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Contents

1. Overview 1
1.1 Scope 1
1.2 Purpose 1
1.3 Application 1
1.4 Annexes 2

2. Definitions, abbreviations, and acronyms 2
2.1 Definitions 2
2.2 Abbreviations and acronyms 4

3. Structure of this standard 5
3.1 Layers 5
3.2 Signal Modeling Language (SML) layer 6
3.3 BSC layer 6
3.4 TSF layer 6
3.5 Test requirement layer 6
3.6 Using the layers 7

4. Signals and SignalFunctions 7
4.1 Introduction 7
4.2 Physical signal states 8
4.3 Event states 9
4.4 Digital stream states 9

5. SML layer 10

6. BSC layer 11
6.1 BSC layer base classes 11
6.2 General description of BSCs 11
6.3 SignalFunction template 12

7. TSF layer 12
7.1 TSF classes 13
7.2 TSF signals defined by a model 13
7.3 TSF signals defined by an external reference 16

8. Test procedure language (TPL) 16
8.1 Goals of the TPL 16
8.2 Elements of the TPL 16
8.3 Use of the TPL 17

9. Maximizing test platform independence 17

Annex A (normative) Signal modeling language (SML) 18
A.1 Use of the SML 18
A.2 Introduction 18
A.3 Physical types 19
A.4 Signal definitions 22
A.5 Pure signals 24
A.6 Pure signal-combining mechanisms 26
A.7 Pure function transformations 32

iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC 62529:2012
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A.8 Measuring, limiting, and sampling signals 32
A.9 Digital signals 34
A.10 Basic component SML 38
A.11 Fast Fourier analysis support 63

Annex B (normative) Basic signal components (BSC) layer 65
B.1 BSC layer base classes 65
B.2 BSC subclasses 65
B.3 Description of a BSC 69
B.4 Physical class 76
B.5 PulseDefns class 87
B.6 SignalFunction class 89

Annex C (normative) Dynamic signal descriptions 143
C.1 Introduction 143
C.2 Basic classes 144
C.3 Dynamic signal goals and use cases 152

Annex D (normative) Interface definition language (IDL) basic components 153
D.1 Introduction 153
D.2 IDL BSC library 153

Annex E (informative) Test signal framework (TSF) for C/ATLAS 154
E.1 Introduction 154
E.2 TSF library definition in extensible markup language (XML) 154
E.3 Interface definition language (IDL) for the TSF for C/ATLAS 154
E.4 AC_SIGNAL<type: Current|| Power|| Voltage> 155
E.5 AM_SIGNAL 157
E.6 DC_SIGNAL<type: Voltage|| Current|| Power> 159
E.7 DIGITAL_PARALLEL 161
E.8 DIGITAL_SERIAL 163
E.9 DIGITAL_TEST 165
E.10 DME_INTERROGATION 168
E.11 DME_RESPONSE 171
E.12 FM_SIGNAL<type: Voltage|| Power|| Current> 174
E.13 ILS_GLIDE_SLOPE<type: Voltage|| Power> 177
E.14 ILS_LOCALIZER<type: Power|| Voltage> 180
E.15 ILS_MARKER 183
E.16 PM_SIGNAL 186
E.17 PULSED_AC_SIGNAL<type: Current|| Power|| Voltage> 188
E.18 PULSED_AC_TRAIN<type: Voltage|| Current|| Power> 190
E.19 PULSED_DC_SIGNAL<type: Voltage|| Current|| Power> 192
E.20 PULSED_DC_TRAIN<type: Voltage|| Current|| Power> 194
E.21 RADAR_RX_SIGNAL 196
E.22 RADAR_TX_SIGNAL<type: Current|| Voltage|| Power> 199
E.23 RAMP_SIGNAL<type: Voltage|| Current|| Power> 200
E.24 RANDOM_NOISE 202
E.25 RESOLVER 204
E.26 RS_232 207
E.27 SQUARE_WAVE<type: Current|| Voltage|| Power> 208
E.28 SSR_INTERROGATION<type: Voltage|| Current|| Power> 210
E.29 SSR_RESPONSE<type: Voltage|| Current|| Power> 213
E.30 STEP_SIGNAL 217
E.31 SUP_CAR_SIGNAL 219
E.32 SYNCHRO 221
E.33 TACAN 225

iTeh STANDARD PREVIEW
(standards.iteh.ai)
IEC 62529:2012
https://standards.iteh.ai/catalog/standards/sist/29f9de39-36b3-4cb3-9567-71126186e247/iec-62529-2012

