Keysight *Medalist* i3070 Series 5
In-Circuit Test System

The Keysight Technologies, Inc. *Medalist* i3070 Series 5 In-Circuit Test (ICT) system introduces a new infrastructure with 3 new Capabilities:

1. The flexibility to incorporate external circuits to balance between ICT & functional testers and reduce investment on functional testers
2. Wider range of power handling capabilities for today's high-powered products to reduce investment on power supply hardware
3. Improved test throughput to increase production volumes, making more tester resources available

The Series 5 – Saves Costs. No Compromise.

Data Sheet

The Keysight *Medalist* i3070 Series 5 In-Circuit Test System comes with industry-leading limited access test technology, including the multiple-award-winning Cover-Extend Technology.

KEYSIGHT TECHNOLOGIES

Latest Features on the Series 5 ICT System

New Analog Measurement Card

The new Analog Stimulus and Response Unit (ASRU) includes

1. **BT-Basic DLL Integration**
   This feature allows users to call any external DLL function by passing the parameters and receiving the results within the BT-Basic environment. Examples of DLL functions include flash programming, updating of databases and functional tests.

2. **Keysight *Medalist* i3070 LED Test***
   Medalist i3070 LED Test is an industry-first digital LED test, integrated into ICT, to inspect the color and intensity of LEDs in the visible light spectrum (400-660 nm). It provides fast, reliable, and accurate inspection of LEDs for color (wavelength) and luminosity (intensity).

3. **Two channels of high current capabilities of up to 10 A per channel**
   The DUT power supply channels 3 and 4 on the ASRU card have their current capabilities increased from 4 A to 10 A per channel. This allows the channels to carry 10 A currents into the board for high current application testing, such as power supplies.

4. **Power Monitoring Circuit**
   The Power Monitoring Circuit (PMC) is a new safety feature. It not only provides real time monitoring but also helps users to distinguish between a power supply failure or a digital test failure in the event of a failed digital test. This feature also tries to prevent the back-drive current that can cause damage to ICs.

5. **Fixture power supply**
   This powering capability is intended for fixture electronics and other external powering purposes. It is controlled by the user with BT-BASIC commands for enabling and disabling.

6. **60 V zener testing capabilities**
   In today's boards, because of their higher voltage power supply requirements, larger zener diodes are required. With the new ASRU card, a maximum of 60 V zeners can be tested instead of up to 18 V.

7. **Digitized Measurement Circuit (DMC) with new frequency options**
   The purpose of this circuit is to speed up the analog testing by using multiple ports on a microcontroller to digitize, at one time, the multiple readings taken during a test. The microcontroller ports can be assigned to the stimulus and response busses as well as the sense busses, so that all four readings on a 4-wire measurement can be taken at one time. This Digitized Measurement Circuit comes with two new frequency options: fr100k and fr200k. These frequencies are added to the AC testing methods for passive components like capacitors and inductors for better isolation of smaller components during test.

   This new measurement circuit is different and separate from the analog measurement circuit using Measurement Op-Amplifier (MOA). Tests generated for the MOA will have to be re-debugged if tested with the DMC because the internal circuit characteristics are different from the MOA. The stability and reliability of the measurement after the test has been debugged remains the same as when measured with the MOA circuit.

