x2592				2x1024, 4x512	8x512
								
DUT size(mm)	350x350	410x380*	711x609		430x300	430x300	430x300	620x508
DUT Weight	3Kg	3Kg	15Kg		3Kg	3Kg	3Kg	6Kg
Infeed buffer	YES	-	-		No	No	No	No
Dual Lanes	No	YES	No		No	No	No	No
Foot Print(mm)	1206x900x1860	800x1400x1900	1800x1350x1930		850x900x1900	850x900x1900	850x900x1900	1200x1400x1900
Pressing force	10KN	10KN	20KN		7KN	7KN	7KN	15KN
Fixture ID	200x	200x	200x		-	-	-	-
Direction	Left-in Right-out	Left-in Right-out	Left-in Right-out		upgrade	Left-in Right-out	Left-in Right-out	Left-in Right-out
	Right-in Left-out	Right-in Left-out	Right-in Left-out			Right-in Left-out	Right-in Left-out	Right-in Left-out
	(factory set)	(user set)	(user set)			(user set)	(user set)	(user set)
Flow and Position						fixture compatible		

i3070 Series 5i

- Standard 2-Module Inline System

Robust. Advanced. Reliable

- 2-Module configuration, 2592 nodes
- Programmable press height delivering up to 10KN force
- Identical features and performance w.r.t. i3070 Series 5
- Shares i3070 Series 5 hardware, interchangeable
- Supports dual stage testing
- Advanced automation and safety options available



i3070 Series 5i

- Lean 2-Module Inline System

Lean. Flexible. Automated.

- Full fixture compatibility with the standard i3070 Inline system
- 0.8m by 1.4m footprint to ease production floor planning
- Changeable conveyor flow directions, easy to integrate into different SMT line layouts
- Built-in bypass conveyor, allows board to move to downstream equipment without delay
- Test larger board up to 410 mm x 380 mm



Lean Foot Print

Save space and better mobility



Standard Inline ICT

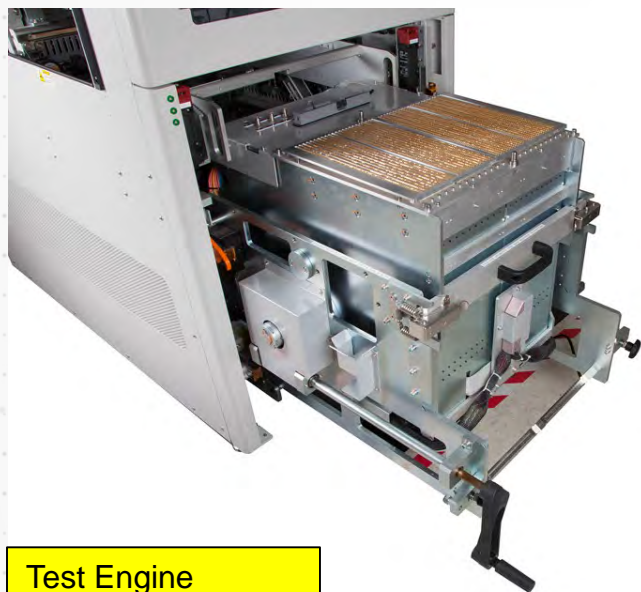
33% smaller



Lean Inline ICT

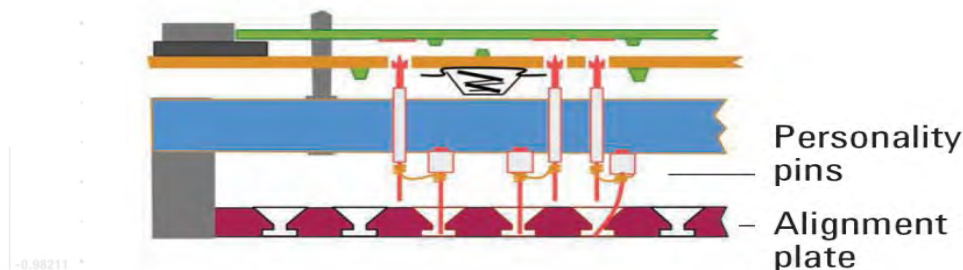
System Overview

Test Engine



1. Industry-leading ICT measurement electronics
2. Supports short wire fixture
 - Preserving transportability, repeatability and stability

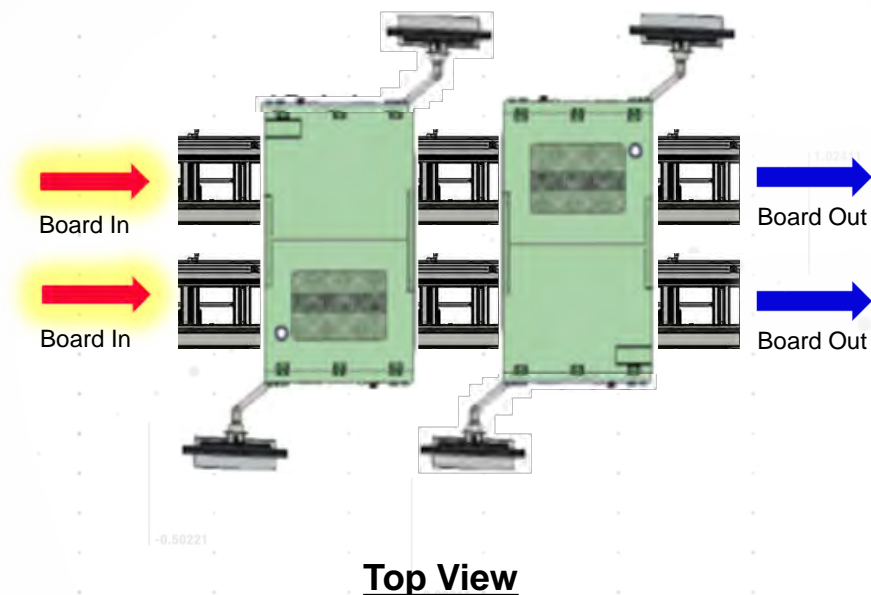
Short-wire Fixturing Technology



3. Enhanced support structure to ensure co-planarity
4. Unique design enable easy maintenance

Possibilities

i3070 Lean Inline with Bypass Conveyor



Application Scenario

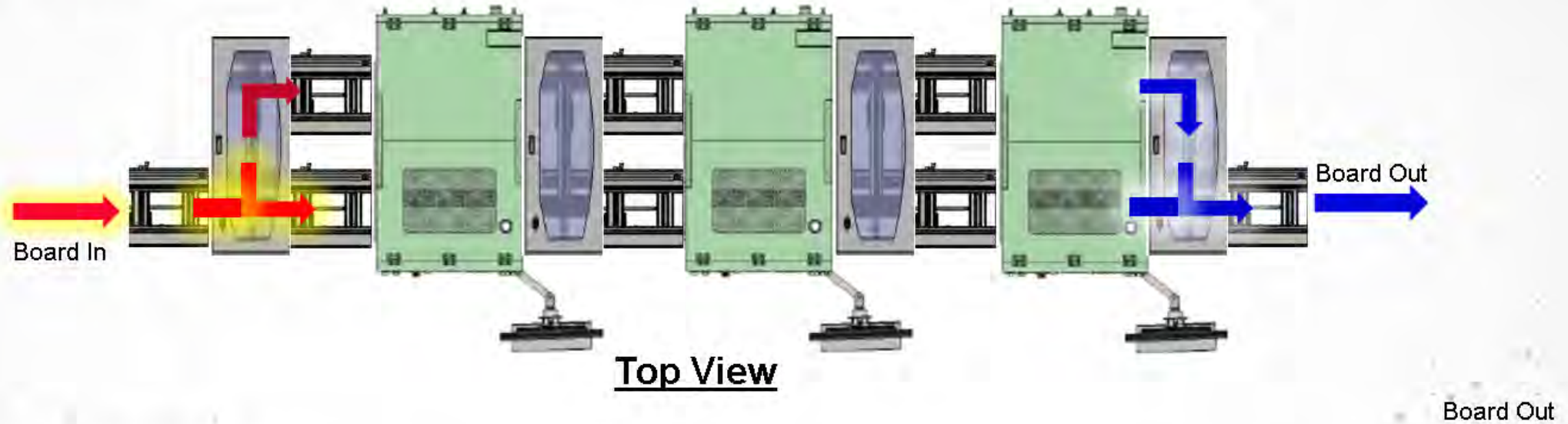
- Dual Lane setup
- Limited floor space availability
- Excellent, stable yield
- Medium/Low node counts

Solution

- Inline ICT testers placed in opposite directions
- Built-in bypass conveyor used for board transportation
- Buffer conveyors can be replaced with Traversers

