INTERNATIONAL STANDARD

IEC 62014-1

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Electronic design automation libraries –

Part 1:
Input/output buffer information specifications (IBIS version 3.2)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRONIC DESIGN AUTOMATION LIBRARIES-

Part 1: Input/output buffer information specifications (IBIS version 3.2)

FOREWORD

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International Standard IEC 62014-1 has been prepared by IEC technical committee 93: Design Automation

This standard is based on ANSI-EIA-656-A (September 1999): I/O buffer information specifications (IBIS) version 3.2

The text of this standard is based on the following documents:

FDIS	Report on voting
93/129/FDIS	93/136/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This standard does not follow the rules for the structure of international standards given in Part 3 of the ISO/IEC Directives.

IEC 62014 consists of the following parts:

IEC 62014-1, *Electronic design automation libraries – Part 1: Input/Output buffer information specifications (IBIS version 3.2)*

IEC 62014-2, *Electronic design automation libraries – Part 2: Library standard architectures* (TR)(under consideration)

IEC 62014-3, *Electronic design automation libraries – Part 3: Modules of integrated circuits for EMI Behavioural simulation* (under consideration)

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

INTRODUCTION

Background of IBIS

IBIS was first developed at Intel Corporation and has been expanded to its current form (Version 3.2) through the cooperative efforts of additional analog simulator vendors, computer manufacturers, IC vendors, commercial users, and universities. In May 1993, the group formed itself into the IBIS Open Forum, an open, voluntary, cooperative association. In March 1995, the group affiliated with the EIA (now the Electronic Industries Alliance) as the EIA IBIS Open Forum.

The Forum has been and continues to meet via teleconference approximately every third week to propose updates to the IBIS standard, to help new participants, and to advance the standard. The Forum also meets in person about four times a year to exchange ideas and conduct official business.

Most of the Forum activities are handled through e-mail discussions using a reflector "ibis@eda.org." A users group reflector "ibis-users@eda.org" is also supported for users of IBIS. One can get more information on subscribing to the reflectors and to other ongoing Forum activities through the official web page: "http://www.eigroup.org/ibis/ibis.htm". The process of making changes and improvements to IBIS is through a "BIRD" (Buffer Issue Resolution

Document) process involving approval by the Forum voting members. Over the years the Forum has grown to over thirty voting members (requiring a modest yearly fee for administrative support), but the Forum also maintains an open, public communications policy and welcomes all interested participants regardless of membership status.

Through official EIA and ANSI (American National Standards Institution) public letter ballot processes, IBIS Version 2.1 was ratified as ANSI/EIA-656 in December 13, 1995. Version 1.1 of IBIS focused on TTL and CMOS logic components. Although never officially ratified as a national standard, IBIS Version 1.1 served as a basis for advances in Version 2.1 to increase its accuracy and number of device types that are supported.

Version 2.1 contains the following advances:

– Controlled slew rate devices
– ECL and PECL technologies
– Independent control over power rails so RS232 and other types of devices with multiple rails can be modeled
– Differential drivers and devices
– Open-drain I/O devices such as open drain and open collector devices
– Expanded package model definitions to include coupling between pins.

The Forum also voluntarily funded a parser development activity through the sale of source code licenses of "ibischk2" and has made executables of the parser code freely and publicly available to enable IBIS model checking.

Industrial advances associated with new semiconductor topologies, package design and measurement needs kept the Forum busy proposing new capabilities, eventually leading to IBIS Version 3.2. Again through official EIA and ANSI public letter ballot processes, IBIS Version 3.2 was ratified as ANSI/EIA-656-A on September 21, 1999.

Its advances include the following:

– Series and series switch models
– Multi-stage driver capability for phased stages

– Submodel capability supporting dynamic clamps and bus hold functions for active and dynamic terminations

– More specification values for overshoot and pulse immunity

– Uncoupled packages with sections and forks

– Uncoupled advanced packages known as electrical board descriptions with sections, forks and on-board components.

IBIS Version 3.2 has complied with an original Forum objective that all subsequent versions of IBIS be backward compatible with previous versions.

The Forum funded through voluntary source code license purchases the corresponding "ibischk3" parser and has made its executables freely available.

The IBIS Standard has achieved wide spread national and international support and recognition as indicated by over 40 semiconductor vendors providing IBIS models freely from their web sites. Many more IBIS models and libraries are available from commercial vendors and directly through IC vendor sales organizations. While IBIS models can be of value in all phases of a design and analysis process, they are particularly suitable for printed circuit board design tools used in conjunction with the corresponding physical and mechanical data bases describing the boards.

Future IBIS Directions

Technology continues to advance, forcing more stringent electrical requirements and newer ways of doing things. The Forum is keeping up with such advances. However, its strategy has shifted. Up to now the Forum has been adding to the existing fixed-format IBIS document. Such a process is slow and subject to unexpected interactions with existing capability. The newer approach is to create a compatible macro-language that allows more rapid reconfiguration and response to changing needs.

While the Forum has not yet ratified any of these approaches, it is pursuing these projects:

– A macro-language that fully supports IBIS Version 3.2 but can also support more advanced features and nodal component structures

– A separate Connector Specification with advanced coupled stages to support key component used to connect printed circuit boards (and possibly be used for more advanced package models)

– Some further advances in specification details beyond IBIS Version 3.2.

These projects advance the capability of IBIS in a manner that supports the existing IBIS Version 3.2 functionality, but also allows for much more rapid implementation of new requirements.

References

ANSI/EIA-656: IBIS Version 2.1 released December 13, 1995

ANSI/EIA-656-A: IBIS Version 3.2 released September 21, 1999

ELECTRONIC DESIGN AUTOMATION LIBRARIES –

Part 1: Input/output buffer information specifications (IBIS version 3.2)

Scope and object

This standard gives specifications for electronic behavioral of digital integrated circuit input/ output analog characteristics. It specifies a consistent software-parsable format for essential behavioral information.

The goal of this standard is to support all simulators of all degrees of sophistication.