



# IC100-S

## Automatic Test System for Integrated Circuits

The 100-S packs a variety of fast and powerful instruments into a small box at a small price.

This rugged little tester is fully capable of high volume production testing. It includes everything needed to test most low-to-medium complexity analog, digital, and mixed-signal IC's. It is the perfect choice when testing devices with serial interfaces like I<sup>2</sup>C and SPI.



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# IC100-S Overview

## Features:

- Space saving footprint, integrated computer, small light-weight test head
- Fill-in-the-blanks software for easy, intuitive test development
- Summary sheets, Datalogs, and a Prober/Handler interface are included
- Curve-Tracer software gives engineers a built-in, efficient lab tool
- Up to 16 SMU's, 16 digital inputs & 16 outputs, serial ports, 32 relay controls

## Applications:

- Power Management Device with serial microcontroller interfaces
- Serially-programmable Analog Switches, Multiplexers, DAC's & ADC's
- Common Analog & Mixed-Signal IC's like Op Amps, Regulators, References

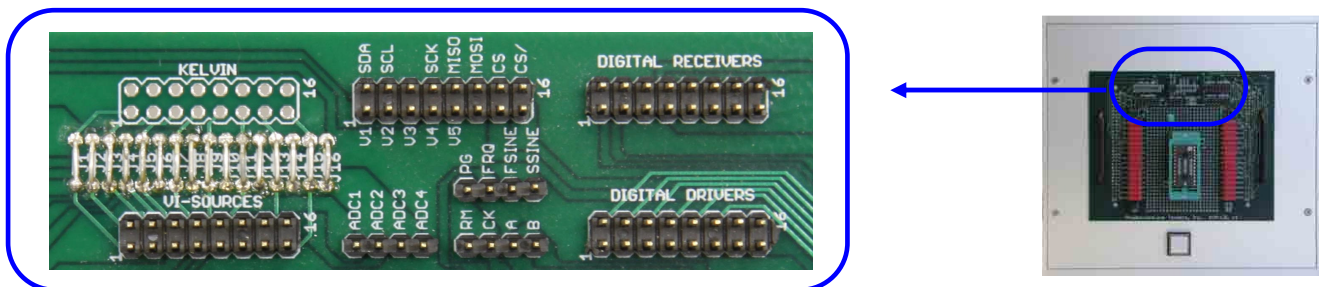
## Instrumentation:

- 4 to 16 VI-Sources: Kelvin, 4-quadrant,  $\pm 20V$ ,  $\pm 200mA$
- I<sup>2</sup>C serial interface to 3.4MHz
- SPI serial interface to 20MHz
- 16 Digital Drivers with programmable VIH and VIL
- 16 Digital Receivers with programmable Vt
- 24-bit ADC with programmable conversion speed & resolution
- 32 independent loadboard relays
- 5 user-defined 16-bit DAC's,  $\pm 10V$  outputs

## Factory Requirements:

- Switchable 110VAC or 240VAC, less than 500 watts
- Card Cage Box: 13" (330mm) deep x 10.85" (275mm) wide x 9.3" (236mm) tall
- Test Head Box: 8" (203mm) deep x 8.35" (212mm) wide x 1.75" (45mm) tall

## Simple connections between tester and DUT



Each tester instrument is routed to the loadboard, and is clearly marked on the loadboard silkscreen for easy connections to the DUT. Every signal has an internal relay between the tester and the DUT that automatically opens and closes. In this way, multiple instruments may be shorted together at the DUT, without interfering with each other.

# Fill-in-the-blank Programming

Each cell of each test may be individually programmed.

| Test Name    | Relays   | Sources | Digital | Serial | AD/DA  | PUT | Min | Max    | Units  | Bin |
|--------------|----------|---------|---------|--------|--------|-----|-----|--------|--------|-----|
| 1 ICC        | 1, 3, 29 | 5.5 V   |         |        | 22 bit | VCC | 0   | 200 uA |        | 2   |
| 2 Write Reg1 | 3, 19    | 0       | 3F45    | I2C    |        | SDA | 0   | 0      | I2C Wr | 8   |
| 3 ReadReg 1  | 3, 19    | 0       | 7FFF    | I2C    |        | SDA | 255 | 255    | I2C Rd | 7   |

Double-clicking main spreadsheet here ...

...opens the Serial tab for programming Test 3 here.