** (Appropriate hardware is needed)*

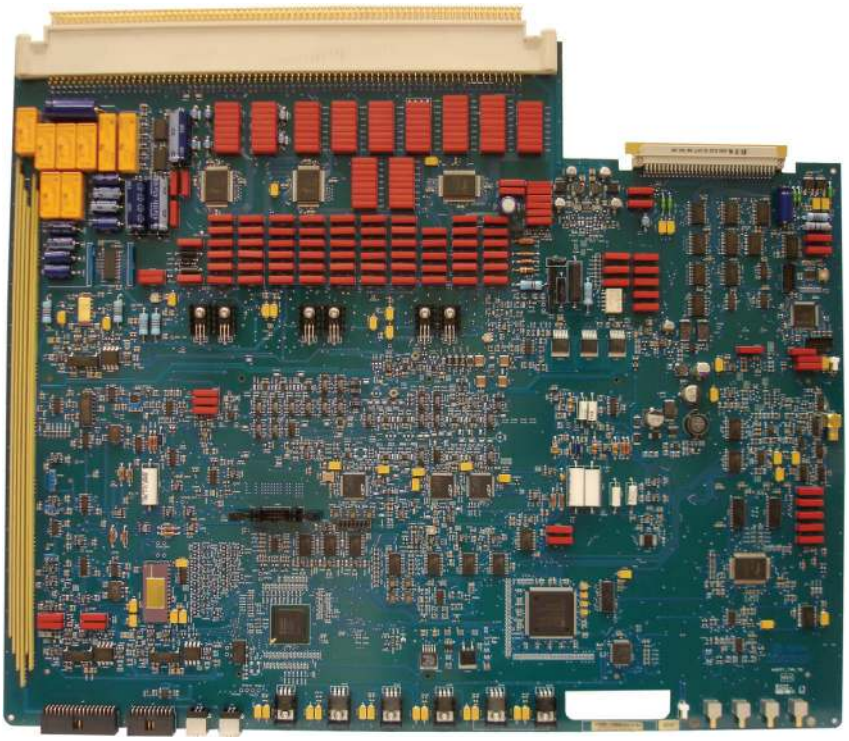

Figure 1. The new analog stimulus and response unit card in the Medalist i3070 Series 5 offers users many new features and faster analog tests

Latest Features on the Series 5 ICT System

Incorporating External Electronics

This capability is enabled through both hardware and software features added to the i3070 Series 5 test system.

Introduction of utility card

The new utility card is an optional pin card that will fit in a card slot in any of the modules on the testhead. It has three cavities in the card to allow users to plug in their own custom electronics for added functional test or functionality during ICT. The user can now design his own card and make it part of the tester. One utility card can be installed on each module. Each custom electronics unit should come with the necessary software drivers that can be installed on the testhead controller.

Each cavity on the utility card has two connectors; one is mainly for a signal bus to the board under test and the other for power and control to the external electronics installed in the cavity.

Please refer to the Keysight data sheet 5990-4411EN (Keysight Utility Card Specifications) for more details on the utility card.

Connecting external instruments or equipment

Balanced multiplexed 1:4 75 Ω ports

Two balanced 1:4 multiplexed 75 Ω ports are available on the utility card to allow users to add differential signals to the board under test. These ports can be used individually for single sided signals.

Parameter	Rating
Number of ports	2
Multiplexing	1:4
Bandwidth	3 dB (at 35 MHz ±3 MHz)
Crosstalk	< 1 MHz (–55 dB ±2 dB)
Maximum current	2 A ±0.5 A
Impedance	75 Ω per pair

General purpose relays

Eight general purpose relays are available on the utility card. The control of these relays in software is the same as for the general purpose relays on the ASRU.

Flexible 1:6 multiplexed power supply channels

The Utility Card allows 48 V at 10 A on each of two 1:6 port power supply channels. Each power supply channel can be user-configured to be multiplexed to supply power to up to six individual boards on a panel or the individual relays can be configured to switch together to enable testing of a single board which requires 10 A current power supplies.

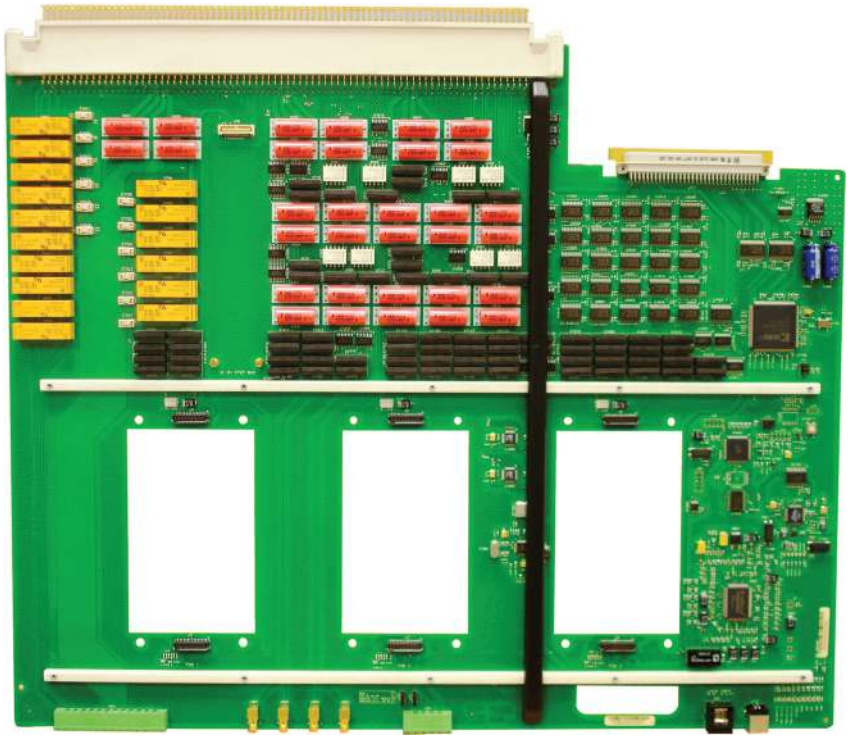

Figure 2. The new utility card on the Medalist i3070 Series 5 allows for customizable functional tests to be added at the in-circuit test process