Possibilities

i3070 Lean Inline with Bypass Conveyor



Application Scenario

- High volume, low mix
- Excellent, stable yield
- Medium/Low node counts
- Upstream run rate faster than ICT

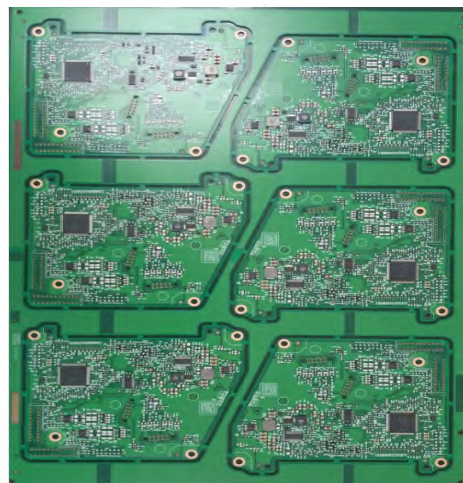
Solution

- Multiple inline ICT testers for line balancing
- Traverser conveyors transport boards to available testers

i3070 S5i Benchmarking with other Inline ICT



Keysight									
CUSTOMER:		<div></div>				<div></div>			
DEL NAME(PCB NAME):		38202120							
FIXTURE TYPE:		Keysight i3070 S5 Inline							
PROJECT MANAGER:		Sui Bin							
DATE:		9/23/2016							
PCB SIZE:		106mm*134mm							
PANEL SIZE:		387mm*279mm				Total		6 Panel DUTs	
A.	Test Probe Analysis								
	TOP	100 mil	75mil	50mil	39mil	other			
		16							
	BOTTOM	100 mil	75mil	50mil	39mil	other			
		155	55						
	SUM	171	55	0	0	0	226	Include Power	



CA TYPE	KEY	TER	COMMENTS
NODES	207	195	
RES	93	90	R508,R536,R537
CAP	56	45	C121,C122,C515,C536,C62,C63,C64,C819,C820,C821,C822
IND	7	5	L507,L508
DIODE	10	10	
MOSFET	6	5	M506
NPN	3	3	
IC	8	0	U336,U337,U338,U401,U506,U636,U811,U812
Crystal	1	0	Y431
Component Coverage Summary			
Total Stuffed In BOM	240	240	
Total NO TEST	2	88	We have 2 unstable small CAP (C61, C519) commented out, same as TER
BYPASS CAP Tested In Parallel	54	3	We have 54 BYPASS CAP Coverage, but TER Report only showing 3
Total Tested (w/o BYPASS CAP)	184	158	
Total Tested (with BYPASS CAP)	238	161	
Comp Coverage (w/o BYPASS CAP)	76.67%	65.83%	
Comp Coverage (with BYPASS CAP)	99.17%	67.08%	

INLINE TESTER PROGRAM									
Status:									
basic 3436 1									
Pin Test : 1.118									
Start short probe tests...									
Testing Presorts									
Pyramant Test : .721									
Testing Shorts									
Short Test : .254									
Testing Analog Unpowered									
Analog Test : 5.038									
Testing Vectorless Test									
Vectorless Test : 1.389									
Testing FET ON/OFF Tests									
FET-Powered Test : .253									
Setting Up Power Supplies									
Power supply Test : .399									
Testing Digital Incircuit									
Digital Test : 0									
Testing Analog Powered and Mixed									
Analog Function Test : 5.086									
** PANEL PASSED **									
Total test time: 17.55									
edit	recall	recall	execute	basic	clear	test	pb	store	
	plus	minus			marks	consult	qstats	line	

