Analog and Mixed-Signal Boundary-Scan (IEEE 1149.4 Std.)
5.1 The Simplest Concept of 1149.4

The simplest concept of the 1149.4 Standard is to imagine that we have integrated a portion of an ATE system’s analog measurement bus and multiplexing system into an IC, eliminating the need for ICT access to it.

Ken Parker

The first important characteristic to note about the IEEE 1149.4 Std is that it is intended for use with lower frequencies: from DC to around 10 MHz. If this seems like a serious limitation, consider the fact that virtually all the boards tested with ICT over the last 25 years have had their analog components tested at 10 kHz or less!

5. Analog and Mixed-Signal Boundary-Scan Technology
5.2 General Architecture of 1149.4 Device

5. Analog and Mixed-Signal Boundary-Scan Technology
5.3 TBIC Switching Structure

For Interconnect Test on AT1/AT2 pins

For Isolation and Characterization

ATn disconnected from ABn via S5 ... S8

V_H and V_L allow fixed “1” and “0”

Noise suppression via S9, S10, V_{clamp} when ABn are not in use

5. Analog and Mixed-Signal Boundary-Scan Technology
5.4 Control Structure for TBIC Switches

From TAP

- Mode 1
- Mode 2

From TBIC Digitizers

- DAT1
- DAT2

Control Structure for TBIC Switches

- S1
- S2
- S3
- S4
- S5
- S6
- S7
- S8
- S9
- S10

Uncommitted, may be used for improved TBIC testability

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5.5 ABM Switching Structure

One-bit digitizer that creates a digital interpretation of the voltage on the analog I/O pin and used to support 1149.1-style interconnect tests.

Volatges $V_L$ and $V_H$ are used to create digital voltage levels on the analog pin in support of 1149.1-style interconnect tests.

Voltage $V_G$ is used in support of analog metrology. It should be a reference quality voltage.

Internal measurement bus wires AB1 and AB2: it’s required that AB1 be able to provide a current to the pin, and that AB2 be able to monitor the pin voltage.

5. Analog and Mixed-Signal Boundary-Scan Technology
5.6 Control Structure for ABM Switches

From TAP

{ Mode1  Mode2 }

From ABM Digitizer

Uncommitted, may be used for improved ABM testability

To TDO

M1  M2

DPin

C

B2  B1

From TDI

ABM Control Decode Logic

SD  SH  SL  SG  SB1  SB2
5.7 **PROBE Instruction**

Waveform appearing on any analog pin...

...can be monitored at AT2 in real time!

5. Analog and Mixed-Signal Boundary-Scan Technology
5.8 DC Measurements

\[ R = \frac{V}{I} \]

5. Analog and Mixed-Signal Boundary-Scan Technology
Are you interested to continue? 
Explanations and details?
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