Serial configuration window for Test 3: ReadReg 1. The 'Serial' tab is active, showing 'use I2C' selected. The I2C Port section includes SCL Frequency (400 KHz) and DUT Address (32). A table shows R/W operations for addresses 0-7. The SPI Port section is disabled. Data Format is set to Hex, 1 byte per cell.

| R/W   | 0  | 1  | 2  | 3  | 4 | 5 | 6 | 7 |
|-------|----|----|----|----|---|---|---|---|
| Write | 64 | 02 | 5A | 5A |   |   |   |   |
| Write | 64 | 06 | 00 | 00 |   |   |   |   |
| Read  | 65 | 5A | 5A |    |   |   |   |   |

This example shows how to program the I<sup>2</sup>C port. In the main spreadsheet, select the test (row) and the appropriate tester resource (column).

In this device, the two I/O ports are programmed through the I<sup>2</sup>C port with the data pattern "5A", using control code "02". Then the direction is changed to input using control code "06". Finally, the Read is done, and the expected data is entered into bytes 1 and 2. (Note this data is NOT sent to the DUT, but is for comparison purposes.)

The tester calculates the first I<sup>2</sup>C byte (in column 0) and also takes care of the start bit, stop bits, and acknowledge handshaking automatically. The actual data sent by the DUT will be compared to the "5A" expected pattern.

| Test # | Test Name | Results | Min  | Max | Units |
|--------|-----------|---------|------|-----|-------|
| 1      | ICC       | 0.583   | 0    | 1.2 | mA    |
| 2      | ICC2      | 0.815   | 0    | 2   | mA    |
| 3      | VDS       | 0.664   | -10  | 10  | mV    |
| 4      | IDS       | -1.308  | -50  | 50  | mA    |
| 5      | IB+       | 15.399  | -250 | 250 | nA    |
| 6      | IB-       | -20.673 | -250 | 250 | nA    |
| 7      | VO+       | 13.253  | 13   | 20  | V     |
| 8      | VO-       | -13.526 | -20  | -13 | V     |
| 9      | CMRR+     | 14.005  | 12   | 20  | V     |
| 10     | CMRR-     | -13.640 | -20  | -12 | V     |
| 11     | CMRR      | 97.374  | 65   | 999 | dB    |
| 12     | PSRR+     | 0.576   | -10  | +10 | mV    |
| 13     | PSRR-     | -7.134  | -10  | +10 | mV    |
| 14     | PSRR      | 161.683 | 64   | 999 | dB    |
| 15     | AVOL+     | 0.595   | -10  | 10  | mV    |
| 16     | AVOL-     | 0.715   | -10  | 10  | mV    |
| 17     | AVOL      | 83.379  | 25   | 999 | V/V   |

Realtime Results

Loadboard Relays configuration window for Test 9: CMRR+. Shows a grid of relay checkboxes (K1-K29) and a 'Setting Time' field set to 1 msec.

Loadboard Relays

| Source | DUT Pin | Force Value | Units | Compliance | Comp. Units |
|--------|---------|-------------|-------|------------|-------------|
| 1      | IN-     | 13.5 V      |       |            | 5 mA        |
| 2      | IN+     |             |       |            |             |
| 3      | V+      | 15 V        |       |            | 5 mA        |
| 4      | V-      | -15 V       |       |            | -5 mA       |
| 5      | LoopOut | 1 mA        |       |            | 19 V        |
| 6      | LO100x  |             |       |            |             |
| 7      | Out100x |             |       |            |             |
| 8      | Out     |             |       |            |             |
| 9      | LoopIn  |             |       |            |             |

Programming VI-Sources

# IC100-S Instruments

|                  |                              |   |
|------------------|------------------------------|---|
| DVI              | Dual VI-Source               | 4-quadrant Kelvin voltage/current sources, $\pm 20V$ , $\pm 200mA$  |
| I <sup>2</sup> C | I <sup>2</sup> C Serial Port | Automated I <sup>2</sup> C port, 64 byte buffer, to 3.4MHz          |
| SPI              | SPI Serial Port              | Flexible Serial port sends/receives up to 256 bytes, to 20MHz       |
| DRV              | Digital Drivers              | 16 Digital Drivers, 0 to 5V amplitude, up to 64 vectors per test    |
| RCV              | Digital Receivers            | 16 Digital Receivers, 0 to 5V threshold, 64 vectors per test        |
| 24B              | 24-bit Voltmeter             | 24-bit ADC, $\pm 20V$ input, programmable speed and resolution      |
| LBK              | Loadboard Relays             | 32 independent and uncommitted, user-controlled relays              |
| DAC              | 16-bit Voltage Srcs          | 5 precision voltage sources, $\pm 10V$ outputs                      |
| PLS              | Pulse Generator              | DDS, 50MHz max, programmable bursting                               |
| SINE             | Sine Generator               | DDS, 0 to 20MHz, 0 to 10Vp-p  |
| TIA              | Time Analyzer                | Rise/Fall, tpd, width. $\pm 1nsec$ accuracy, $< 100psec$ resolution |

Specifications subject to change without notice.  
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