Plus load -un-load
KEY= 25sec
T?? = 28sec

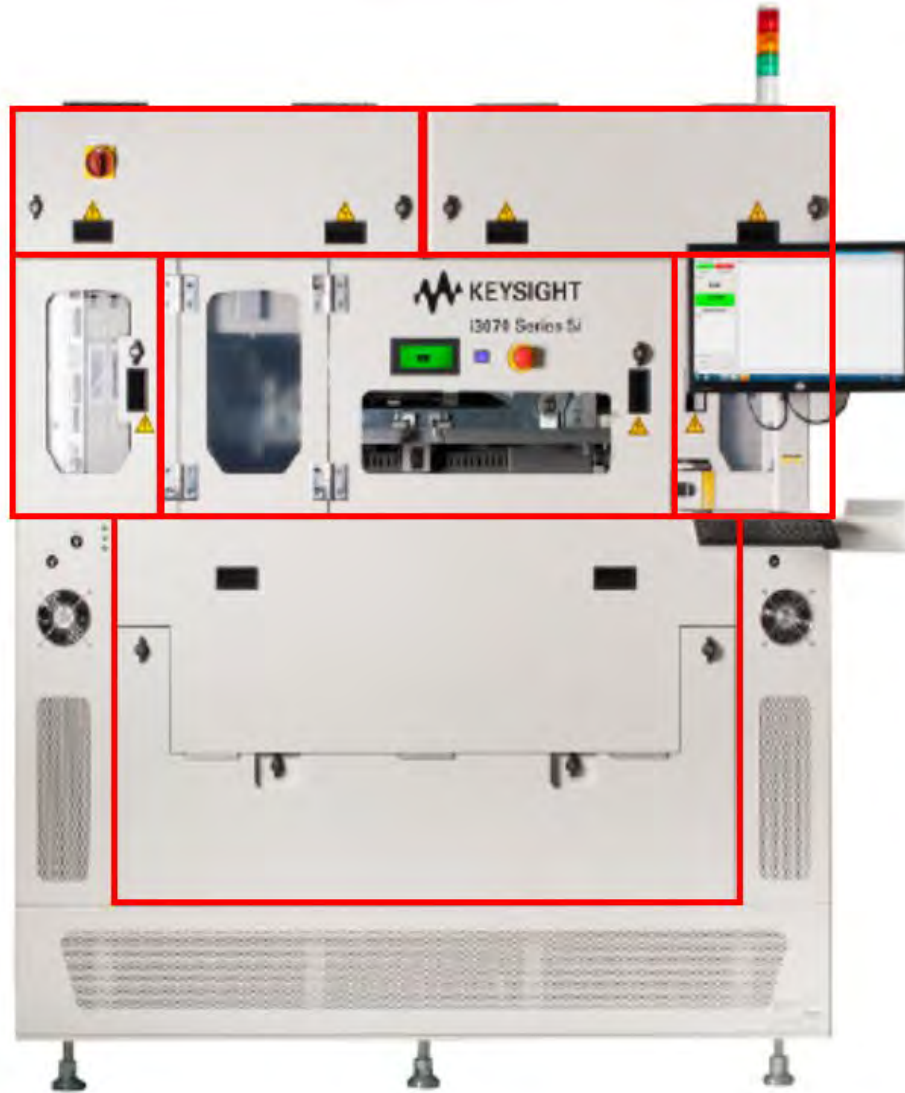
Both are in 2 Up parallel test

i3070 4-Module Series 5 for Big Boards - i367x, Series 5i



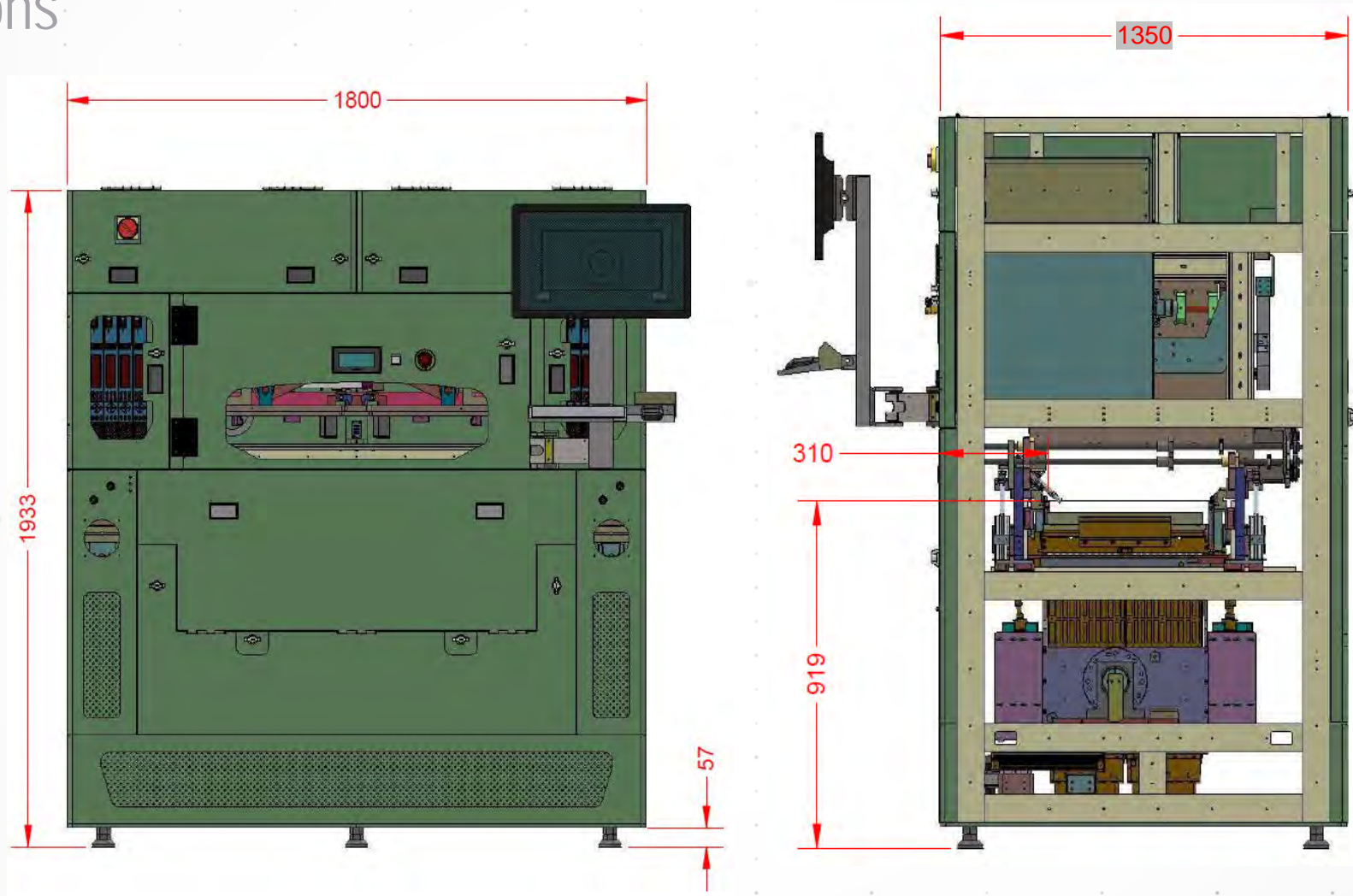
For bigger board:
711mm x 609mm

System Overview



i3070 4-Module Series 5

Dimensions

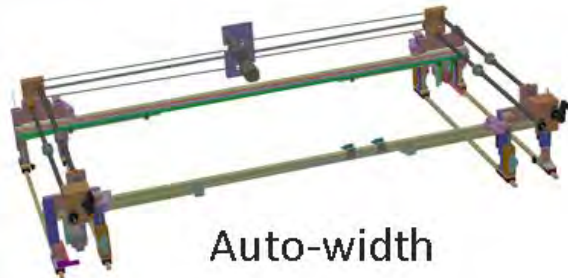


Smaller Footprint

1. 23% shorter in length than E9903E (minus Support bay)
2. Unified Inline platform – share > 50% of common parts



Press



Auto-width



Board Sensor



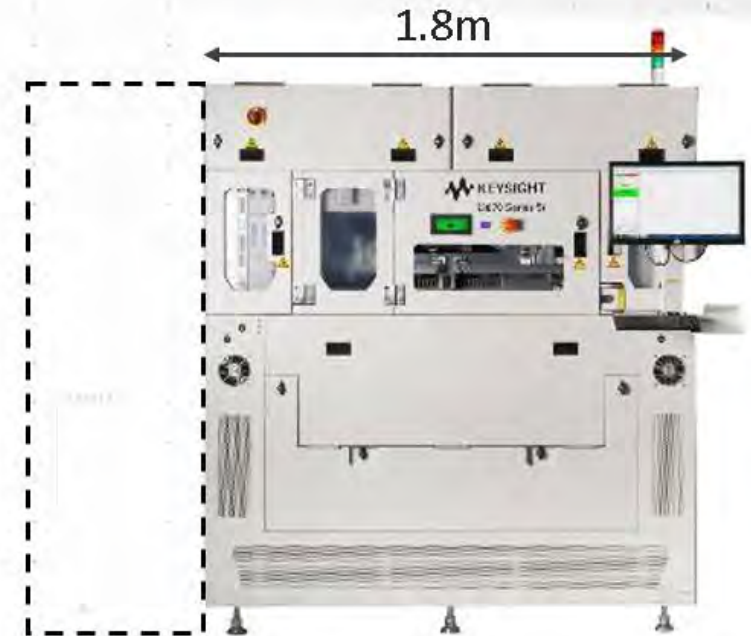
PLC



LCD Touch Panel



Circuit Breaker



General Specification

Datasheet:

<https://literature.cdn.keysight.com/litweb/pdf/5991-2686EN.pdf?id=2384839>

Specifications	Units	E9988E	E9988EL	E9986E
		2-module Standard	2-module Lean	4-module
Dimensions (excluding beacon and LCD panel)	mm	1206 (L) x 900 (W) x 1860 (H)	800 (L) x 1400 (W) x 1900 (H)	1800 (L) x 1350 (W) x 1930 (H)
	inches	47.5 (L) x 36.6 (W) x 73.2 (H)	31.5 (L) x 55.1 (W) x 74.8 (H)	70.8 (L) x 53.1 (W) x 77.1 (H)
Number of test nodes	-	2,592 maximum		5,184 maximum
PCB size	mm	Min: 50 (L) x 60 (W)	Min: 50 (L) x 60 (W)	Min: 50 (L) x 60 (W)
		Max: 350 (L) x 350 (W)	Max: 410 (L) x 380 (W) ¹	Max: 711 (L) x 609 (W)
	inches	Min: 2 (L) x 2.4 (W)	Min: 2 (L) x 2.4 (W)	Min: 2 (L) x 2.4 (W)
		Max: 13.8 (L) x 13.8 (W)	Max: 16.1 (L) x 15.0 (W) ¹	Max: 28 (L) x 24 (W)
PCB thickness	mm	Min: 0.6, max: 4		Min: 0.8, Max: 8
	inches	Min: 0.02, max: 0.16		Min: 0.02, Max: 0.31
Maximum supportable PCB weight	kg	3		15
	lb	6.6		33
PCB edge support	mm	2, 3		3, 5, 10
	inches	0.079, 0.12		0.12, 0.2, 0.39
Component clearance	mm	Top: 90, bottom: 30		
	inches	Top: 3.5, bottom: 1.2		
Transport method	-	Belt transfer		
Transport direction	-	Left to right or right to left	Left to right or right to left	
		(factory configured)	(User-configurable direction)	
Transport speed	mm/sec	Min: 100, max: 400		
	in/sec	Min: 3.9, Max: 15.7		
Transport height	mm	Min: 900, max 1000 ²		Min: 925, max 1000
	inches	Min: 35.4, max: 39.4 ²		Min: 36.4, max: 39.4
Bottom fixture height	mm	Min: 75, max 105		
	inches	Min: 2.9, max: 4.1		
PCB exchange time	sec	5 to 8		8 to 12
Press force	kN	10		20
	lbf	2,248		4,496
Air pressure	kPa	500 to 700		
	psi	72.5 to 101.5		
Power	-	3-phase, DELTA; supports 200 – 400 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)		

Why manufacturers go for automated manufacturing?

OPERATIONAL EFFICIENCY

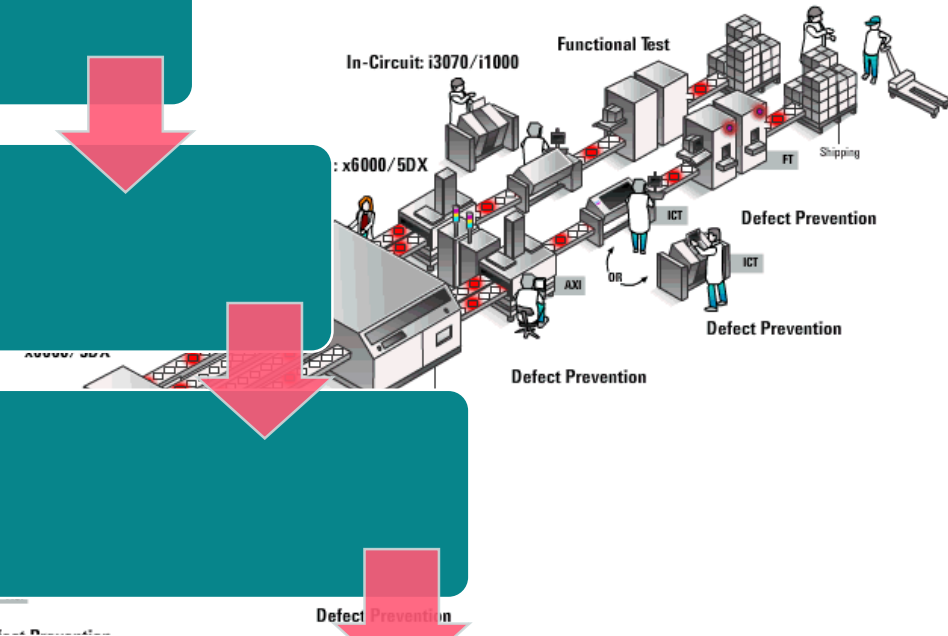


1. Eliminate repetitive tasks

2. Improves manufacturing process

3. Increase productivity

4. Improve product quality



How E9986E accelerate the customers' automation requirements?