Latest Features on the Series 5 ICT System

Software Enhancement

The Series 5 also includes software and enhancements listed below, and retains all the user-friendly features of the original i3070 system, such as:

- **DC test method for large capacitor testing**
  When testing large capacitors, it is possible to specify the current instead of using the standard 100 mV across the capacitor.
- **Ease of use**
  Point-and-click interfaces remove the user's need to type in commands during the operation of the tester
- **Board Locator**
  The Board Locator allows the user to search for any component on the board under test as well as probes and testhead resources.
- **AutoOptimizer**
  Keysight *Medalist* i3070 tests can be optimized with the click of a button, reducing test time by 10 to 50 percent per test.
- **AutoDebug**
  With the click of a button, the system can perform a complete analog test debug in a matter of hours. AutoDebug fine-tunes tests so boards pass reliably in production.

Please refer to the *Keysight Medalist i3070 In-Circuit Test System* data sheet 5989-6292EN for detailed information on the original features which users can continue to enjoy on the Series 5.

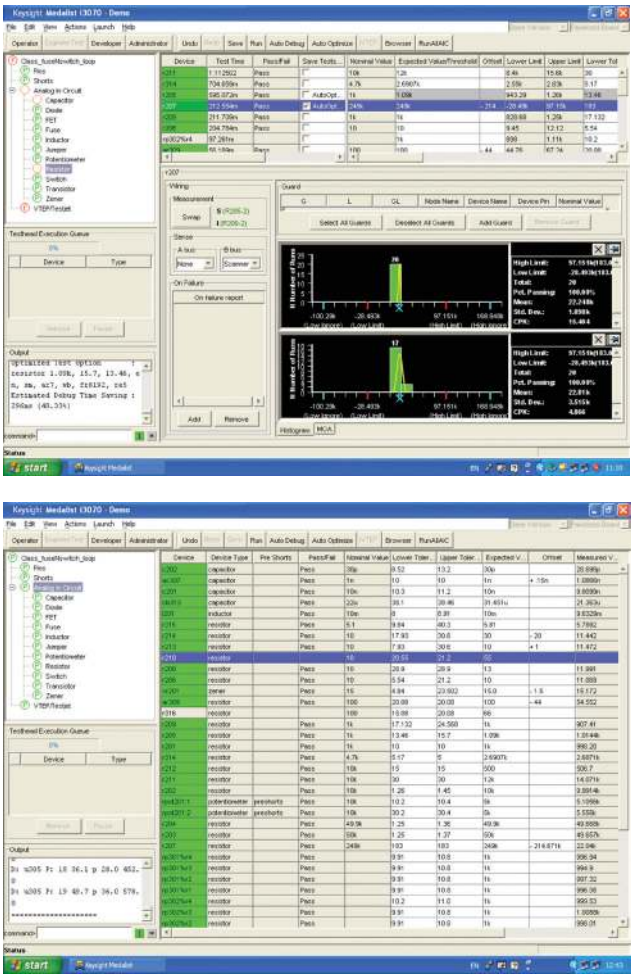

Figure 3. The Series 5 retains all the easy-to-use interfaces that many users are now accustomed to on the Medalist i3070 system

Related Keysight Literature

Publication title	Pub number
Keysight Medalist i3070 ICT Data Sheet	5989-6292EN
Keysight Utility Card Specifications	5990-4411EN
Medalist i3070 In Circuit Test – Utilizing the most comprehensive Limited Access Solution on In Circuit Test – A Case Study	5990-3741EN
Keysight Medalist VTEP v2.0 Powered! With Cover-Extend Technology Flyer	5989-8429EN
Overcoming Limited Access with Cover-Extend Technology at In-Circuit Test Case Study	5990-4218EN
IEEE 1149.6 Standard Boundary Scan Testing on Keysight Medalist i3070 In Circuit Systems White Paper	5990-3232EN
Keysight Medalist Bead Probe Technology Product Overview	5989-5802EN
Comparing Contact Performance on PCBA using Conventional Testpads and Bead Probes White Paper	5989-9918EN
Using Bead Probes to Increase Test Access Case Study	5989-8420EN

Related literature can be located on Keysight's *Medalist* In-Circuit Test Solutions web site at: www.keysight.com/find/ict under the "Library" tab.

