

Doubling Production Throughput with i3070 Advanced Throughput Multiplier

Introduction

Keysight's i3070 system has been continuously innovating to improve production throughput and provide better test coverage, bringing more value to customers.

One of the latest i3070 features, the advanced throughput multiplier, improves overall test throughput by approximately 2x. It tests two homogeneous printed circuit board assemblies (each PCBA with a node count of between 1,296 and 2,592) simultaneously across two banks in a four-module i3070 system.

This application note describes what it takes to upgrade an existing i3070 Series 5 system (both offline and inline) to enable the advanced throughput multiplier feature. It addresses test program development, debugging procedures, test throughput improvement results, and other benefits.



Figure 1. i3070 Series 5 with consists of an ASRU revision N card, Control XTPA card, and iSystem card



Requirements to enable the advanced throughput multiplier

- One-time hardware upgrade with the high-speed link switchboard to an existing i3070 Series 5 system
- i3070 09.20pc software version with the advanced throughput multiplier software feature license

Hardware

Enabling the advanced throughput multiplier feature requires a one-time hardware upgrade to your existing i3070 Series 5 system with the high-speed link (HSL) switchboard (as shown in Figure 2). This supports the new high-speed link cable connection needed for the advanced throughput multiplier test whereby two module resources (in a bank) combine to test a medium-size PCBA.

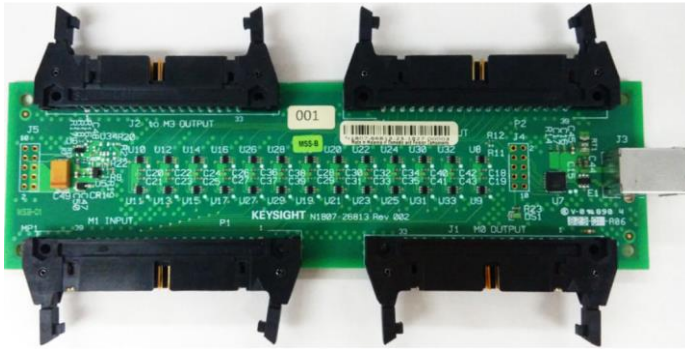


Figure 2. High-speed link switchboard

High-Speed Link Switchboard

Figure 3 shows the connection between the HSL switchboard, the six high-speed link cables, and the control card in a four-module i3070 system.

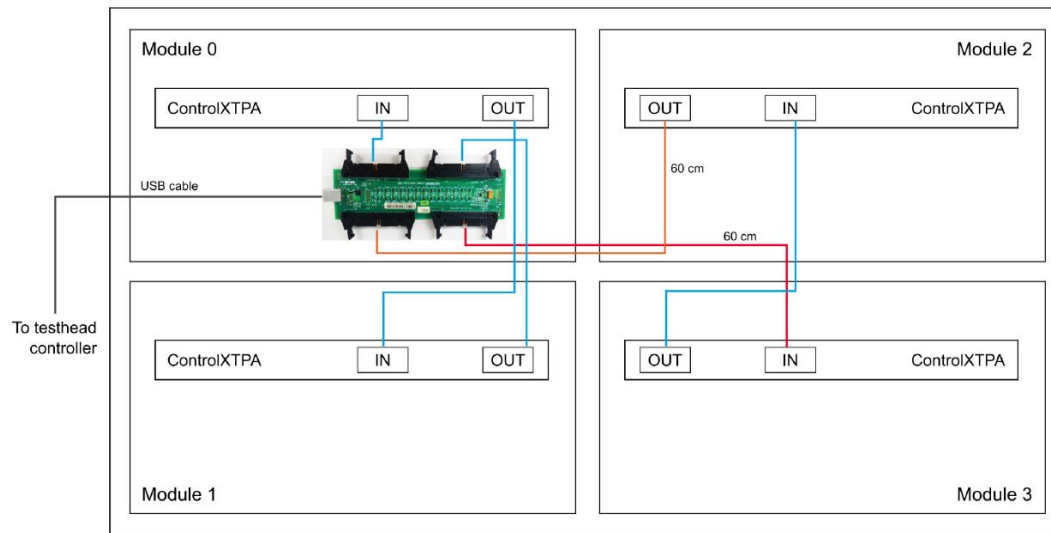


Figure 3. Connection of HSL switchboard in the four-module i3070 system

You can perform the HSL switchboard upgrade on both offline and inline four-module i3070 Series 5 systems. Because of the different card cage rotation engines in the offline and inline four-module i3070 Series 5 systems, the HSL switchboards are in different locations, as shown in Figures 4 and 5, respectively.