Fully automated

- Migrate labor shortage
- High utilization rate (24 x7)



Scalable

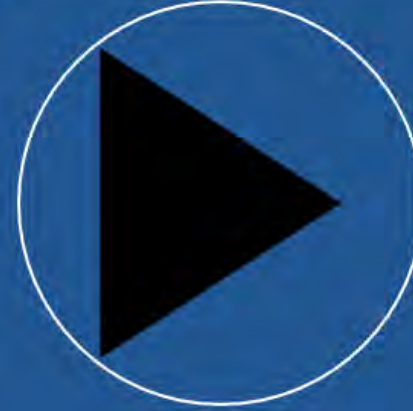
- Nodes
- Board size
- Dual Boards testing

COMPETITORS
Manual intervention
< 15" x 14"



Thru'put

- Module TM
- Bank TM (coming soon)
- Parallel load/unload
- Buffer Zone (evaluating)
- Flash Port (PLHE project)



Inline to Offline Solution

- Offline fixture adapter

COMPETITORS



Ease of Maintenance

- Integrated testhead/handler design
- Robust and reliable design
- Motorized Testhead rotation
- Dual programmable rails
- Front facing access

Eliminate Pneumatic Fixture

SERVO DRIVEN PRESS

Customer: "I am paying too much for my pneumatic fixture"

New way: Servo driven Press

1. Eliminate the need of expensive pneumatic fixture (~ saving range from \$4k to \$8k* per fixture)

* Savings will vary depending on complexity of the product to be tested

2. 13 to 25 fixtures = **breakeven** (Handler cost)

BENEFIT: Saving from the pneumatic = ROI

3. Uniform press down action
 - a. Ensures even contact between test pad and probe (less debug required, shorter development time)
 - b. Even distribution of forces (does not stress the DUT)
 - c. Longer lifespan for probes (lower maintenance cost)



20% More Productive than E9903E

MORE THROUGHPUT

Customer: “I need x numbers of ICT to match the output from my SMT line”

New way: Go Inline

BENEFIT:

Lower CAPEX investment



From Inline to Offline

FLEXIBLE

Customer: “My manufacturing line is dedicated to a specific product”

New way: Offline Fixture Adapter

1. Allow Inline fixture to be re-usable at Offline i3070
2. Available from fixture partners (many choices)

BENEFIT:

Same fixture can be used at Inline & Offline i3070

Reusable Inline fixture at Offline System

Challenges:

- How to retest board return / after board repaired?
- Huge capital for fixture house, debug after fixture built

Impact:

- Project delay due to system not available.

Our Solution:

- Built-in reusable offline fixture concept

Concept	Pro & Con
Inline – Offline Build-in Convertible	Easy Setup Multiple investments Use 2 set of fixture accessories Use Vacuum port
Offline Press	Heavy, may have challenge One time investment Use 1 set of fixture accessories Vacuum Port Not necessary



Offline Press



Convertible Top Clamp;
Same bottom fixture base

What is special in 4 Module inline i367x?

**Module TM + Bank TM
+ Combined Resource**

**Dual - Moveable
Conveyor Auto Width**

**Super Large Board
711mm*609mm**

**Inline-Offline
Compatible Fixture**

Software Readiness for fixturing

AUTOMATIC PLACEMENT

i3070 Software Revision !!

1. 09.10sc
2. 09.20p or latest

Available in Partner Portal or KSM on May '18

1. "Inline-4MOD" – 28" x 17.7"
2. "Inline-4MODXL" - 28" x 24"

Additional Info:

1. Belt Exposure/PCB board edge
2. Front Rail Offset

Fixture Options Form

Actions Help

Notes:

Fixture Type: **Inline-4MOD** Size: Full

Electrical Top Probes Allowed: No

Confine Transfers To Assigned Modules: No

Default Probe Type for TestJet/VTEP Devices Added by Board Consultant: Auto Selection

Wire Wrapping: Auto

Metric Units: No

Heavy Probe Force: 8 Oz.

Light Probe Force: 4 Oz.

Mechanical Probe Density: 800 Oz./Sq.In.

Vacuum Probe Density: 104 Oz./Sq.In.

Autofile: 3463

Rail Offset: 0 mm.

Belt Exposure: 3 mm.

Update Close

PCB Edge Support

E9986E-ES1; E9986E-ES2; E9986E-ES3

PCB edge support	Handling weight
3 mm (0.1181 in)	< 3 kg (6.6 lbs)
5 mm (0.1968 in)	3 – 7 kg (6.6 – 15.4 lbs)
10 mm (0.3937 in)	7 – 15 kg (15.4 – 33 lbs)

COMPETITORS



Challenges:

- Heavy boards, more grip > Lighter boards
- High Mixed, different boards weight and edge support

Impact:

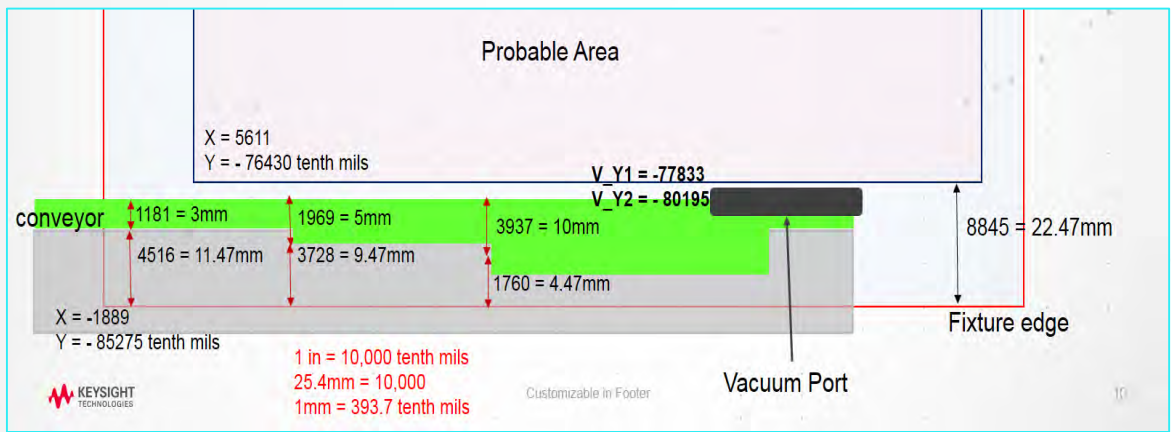
- board fall, Stop-Short
- Transfer not smooth due to “catch” area insufficient
- System Error and Lost production output

Our Solution:

- configurable of belt Exposure
- Changeable by user

Automatic Conveyor Width

E9986E-A01



Zero OFFSET	“X” OFFSET
Probable Area Maximized	Optimized Probable Area
Test Probes May lean into vacuum port area	Test Probes avoided into Vacuum port Area
Work with Offline Press Only	Work with Convertible fixture and Offline Press

Challenges:

- Test Probes potential occupy Vacuum port area for Offline usage

Impact:

- Unable to use vacuum for Convertible fixture.