Specifications

	Keysight *Medalist* i3070 Series 5 Multiplexed	Keysight *Medalist* i3070 Series 5 Un-multiplexed
Maximum channels	1152	5184
Maximum nodes	5184	5184
Pin card	HybridPlus double density	Un-multiplexed hybrid 144 channel
Driver/receiver mux ratio	9:2 multiplexing	1:1 tester-per-pin
Vector application rate	6.25 MPs, 12.5 MPs, 20 MPs	6.25 MPs
Logic level	–3.5 V to 5 V (per digital channel pin programmable)	0 to 4.75 V (per-pin programmable)
Logic threshold	Dual threshold	Single threshold
Slew rate	25 V/µsec to 275 V/µsec (per digital channel pin programmable)	300 V/µsec (optimized fixed rise/fall time)
Digital driver/Receiver offset	–30 n to +100 n (per digital channel pin programmable)	Not applicable
Operating system	Windows 7 Professional	
Test generation toolset	Board Consultant Fixture Consultant Test Consultant	Time-to-money test development
Board/Fixture graphics display	Browser Board Consultant Fixture consultant	Browser
Circuit analysis	Automatic (IPG) with Monte Carlo simulation	
Keysight *Medalist* i3070 Application Software	Windows graphical user interface (supports localization)	
Probe pin locator	Interactive probe/pin locator with guided probed	
Runtime yield display	Real time FPY (First Pass Yield) display at runtime	
Probe/fixture maintenance tools	Worst probe reporting (reports real time fixture probe number that fails frequently)	
Yield enhancement tool	IYET (Intelligent Yield Enhancement Tool)	
Analog unpowered debug interface	Graphical user interface in spread sheet format (supports localization)	
Digital/Analog powered debug interface	PushButton Debug	
AutoDebug	AutoDebug on analog unpowered tests, TestJet, VTEP v2.0 (VTEP, iVTEP and NPM) and Cover-Extend Technology	
Modular construction for flexibility/scalability	(1 to 4) Standard	
Dual-well construction for maximum throughput	Standard	
Throughput multiplier	Standard	
Failure message printer	Standard (strip printer)	
Vacuum solenoids	Built-in standard	

Specifications

	Keysight *Medalist* i3070 Series 5 Multiplexed	Keysight *Medalist* i3070 Series 5 Un-multiplexed
System power input connections	Included (power supply type will be specified based on regional requirements)	
Shipping and installation assistance	Included (Keysight authorized representative)	
Analog unpowered measurement	2 to 6 wire measurement	
Backdriving current	750 mA	
Backdriving test program setup	Automatic by logic family	
Overvoltage protection	Yes	
Capacitor discharge protection	Yes	
Arbitrary waveform generator	Yes	
Fixture types supported	Short wire, long wire	
Repeatability	Excellent	
Transportability	Excellent	
Temperature compensation	AutoAdjust at every 5° C temperature drift/1000 hours of operation	
Open/short testing	Yes (automatic IPG)	
Analog testing	Yes (automatic IPG)	
Vector programming	VCL and PCF	
Vectorless testing	VTEP v2.0 and TestJet	
NAND tree program generator	Language based	
Disabling analysis	Yes (automatic IPG)	
Digital test pattern generator	Yes	
Frequency measurement	60 MHz (beyond 60 MHz measurement possible using fixture electronics solution)	
Multilevel disable (digital isolation)	Yes	
High-voltage testing capability	100 V	
Low-voltage testing capability	No limit	
Number of analog guarding points	Unlimited	
Worst probe report	Yes	
First pass yield report	Yes	
Component-level coverage report	Yes	
Intelligent yield enhancement test	Yes	
Limited access tools	Yes	
Flash 70 device programming	Yes	
Polarity check software	Yes	
ICT Boundary Scan	Yes	
PanelTest for panelized PCBAs	Yes	
Simplate express fixturing software	Yes	
Standard i3070 operating system	Yes	
Multiple board versions software	Yes	
Dual-well sharing	Yes	
Throughput multiplier	Yes	
Relay-level diagnostics tool	Included	1-year license
SPC quality tool	Push-button Q-Stats	

