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IEEE Standard for Access and Control of Instrumentation Embedded within a Semiconductor Device

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IEEE Std 1687™-2014

IEEE Standard for Access and Control of Instrumentation Embedded within a Semiconductor Device

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Test Technology Standards Committee
of the
IEEE Computer Society

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Abstract: A methodology for accessing instrumentation embedded within a semiconductor device, without defining the instruments or their features themselves, via the IEEE 1149.1™ test access port (TAP) and/or other signals, is described in this standard. The elements of the methodology include a hardware architecture for the on-chip network connecting the instruments to the chip pins, a hardware description language to describe this network, and a software language and protocol for communicating with the instruments via this network.

Keywords: access network, built-in self-test (BIST), boundary scan, debug, design for testability (DFT), embedded instruments, IEEE 1149.1™, IEEE 1687™, Instrument Connectivity Language (ICL), internal JTAG (IJTAG), Joint Test Action Group (JTAG), on-chip instrumentation, Procedural Description Language (PDL), test, Tool Command Language (Tcl)

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Introduction

This introduction is not part of IEEE Std 1687™-2014, IEEE Standard for Access and Control of Instrumentation Embedded within a Semiconductor Device.

The development of this standard stemmed from two independent (and unaware of each other) efforts at the 2004 International Test Conference to address issues surrounding the use of the IEEE 1149.1 test access port (TAP) for purposes well beyond boundary scan testing. These efforts were merged, and the Internal JTAG (IJTAG) Working Group was born. The scope of the effort was refined in the following months as more members joined the group to focus on the access to design for testability (DFT) features (more generally called *instruments*) inside devices. The development of the ideas comprising this standard can be traced by presentations at a series of conferences, workshops, and symposia, including ITC'05, BAST'06, ITSW'06, VTS'06, ETS'06, ITC'06, VTS'07, ETS'07, ITC'07, ETS'08, ITC'08, and IOLTS'09, ITC'11, ETS'12, ITC'12, and ITC'13.

Frequently asked questions

The IEEE 1687 web site will include an FAQ.[a]

[a]See http://grouper.ieee.org/groups/1687/.

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IEEE Standard for Access and Control of Instrumentation Embedded within a Semiconductor Device

1. Overview

1.1 Scope

This standard develops a methodology for access to embedded instrumentation, without defining the instruments or their features themselves, via the IEEE 1149.1™ test access port (TAP) and additional signals that may be required. The elements of the methodology include a description language for the characteristics of the features and for communication with the features, and requirements for interfacing to the features.

1.2 Purpose

IEEE Std 1149.1 specifies circuits to be embedded within a semiconductor device to support board test; namely, the TAP, TAP Controller, and a number of internal registers.[1] In practice the TAP and TAP Controller are being used for other functions well beyond boundary scan in an ad-hoc manner across the industry to access a wide variety of embedded instruments. The purpose of the IEEE 1687 initiative is to provide an extension to IEEE Std 1149.1 specifically aimed at using the TAP to manage the configuration, operation, and collection of data from this embedded instrumentation circuitry.

[1] Information on references can be found in Clause 2.