Our Solution:

- Both conveyors is moveable/programmable
- Front Rail Offset

COMPETITORS 

Board Stopper Options

E9986E-BSF ; E9986E-BSR

Challenges:

- Very limited setup time during production change-over
- Potential skew for large width board

Impact:

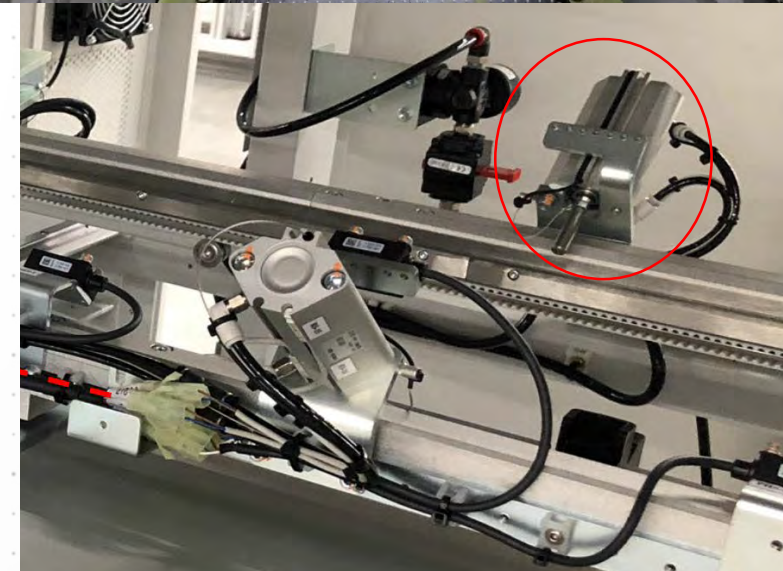
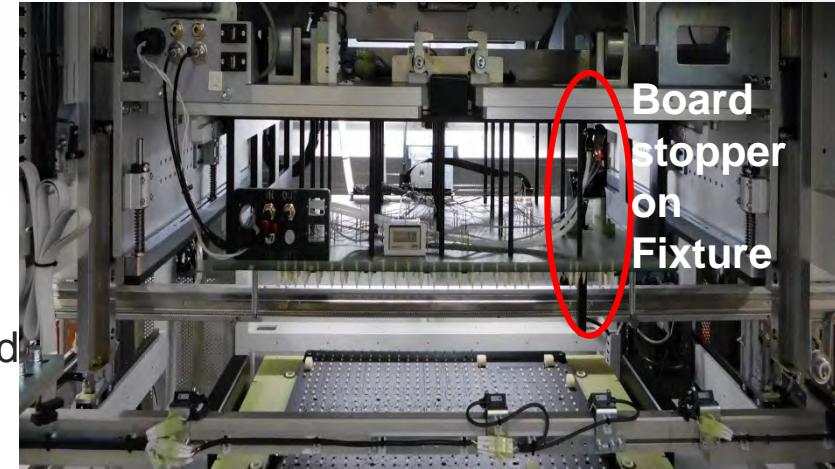
- Change over take longer, lost of throughput. Technician may forget to adjust board stopper.
- Board may damage if skew effect is too much

How to overcome?

1. Minimize fixture setup time without the need to adjust board stopper. Alternate 1
2. Board Stopper position near centre edge of the board. Alternate 2

Alternate:

1. Fixed board stopper location permanently.
2. Additional board stopper (E9986E-BSR) on the rear conveyor rail.



Dual Board Staging and Testing

Our Solution:

- Additional stopper to stage board/panels, test with Throughput Multiplier or Advanced Throughput Multiplier
- Advantage for board with test time > loading time, throughput increase by 1.5x (96s / 64s)

Example:

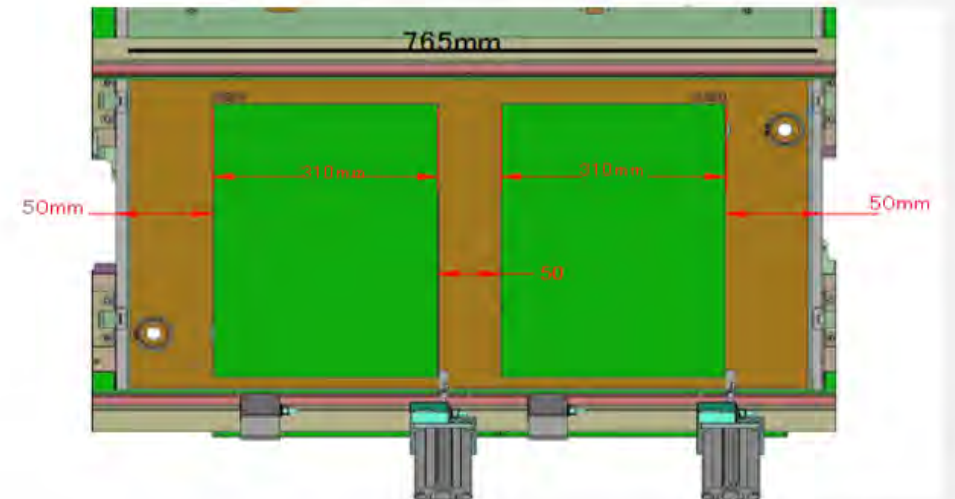
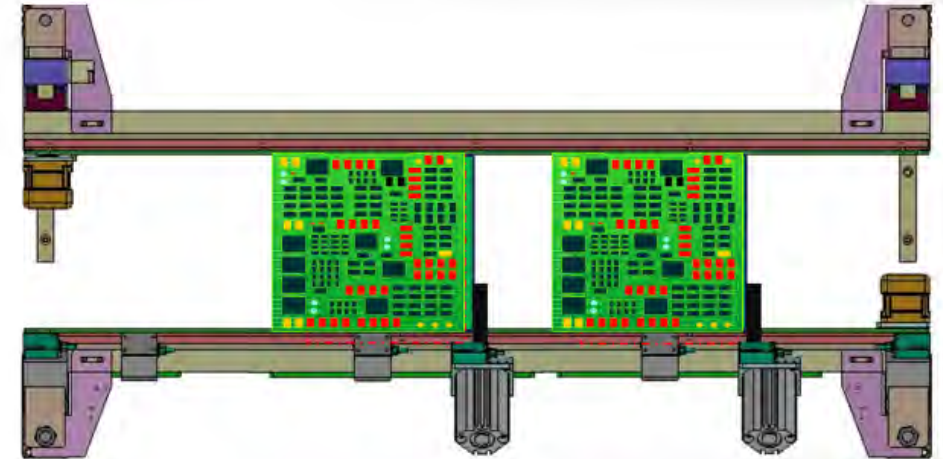
loading/unloading per board: 8s

Test time/board: 40s

TM for 2 boards (assume 80% reduction): $40 \times 1.2 = 48\text{s}$

Non-DBST: $(40 + 8) \times 2 = 96\text{s}$

DBST: $8 \times 2 + 48 = 64\text{s}$



Board Orientation

Challenges:

- Board get damaged
 - Wrong board
 - Wrong orientation

Impact:

- Product Yield Lost, Lost of Revenue
- Scrap, Lost of Profit

How to overcome?

- Check for correct orientation before Press.

Note:

1. Not a concern for symmetrical panel
2. May be redundant as barcode read will fail verify
3. Handling time increase if enabled

Board Orientation Signal (007)

Purposes:

1. Check that DUT is in correct orientation.
2. Check that DUT has stopped at the correct position.

Sensor Type:

Board Orientation Laser thru beam sensor

Signal: NPN

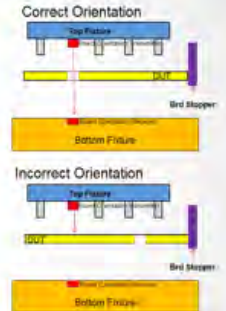
Power: +24V DC

Sense distance: 300mm

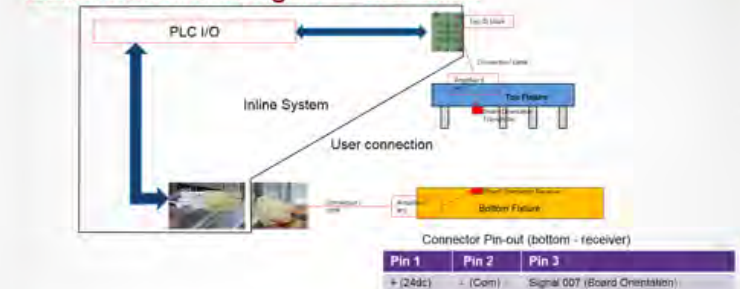
Recommendation: Optex (economical), Keyence, Omron

Connector Pin-out (bottom - receiver)

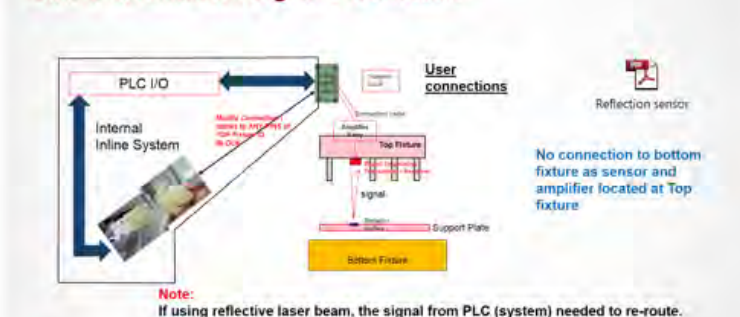
Pin 1	Pin 2	Pin 3
+ (24dc)	- (Com)	Signal 007 (Board Orientation)



Board Orientation Signal - Thru Beam



Board Orientation Signal - Reflective



Note:
If using reflective laser beam, the signal from PLC (system) needed to re-route.