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E.34 TRIANGULAR_WAVE_SIGNAL<type: Voltage|| Current|| Power> 229
E.35 VOR 231

Annex F (informative) Test signal framework (TSF) library for digital pulse classes 235
F.1 Introduction 235
F.2 TSF library definition in extensible markup language (XML) 235
F.3 Graphical models of TSFs 235
F.4 Pulse class family of TSFs 235
F.5 DTIF 252

Annex G (normative) Carrier language requirements 254
G.1 Carrier language requirements 254
G.2 Interface definition language (IDL) 254
G.3 Datatypes 254
G.4 Data-processing requirements 259
G.5 Control structures 263

Annex H (normative) Test procedure language (TPL) 265
H.1 TPL layer 265
H.2 Elements of the TPL 265
H.3 Structure of test requirements 265
H.4 Carrier language 265
H.5 Signal statements 265
H.6 Mapping of test statements to carrier language 267
H.7 Test statement definitions 267
H.8 Elements used in test statement definitions 285
H.9 Attributes with multiple properties 288
H.10 Transferring data in digital signals 292
H.11 Creating test requirements 296
H.12 Delimiting TPL statements 298

Annex I (normative) Extensible markup language (XML) signal descriptions 300
I.1 Introduction 300
I.2 XSD for BSCs 301
I.3 XSD for TSFs 302

Annex J (informative) Support for ATLAS nouns and modifiers 308
J.1 Signal and test definition (STD) support for ATLAS signals 308
J.2 STD support for ATLAS nouns 308
J.3 STD support for C/ATLAS noun modifiers 311
J.4 Support for C/ATLAS extensions 319

Annex K (informative) Guide for maximizing test platform independence and test application interchangeability 320
K.1 Introduction 320
K.2 Guiding principles 320
K.3 Best practice rules 320

Annex L (informative) Bibliography 323

Annex M (informative) IEEE List of Participants 325

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IEC 62529:2012
https://standards.iteh.ai/catalog/standards/sist/29f9de39-36b3-4cb3-9567-71126186e247/iec-62529-2012

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Abstract: This standard provides the means to define and describe signals used in testing. It also provides a set of common basic signals, built upon formal mathematical specifications so that signals can be combined to form complex signals usable across all test platforms.

Keywords: ATE, ATLAS, automatic test equipment, IEEE 1641, signal definitions, test definitions, test requirements, test signals, unit under test, UUT

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IEEE Introduction

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This signal and test definition (STD) standard provides the ability to unambiguously define test signals. It includes a rigorous mathematical and definitive foundation for all of its signal components. Any signal defined using this standard will be the same regardless of the equipment is used to create it. The standard supports the implementation of new technologies by providing users with the ability to describe their own signals by combining existing signals. Thus, any desired signal may be described, and there is no limit on the extensibility of signals supported by this standard.

Signals defined using this standard can be used in a programming environment of the user's choice provided that that environment fulfills the minimum requirements defined in this standard. This universality enables the user to take full advantage of modern program structures and development environments, including graphical programming environments.

This standard was developed by the Test and ATS Description Subcommittee (of the IEEE Standards Coordinating Committee 20 (SCC20) on Test and Diagnosis for Electronic Systems), which has prepared a companion guide, IEEE Std 1641.1™, to explain how to implement signal definitions and test requirements in conformance with STD.

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1. Overview

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1.1 Scope

This standard provides the means to define and describe signals used in testing. It provides a set of common basic signal definitions, built upon formal mathematical specifications, so that signals can be combined to form complex signals usable across all test platforms. The standard provides support for structural textual languages and programming language interfaces for interoperability.

1.2 Purpose

This standard provides a common reference for signal definitions, which may be used throughout the life cycle of a unit under test (UUT) or test system. Such a reference will in turn facilitate information transfer, test reuse, and broader application of test information—accessible through commercially available development tools.