Figure 4. Location of HSL switchboard in an offline four-module i3070 system

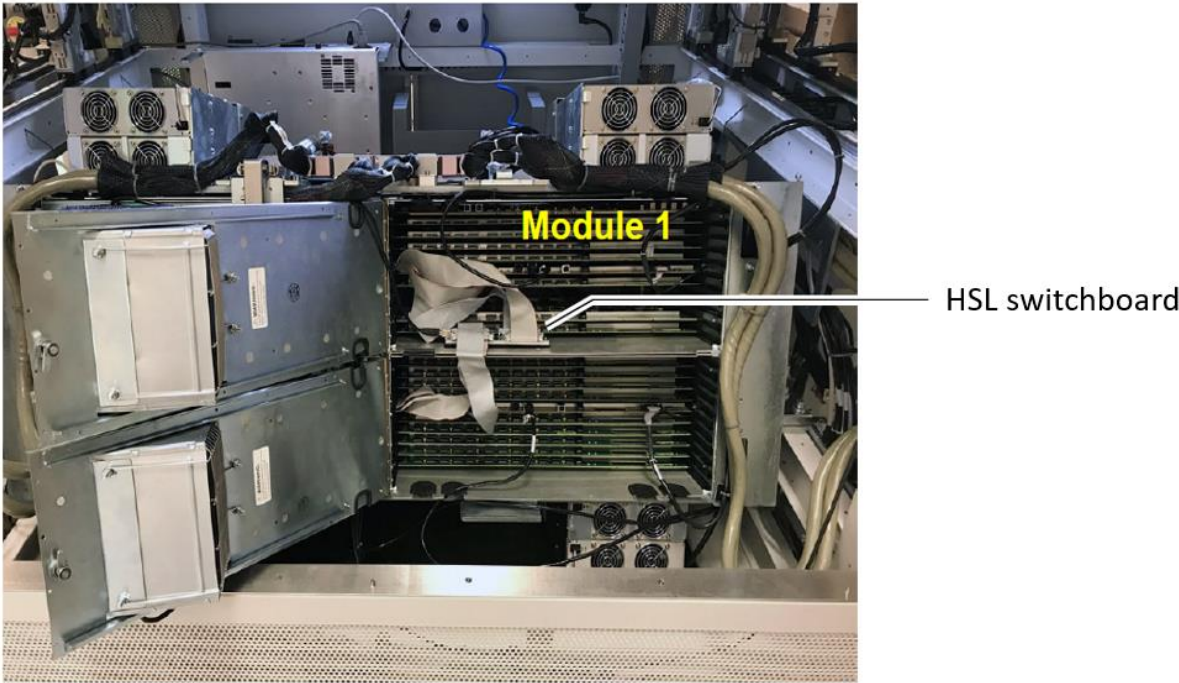


Figure 5. Location of HSL switchboard in an inline four-module i3070 system

Software

You need to upgrade the i3070 software version to 09.20pc to use the advanced throughput multiplier. This requires a new advanced throughput multiplier feature license.

Update to Testhead Configuration File

After upgrading to the HSL switchboard on the four-module i3070 system, you will need to update the testhead configuration file in the i3070 software to reflect the additional hardware.

This introduces a new syntax for this purpose:

- switch high speed link 1

With the advanced throughput multiplier feature license installed, the testhead configuration file will be compiled successfully.

Example 1 Testhead configuration

```
! CONFIGURATION FOR TESTHEAD
!  
testhead name "testhead1" "module3" "module2" "module1" "module0"  
line frequency 60  
  
relay 1 controls vacuum 3  
relay 2 controls vacuum 2  
relay 3 controls vacuum 1  
relay 4 controls vacuum 0  
  
switch high speed link 1
```

Figure 6. New switch high-speed link 1 syntax in testhead configuration file

Update to Board Configuration File

For test program development with the advanced throughput multiplier feature, new syntaxes in the board configuration file enable the software to assign the appropriate bank resources to the boards.

New syntaxes in the board configuration file are as follows:

- enable advanced throughput multiplier
- boards 1 in bank 2
- boards 2 in bank 1

Example 2 Board config

```
target agilent3073 standard
enable multiple board versions
enable software revision b

enable express fixturing
enable advanced boundary scan differential
enable 1149.6 boundary scan
enable silicon nails
enable drivethru
enable cover extend
enable testjet
enable polarity check
enable paneltest
enable advanced throughput multiplier

module 0
. . .

module 3
  cards 1 asru n revision usb
  cards 2 hybrid standard double density
  cards 3 hybrid standard double density
  cards 4 hybrid standard double density
  cards 5 hybrid standard double density
  cards 6 control xtpa
  cards 7 hybrid standard double density
  cards 9 hybrid standard double density
  cards 10 hybrid standard double density
  cards 11 hybrid standard double density
  supplies hp6624 1 to 4 asru channels 1 to 4
end module

boards 1 in bank 2
boards 2 in bank 1
```

Figure 7. New syntaxes in the board configuration file

The engineer can proceed with the standard test program development and debug procedure for panel boards.

Result: Test Throughput Improvement with Advanced Throughput Multiplier Feature

Below is a test time comparison table recorded from an installed customer. It shows results with and without the advanced throughput multiplier feature.

Test type	Without AdvThruputMult (in seconds)	With AdvThruputMult (in seconds)	Throughput improvement
Preshorts	0.085	0.05	41.17%
Shorts	5.004	2.594	48.16%
Analog unpowered	44.638	26.661	40.27%
Bscan interconnect	0.45	0.221	50.88%
Bscan silicon nail	28.441	14.811	47.92%
Digital	12.887	6.657	48.34%
Analog powered and mixed	3.626	2.177	39.96%
Total test time	95.131	53.171	44.11%

Table 1. Test time comparison with and without the advanced throughput multiplier feature

Conclusion

Multiple sites across multiple regions have successfully installed and deployed the advanced throughput multiplier feature. Installing the feature requires the following:

- A simple one-time HSL switchboard (hardware) upgrade to a four-module i3070 system
- A i3070 (software) upgrade to 09.20pc version with the advanced throughput multiplier feature license

This productivity efficiency improvement comes without increased engineering effort or additional floor space, operators, testers, or fixture cost.

Web Resources

Keysight In-Circuit Test Systems: www.keysight.com/find/ict

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