Board Alignment Signal

Challenges:

- Board get Damaged
 - Alien object on the fixture
 - Skew effect

Impact:

- Product Yield Lost, Lost of Revenue
- Scrap, Lost of Profit

How to overcome?

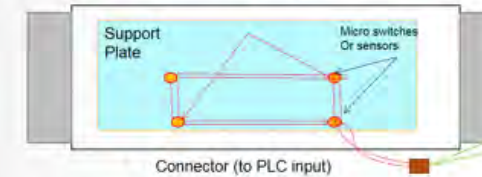
- Check for Alignment or board sitting before Press.

Note:

1. Handling time increase if enabled.

Board-Alignment Signal (315)

Purpose: Check that DUT sit flatly on the support plate.
Sensor Type: Micro switches / Low Beam Laser



Pin	Signal
1	+ (24dc)
2	- (Com)
3	Signal 315 (Board Sit)

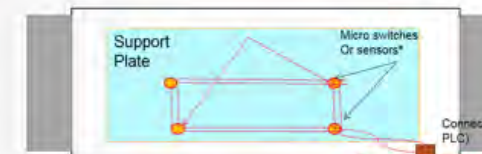
Board-Align/Board-Sit position



PLC checks that board fully sit on fixture support plate before the Press fully engage to All Probes position

KEYSIGHT

Board-Alignment sensor



Note:
Either micro switches or low beam sensors can be used.

Micro switches

Allow Acrobat
Document

Inline System

PLC I/O

KEYSIGHT

Fixture Guideline

- Top Fixture critical dimension
- Additional Keep out for transfer pins
- Bottom Fixture: Maximum thickness and Height
- Tooling pins clearance consideration
- Floating design for Top Bottom Jig Alignment
- ID Transfer Block and its pin assignment

Fixture Guideline available in Online Helps
Fixture 3D model – upon request.

Both available as standalone files

Fixture Dimensions – Front View



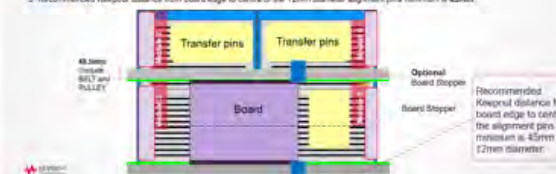
Fixture Dimensions – Side View



Additional Considerations

[Top Access and Transfer jobs](#)

1. KEEP-OUT for Movable rail if there is top beams.
(48-50mm) + (front) design align tolerance
2. Place Transfer pins as far as possible (min 3mm away) from conveyors.
3. Recommended transfer pin areas are the empty space (highlighted in yellow)
 1. Within Conveyors.
4. After movable rail. (Note: Keep-out needed for additional board stopper)
5. KEEP-OUT for future board alignment pins and loading. (highlighted in purple).
(48-50mm design on future layout design and recommendation)
6. Recommended Keep-out distance from board edge to centre of the 12mm diameter alignment pins minimum is 45mm



Fixture Alignment Pin Floating Concept

Top view cross section of the fixture Guiding Pin/Rod(Grey color) and Guiding Bush(Green Color).

The floating concept design to be 2 mm clearance and hence the movement of the top id is now 1.0 mm.



ID transfer block

SAME AS STANDARD INLINE



Press Profile – Relearn for individual fixture

- 1. Standby**

2. Board Align

3. All Probes

4. Long Probes

5. Retest

Legend:

Component	Status
Connector & Pin	Green
Connector	Red
Probe Arm	Blue
Probe	Yellow
Pin	Green
Pin	Red

Fixture Partner

READINESS

Fixture partners validated:

- Q1
- QxQ
- Circuit Check
- Petracarbon
- Testing House
- Bojay
- Megatron

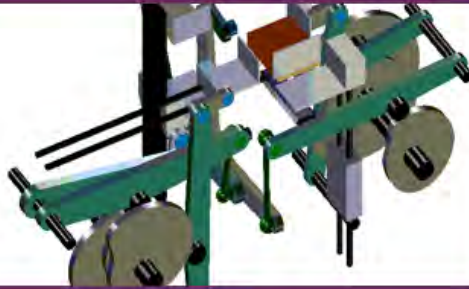


America

SAP

GRC

Summary



Integrated System

- Leverage
- Familiar programming interface
- Robust & Reliable design
- Ease of Use



Cost Saving / Fast ROI

- Eliminates pneumatic fixture (= ROI)
- Floor Space & labor
- Improve Productivity
- Improve Quality



Operational Efficiency

- Minimum training
- Reuse current inventories
- High OEE
- Fixture can be Inline & Offline use

E9986E - Filling in the gaps

Series 6

STAY CONNECTED. CONTINUOUSLY EVOLVING



Series 6

STAY CONNECTED. CONTINUOUSLY EVOLVING



Foot Print

38%

Smaller

Series 6

STAY CONNECTED. CONTINUOUSLY EVOLVING

- PC & PDU relocated to bottom
- DUT power supplies will now be at the rear of system
- Keysight Corporate color code
- 21.5" monitor
- New ergonomic support arm

Testhead Dimension	Before	After
Width	1765 mm	1490 mm
Depth	795 mm	940 mm
Height	878 mm	878 mm

Front View



16% width reduction by removing side pod
38% without side port & support bay



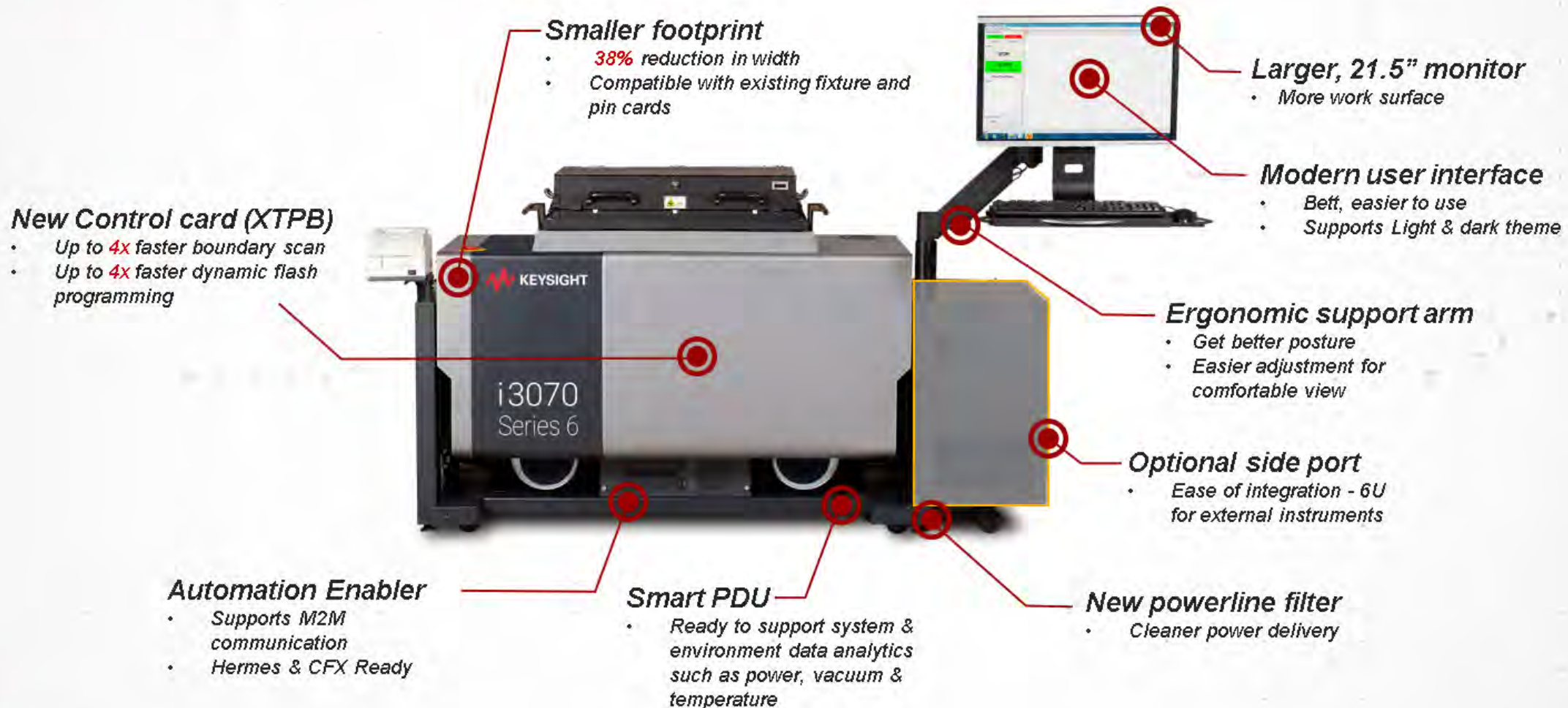
Series 6: 4-module In-Circuit Test System