1.3 Application

This signal and test definition (STD) standard provides the capability to describe and control signals, while permitting a choice of operating environment, including the choice of carrier language. STD permits signal operations to be embedded in any object-oriented environment and thus to be used by the architecture

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standards of various automatic test systems (ATSs). STD may be used to create truly portable test requirements. It will allow test information to pass more freely between the design, test, and maintenance phases of a project and enable the same information to be used directly across project phases. This more efficient use of information will lead to reduced life-cycle costs.

1.4 Annexes

This standard also contains annexes that describe various elements of the standard in detail. The normative annexes include definitions of the basic signals (in words and with reference to an extensible markup language (XML) format), supporting mathematical definitions for these signals, dynamic model information, interface definition descriptions, and a definition of the requirements of a supporting computer language.

Informative annexes are provided to present examples of signal libraries together with their associated XML definition.

2. Definitions, abbreviations, and acronyms

2.1 Definitions

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For the purposes of this document, the following terms and definitions apply. *The IEEE Standards Dictionary: Glossary of Terms & Definitions* should be referenced for terms not defined in this clause.[1]

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Abbreviated Test Language for All Systems (ATLAS): A stylized, abbreviated English language used in the preparation and documentation of test requirements and test programs, which can be implemented either manually or with automatic or semi-automatic test equipment.[2]

argument: Input values that can be passed to a function.

attribute: A property value that is used to define signal characteristics or behavior.

automatic test system (ATS): A system that includes the automatic test equipment (ATE) and all support equipment, support software, test programs, and interface adapters.

base class: A class from which another class inherits attributes or properties.

basic signal component (BSC): The lowest level of building block used to define signals.

class: A generic set of predefined abstract test objects.

component: A part of a system, which may be hardware or software and which may be subdivided into other components. Components communicate their functionality through their interface definitions.

connection: The application of a signal to a unit under test (UUT).

[1] *The IEEE Standards Dictionary: Glossary of Terms & Definitions* is available at http://shop.ieee.org/.
[2] In this standard, the term "ATLAS" refers to any version or subset whether it is a formal standardized version or a project specific modified subset.

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data bus: A signal line or set of signal lines used by a data communication system to interconnect a number of devices and to communicate information.

dynamic signal: A signal whose definition changes over time, by use of the control interface. These changes must be initiated with one of the signal method calls or by changing the interconnections of a signal model.

function: A construct that is a logically separated block of code that operates upon test values (i.e., arguments). Another name for a function is method. Syn: method.

interface definition language (IDL): A machine-compilable language that is used to describe the interfaces that software objects call and object implementations provide. The language provides a neutral way to define software interfaces.

method: *Syn:* **function**.

model: A mathematical or physical representation (i.e., simulation) of system relationships for a process, device, or concept.

physical: Pertaining to the natural characteristics of the universe according to the natural laws of science.

procedural: The part of an signal and test definition (STD) test requirement that defines the tests in the manner and order required for testing.

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property: The special form of method (or function) that supports the semantics of assignment (l-value) and reading (r-value).

reserved word: A keyword whose meaning and use are fixed by the semantics of a language. In certain or all contexts, a reserved word cannot be used for any purpose other than as defined for that language.

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semantics: A branch of linguistics concerned with meaning. For the test procedure language (TPL), semantics is the connotative meaning of words in an TPL statement. For software, semantics is the relationships of symbols and their meaning, independent of the manner of their interpretation and use. For meta-languages, semantics is the discipline for expressing the meanings of computer-language constructs in a meta-language.

sensor: A transducer that converts a test parameter to a form suitable for measurement.

SignalFunction: The name of the base class, for all classes that provide signals.

Subclass: A class that inherits attributes or properties from a base class.

static signal: A signal whose definition does not change over time. All basic signal components (BSCs) and test signal framework (TSF) models are static signals.

syntax: The grammatical arrangement of words in a language statement.

system: A set of interconnected hardware and/or software components that achieves a defined objective by performing specified functions.

system architecture: The structure of and relationship between the components of a system. A system architecture may include the system interface with its operational environment.

template: A pattern or design that establishes the outline, dimensions, or process for subsequent users or implementers.

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