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# NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA



# GB/T 35004-2018

## Logic digital integrated circuits -- Specification for I/O interface model for integrated circuit

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# Table of Contents





## Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard uses the translation method equivalent to IEC /T S62404.2007 "Digital Integrated Circuit Input/Output Electrical Interface Model Specification".

## Introduction

With the rapid growth of electronic systems, accurate predictions of electrical performance, including the noise of integrated circuit electronic systems, are becoming more and more

important. Although an emulator can be used to predict the electrical performance of an electronic system, it is necessary to be able to accurately describe the electrical characteristics of the integrated circuit.

Sexual model. Users require semiconductor manufacturers/suppliers to provide corresponding device models for different simulation tools, however some of these models

Not compatible with SPICE. Since the SPICE model contains specific process parameters, it is necessary to sign a non-public agreement with the seller to obtain

These parameters.

Existing integrated circuit models. IBIS (Input/Output Buffer Interface Specification, approval number IEC 62014-1) has the following characteristics.

* The electrical characteristics of the I/O buffer are described in tabular form, so that specific information disclosed, such as process parameters, can be significantly reduced.

* It is easy to get an IBIS model that is compatible with multiple simulation tools.

* Open source tools that convert SPICE models into IBIS models.

However, the IBIS model has the following problems.

* The current and ground current models are not accurately used for power and ground bounce analysis.

* Since the IBIS model has only input and output phases, it is difficult to establish the impact of the load on the board based on the input and output waveforms.

model. The fixed model of IBIS is not suitable for flexible description of other circuit systems.

* In order to accurately simulate EMI characteristics, more information such as material constants and three-dimensional structures is required.

Digital integrated circuit input/output electrical interface

Model specification

## 1 Scope

In order to provide a standard for the analysis of the electrical characteristics of the device, the following items need to be considered to make the input signal and output signal of the integrated circuit

Standardization of electrical models for numbers, power supplies, and ground ports.

a) Standardize on existing standards to address existing problems and expand analytical capabilities.

b) Define more flexible description rules for electronic circuits to provide more accurate PCB analysis.

c) Introduce a modeling level concept to provide relevant data for each application.

d) Improve the electrical model of the package and module.

## 2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article.

Pieces. For undated references, the latest edition (including all amendments) applies to this document.

IEC 62014-1.2001 Electronic Design Automation Library Part 1. Input/Output Buffer Information Specification (Electronicdesign

automationlibraries-Part 1. Input/outputbufferinformationspecifications) (IBIS version 3.2)

## 3 Terms and definitions

Under consideration.

### 4.1 Overview

The interface model diagram is shown in Figure 1.

Figure 1 interface model diagram

### 4.2 Model coverage

The circuit described by the model covers some or all of the input/output buffers and packages.

### 4.3 Circuit Language

The circuit should be described as an extended SPICE structure. This architecture allows simple buffers, complex buffers, and power supplies to be described in a uniform format.

And ground, package and complex memory modules.

### 4.4 device model

The characteristics of a nonlinear device are described in a one-, two-, or three-dimensional form file.

### 4.5 Model structure

The model's data includes the integrated circuit, package, and module sections. Therefore, each part can be generated independently.

### 4.6 Simulation

The printed circuit board's netlist and the input/output buffer model defined by the

specification provide accurate circuit simulation results.

### 4.7 Association with IBIS

It is beneficial to further develop tools for extracting IBIS data.

## 5 model structure

The model should describe the internals, packages, and modules of the IC, as shown in Figure 2.

The components of the IC, package and module model are shown in Table 1.

The IC, package and module data structures are shown in Figure 3, Figure 4, and Figure 5, respectively.

Figure 2 Levels of the three models

Table 1 Components of the model framework

File component description

IC model file

Title IC type, model version, model level

External terminal of the external port IC (package line)

Pad layout IC pad connection to internal port

Circuit description internal circuit and connection

Input excitation distributes internal circuitry and excitation produces output waveforms

Input excitation input waveform

Device model

Characteristics of nonlinear devices in one-, two-, and three-dimensional table data. Nonlinear device

Such as triodes, diodes, etc.

The package model name used by the package model reference

Package model file

Title package name, model version, model level

Model name package model model list

Inter-comparison of internal port internal ports and package internal circuit models

External port external circuit and package internal circuit model