STAY CONNECTED. CONTINUOUSLY EVOLVING



Series 6: 4-module In-Circuit Test System

STAY CONNECTED. CONTINUOUSLY EVOLVING



Faster Test Throughput

- On average 6 to 12% improvement in overall test time with new XTPB control card
- Digital test execution is expected to be faster e.g. Boundary scan, SiliconNail:
 - Up to **4x** faster for dynamic flash programming
 - Up to **4x** faster boundary scan



XTPB Throughput Insight

Actual Test Cases: SSD Product Board #1

Test Types	XTPA	XTPB	Throughput enhancement
Preshort	0.218	0.168	22.81%
Short	0.303	0.244	19.60%
Analog	3.526	3.034	13.95%
VTEP	4.565	3.900	14.58%
MOSFET	0.106	0.061	42.80%
Setup Power	1.669	1.604	3.89%
Vreg Voltage	1.500	1.515	-0.99%
Analog Functional	0.286	0.255	10.73%
SPI Flash	29.913	17.148	42.67%
BScan Powered Shorts	2.076	1.186	42.87%
BScan Interconnect	1.055	0.934	11.41%
BScan Connect	1.497	1.048	30.00%
Bscan Silicon Nails	0.001	0.000	87.50%
Digital	0.128	0.104	18.63%
Total test time	46.844	31.202	33.39%

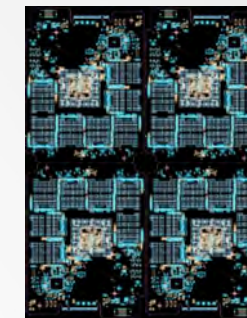
Panel of 4 boards

DEVICE TEST RESULTS

Nodes (Nets) On The Board : 1353
Total Nodes Tested : 85
Total Devices In Board Data : 715

SHORTS TEST DETAILS

Total Nodes In Shorts-Test : 1353
Total Inaccessible Nodes : 1268



33.4%

Overall Speed Improvement

42%

Faster B.Scan Powered Shorts

43%

Faster SPI Flash

XTPB Throughput Insight

Actual Test Cases: SSD Product Board #2

Test Types	XTPA	XTPB	Throughput enhancement
Preshort	0.500	0.402	19.62%
Short	0.392	0.336	14.42%
Analog	2.379	2.223	6.57%
VTEP	1.960	1.904	2.89%
MOSFET	0.424	0.329	22.33%
Setup Power	1.068	1.005	5.87%
Vreg Voltage	0.000	0.000	0%
Analog Functional	0.104	0.081	21.67%
SPI Flash	2.322	2.169	6.58%
BScan Powered Shorts	0.754	0.621	17.71%
BScan Interconnect	0.452	0.370	18.16%
BScan Connect	2.061	1.032	49.94%
Bscan Silicon Nails	14.484	11.903	17.82%
Digital	1.719	1.665	3.17%
Total test time	28.619	24.039	16.01%

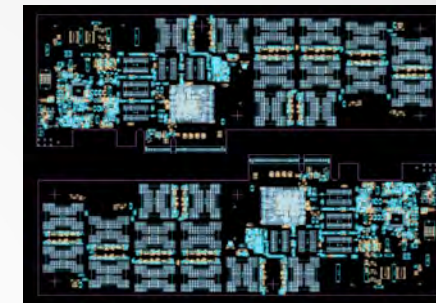
Panel of 2 boards

DEVICE TEST RESULTS

Nodes (Nets) On The Board : 1672
Total Nodes Tested : 196
Total Devices In Board Data : 793

SHORTS TEST DETAILS

Total Nodes In Shorts-Test : 1672
Total Inaccessible Nodes : 1476



16.01%

Overall Speed Improvement

50%

Faster B.scan Connect

17.8%

Faster Silicon Nails

XTPB Throughput Insight

Actual Test Cases: Comms Server

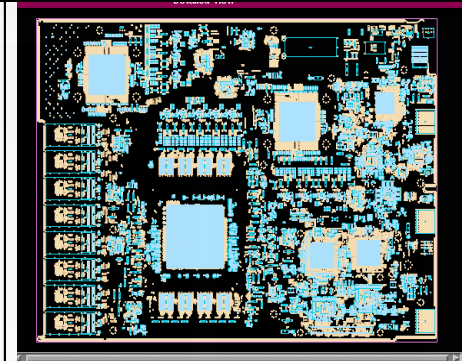
Test Types	XTPA	XTPB	%Improvement
Preshort	28.06	28.39	-1.2%
Vectorless	1.52	1.47	4.1%
Analog Unpowered	39.76	36.80	7.5%
Pre Power	1.12	1.02	9.3%
Setup P/S	33.44	32.34	3.3%
Bscan Powered Short	4.40	3.34	24.1%
Bscan Interconnect	0.38	0.07	80.8%
Bscan In-Circuit	2.10	0.50	76.2%
Digital In Circuit	2.71	2.01	26.1%
Analog Pwr & Mixed	1.97	1.76	10.9%
Total Test_Section	133.64	122.95	8.0%
Total	139.68	128.89	7.7%

DEVICE TEST RESULTS

Nodes (Nets) On The Board: 4808
Total Nodes Tested : 2570
Total Devices In Board Data : 7252