Specifications

	Keysight *Medalist* i3070 Series 5 Multiplexed		Keysight *Medalist* i3070 Series 5 Un-multiplexed
Software products			
Test development software bundle (stand alone)	Includes:	Express fixturing Drive thru Flash programming Flash ISP Advanced probe spacing TestJet Boundary Scan Polarity check Silicon nails Flash70	Multiple board versions Dual-well sharing PLD ISP VTEP v2.0 Powered VTEP iVTEP NPM Cover-Extend Technology InterconnectPlus Advanced Boundary Scan 1149.6 Throughput multiplier Panel test
InterconnectPlus Boundary Scan	Advanced Boundary Scan tool suite		
Drive-Thru for VTEP v2.0	Test development software for Vectorless Test Extended Performance (VTEP) tool		
TestSight Developer	CAD translation software for ICT test and fixture development		
Flash ISP	In-system programming for flash memory devices		
ISP suite	Combined flash and PLD in-system programming software suite		
Silicon nails	Test development tools for limited access test coverage		
Cover-Extend	A hybrid of Boundary Scan and VTEP testing for added test coverage on limited test access boards		
Connect Check	Analog testing in a limited access environment		N/A

Analog capabilities	
Shorts and Opens	2 Ω – 1000 Ω ± (0.25% + 2.2 Ω)
Resistors	0.1 Ω to 10 MΩ ± (0.25% to 5% + plus system residual ≤ 3.5 W)
Capacitors	10 pf to 10 mf ± (2% to 6% + *) * Plus system residual: ± 1 pF with capacitor compensation, 0 to +40 pF typical without capacitor compensation
Inductors	5 µH to 100 H ± (2% to 5%) + plus system residual: 1 µH
Potentiometer	Same method as resistors
Diode	± 0 – 19 V ± (1.0% of reading + 4 mV) + plus system residual: ≤ 3.5 mV/mA
Zener	± 0 – 18 V ± (1.0% of reading + 4 mV) + plus system residual: ≤ 3.5 mV/mA8 ± 19 – 60 V ± (1.0% of reading + 4 mV) + plus system residual: ≤ 3.5 mV/mA8
Transistor	Same method as Diode + DC Beta (10-1000 ± (15.0%))
Depletion FET	5 Ω – 500 Ω ± 1.0% + plus system residual ≤ 3.5 W
Fuse, switch, jumper	0.1 Ω – 500 Ω ± 1.0% + plus system residual ≤ 3.5 W

Specifications

	Keysight *Medalist* i3070 Series 5 Multiplexed	Keysight *Medalist* i3070 Series 5 Un-multiplexed
Modules and pin cards		
Pin card	Hybrid plus double density Analog plus double density Access plus Utility	Un-multiplexed hybrid 144-channel Utility
Measurement card	ASRU (Analog Stimulus Response Unit) Revision N	
Control card	Control XTP	
Number of modules supported	1 to 4 modules (additional modules activation package to expand capabilities of systems having unused empty modules. Required additional hybrid card, Control XTP, ASRU card and associated cabling and hardware)	
DUT power supplies		
DUT power supplies type*	Keysight PS6751Quad Output (0-50 V/0-5 A) Keysight 6624 Quad Output (0-20 V/0-2 A, 0-7 V/0-5 A, 0-50.5 V/0.0824 A, 0-20.2 V/0-2.06 A) Keysight 6621A Dual Output (0-7 V/0-10 A, 0-20.2 V/0-4.12 A) Keysight 6634 Single Output (0-100 V/0-1 A) Keysight 6642 Single Output (0-20 V/ 0-10 A)	
Number of supply channels	Up to 24 programmable supplies or up to 32 channel with utility card	
Accessories		
Bar code reader	For data entry of DUT board serial number	
Pin verification fixture	For system calibration and diagnostics	
Performance port	To add external signal capabilities to your i3070 system	
Product support kits	Multiple optional kits to choose from	
Consulting services	Multiple service options and products to choose from	
User training	Multiple optional training programs to choose from	

* *Refer to Keysight Medalist i3070 Series 5 Test Method and Specifications for more details*

Additional information on Keysight's *Medalist* In-Circuit Test Solutions can be found at www.keysight.com/find/ict

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Published in USA, August 2, 2014
5990-4344EN
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