SHORTS TEST DETAILS

Total Nodes In Shorts-Test : 4808
Total Inaccessible Nodes : 2238



7.7%

Overall Speed Improvement

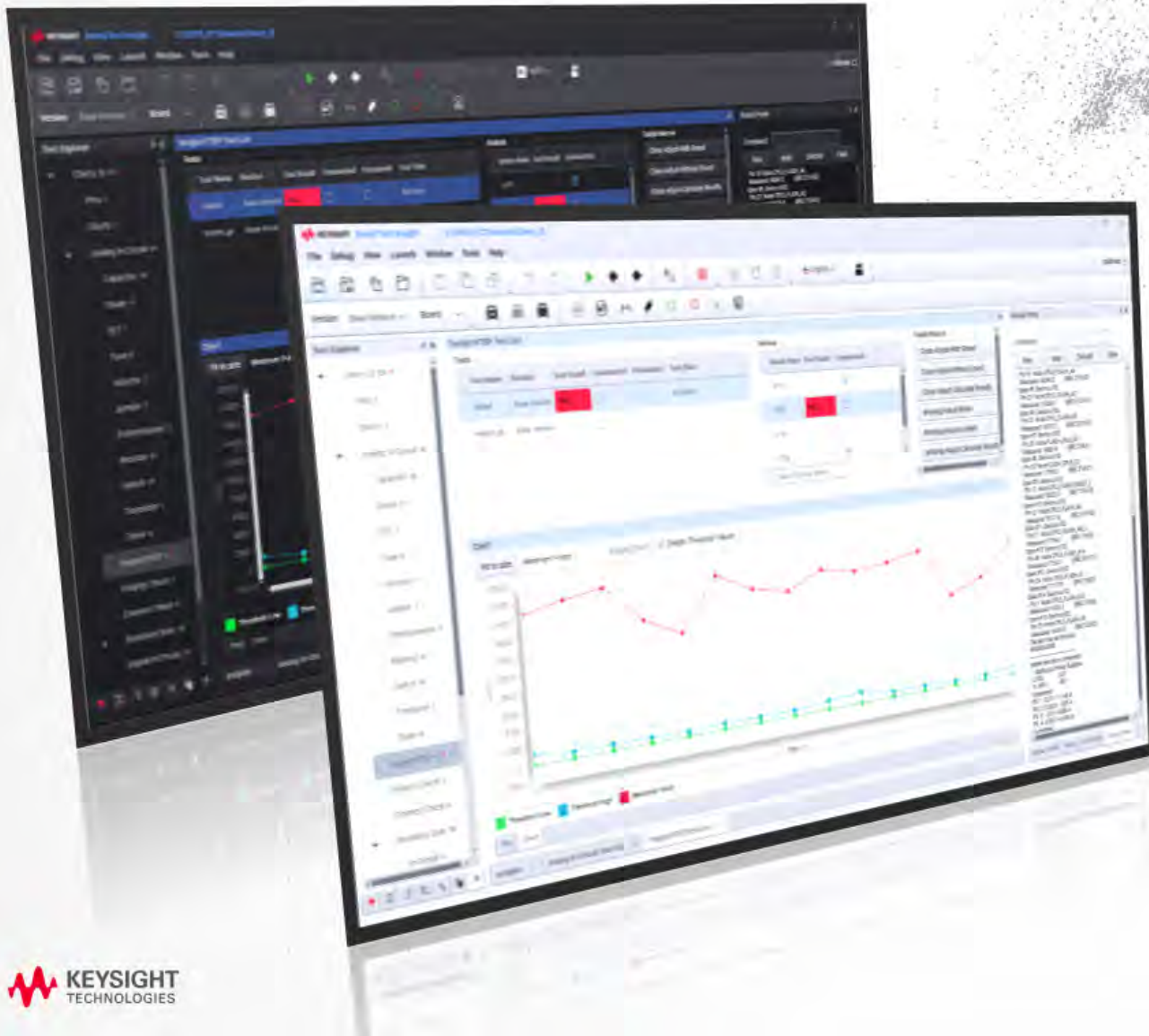
80%

Faster B.Scan Interconnect

76%

Faster B.Scan In-Circuit

Slicker Interface - UI



- Supports light and dark theme, switch on-the-fly, individually saved user's preference
- Designed for debug efficiency and accelerates i3070 programming mastery
- BT-Basic still supported
- Full-featured text editor for testplan modification
 - Auto indent, multiple tabs, customizable text colors, auto-suggestion with intellisense, interactive guarding, ballooned tool tips and many more

Automation Enabler

Benefits

- IPC standard, common communication language
- Understand your system's operating efficiency
- Data exchange with MES systems

Machine

- Machine alarm
- Machine diagnostics
- Machine status
- Fixture status
- Downtime
- Sensor Data
- Power Data

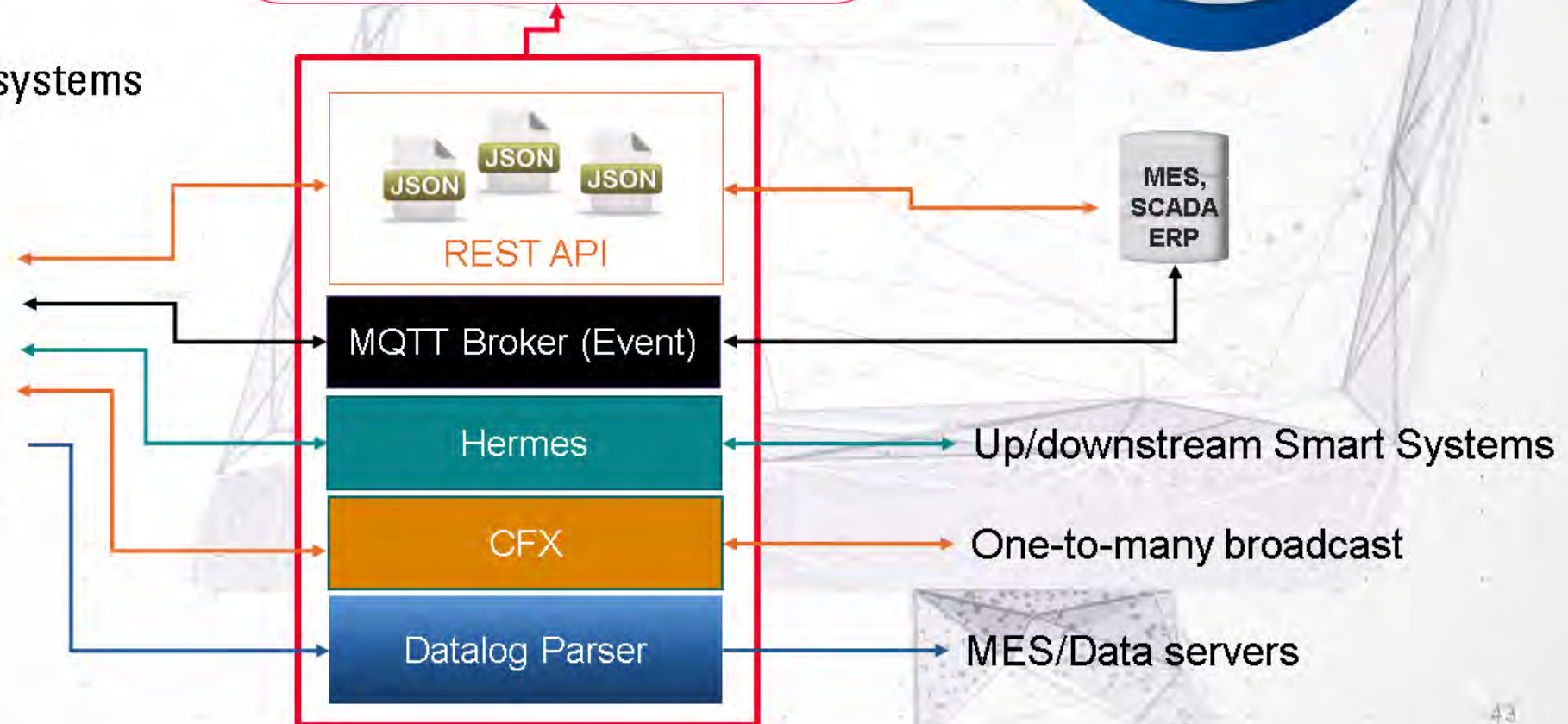
Test

- Test results
- Board file status
- Testplan status
- UUT information
- Test times
- Unique Tests
 - Pins
 - Shorts/Opens
 - VTEP

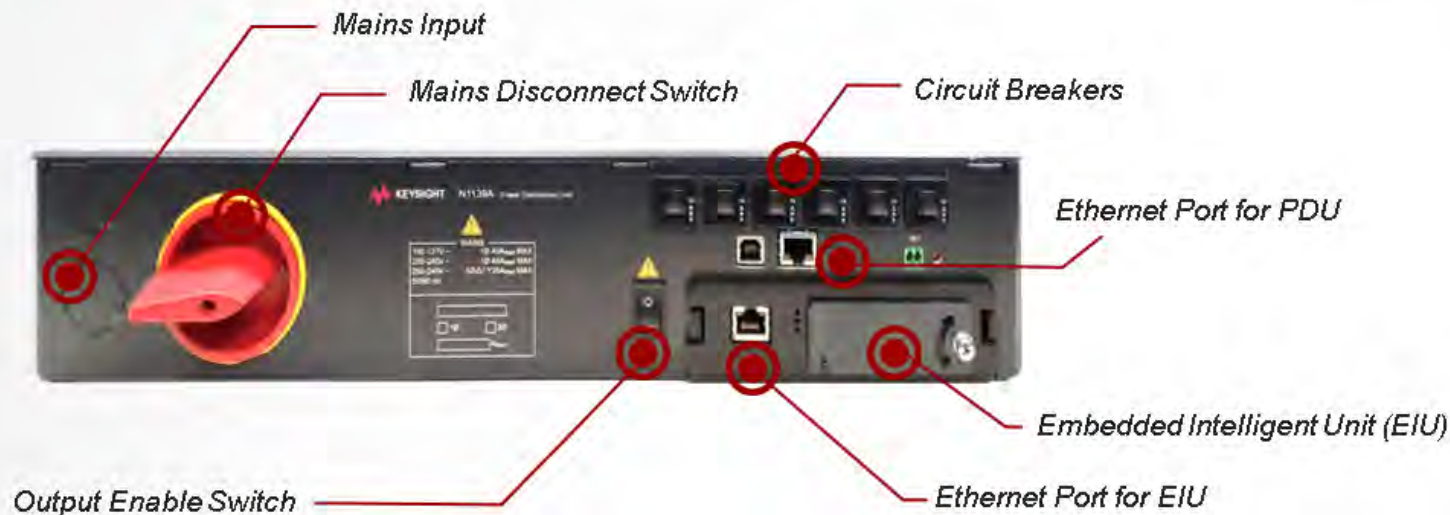
Industry

4.0

M2M



Smarter PDU



Benefits

- Slimmer profile helps to shrink footprint
- Pathwave Manufacturing Analytics (PMA) Ready
- Support future enhancements such as real-time power monitoring, power saving features
- Upgradable firmware



KEYSIGHT
WORLD 2019

