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Standard for Signal and Test Definition

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Contents

1. Overview	12
1.1 Scope	12
1.2 Purpose	12
1.3 Word Usage	12
1.4 Application	13
1.5 Annexes	13
2. Definitions, abbreviations, and acronyms	13
2.1 Definitions	13
2.2 Abbreviations and acronyms	15
3. Structure of this standard	16
3.1 Layers	16
3.2 Signal Modeling Language (SML) layer	17
3.3 BSC layer	17
3.4 TSF layer	18
3.5 Test requirement layer	18
3.6 Using the layers	18
4. Signals and SignalFunctions	18
4.1 Introduction	18
4.2 Physical signal states	19
4.3 Event states	20
4.4 Digital stream states	21
5. SML layer	22
6. BSC layer	23
6.1 BSC layer base classes	23
6.2 General description of BSCs	23
6.3 SignalFunction template	24
7. TSF layer	25
7.1 TSF classes	25
7.2 TSF signals defined by a model	26
7.3 TSF signals defined by an external reference	28
8. Test procedure language (TPL)	28
8.1 Goals of the TPL	28
8.2 Elements of the TPL	29
8.3 Use of the TPL	29
9. Maximizing test platform independence	29
Annex A (normative) Signal modeling language (SML)	30
A.1 Use of the SML	30
A.2 Introduction	30
A.3 Physical types	31
A.4 Signal definitions	34
A.5 Pure signals	36
A.6 Pure signal-combining mechanisms	38

A.7 Pure function transformations.....	44
A.8 Measure, limiting, and sampling signals.....	44
A.9 Digital signals.....	46
A.10 Basic component SML.....	50
A.11 Fast Fourier analysis support.....	76
Annex B (normative) Basic signal components (BSC) layer.....	78
B.1 BSC layer base classes.....	78
B.2 BSC subclasses.....	78
B.3 Description of a BSC.....	83
B.4 Physical class.....	91
B.5 PulseDefns class.....	103
B.6 SignalFunction class.....	104
Annex C (normative) Dynamic signal descriptions.....	163
C.1 Introduction.....	163
C.2 Basic classes.....	164
C.3 Dynamic signal goals and use cases.....	172
Annex D (normative) Interface definition language (IDL) basic components.....	174
D.1 Introduction.....	174
D.2 IDL BSC library.....	174
Annex E (informative) Test signal framework (TSF) for C/ATLAS.....	175
E.1 Introduction.....	175
E.2 TSF library definition in extensible markup language (XML).....	175
E.3 Interface definition language (IDL) for the TSF for C/ATLAS.....	175
E.4 AC_SIGNAL<type: Current Power Voltage>.....	176
E.5 AM_SIGNAL.....	178
E.6 DC_SIGNAL<type: Voltage Current Power>.....	180
E.7 DIGITAL_PARALLEL.....	182
E.8 DIGITAL_SERIAL.....	184
E.9 DIGITAL_TEST.....	186
E.10 DME_INTERROGATION.....	189
E.11 DME_RESPONSE.....	192
E.12 FM_SIGNAL<type: Voltage Power Current>.....	195
E.13 ILS_GLIDE_SLOPE<type: Voltage Power>.....	198
E.14 ILS_LOCALIZER<type: Power Voltage>.....	201
E.15 ILS_MARKER.....	204
E.16 PM_SIGNAL.....	207
E.17 PULSED_AC_SIGNAL<type: Current Power Voltage>.....	209
E.18 PULSED_AC_TRAIN<type: Voltage Current Power>.....	211
E.19 PULSED_DC_SIGNAL<type: Voltage Current Power>.....	213
E.20 PULSED_DC_TRAIN<type: Voltage Current Power>.....	216
E.21 RADAR_RX_SIGNAL.....	218
E.22 RADAR_TX_SIGNAL<type: Current Voltage Power>.....	220
E.23 RAMP_SIGNAL<type: Voltage Current Power>.....	222
E.24 RANDOM_NOISE.....	224
E.25 RESOLVER.....	226
E.26 RS_232.....	229
E.27 SQUARE_WAVE<type: Current Voltage Power>.....	230
E.28 SSR_INTERROGATION<type: Voltage Current Power>.....	232
E.29 SSR_RESPONSE<type: Voltage Current Power>.....	235
E.30 STEP_SIGNAL.....	239
E.31 SUP_CAR_SIGNAL.....	241
E.32 SYNCHRO.....	243

E.33 TACAN	247
E.34 TRIANGULAR_WAVE_SIGNAL<type: Voltage Current Power>	251
E.35 VOR	253
Annex F (informative) Test signal framework (TSF) library for digital pulse classes	257
F.1 Introduction	257
F.2 TSF library definition in extensible markup language (XML)	257
F.3 Graphical models of TSFs	257
F.4 Pulse class family of TSFs	257
F.5 DTIF	274
Annex G (normative) Carrier language requirements	276
G.1 Carrier language requirements	276
G.2 Interface definition language (IDL)	276
G.3 Datatypes	276
Annex H (normative) Test procedure language (TPL)	282
H.1 TPL layer	282
H.2 Elements of the TPL	282
H.3 Structure of test requirements	282
H.4 Carrier language	282
H.5 Signal statements	282
H.6 Mapping of test statements to carrier language	284
H.7 Test statement definitions	285
H.8 Elements used in test statement definitions	303
H.9 Attributes with multiple properties	306
H.10 Transferring data in digital signals	310
H.11 Creating test requirements	314
H.12 Delimiting TPL statements	316
Annex I (normative) Extensible markup language (XML) signal descriptions	318
I.1 Introduction	318
I.2 XSD for BSCs	319
I.3 XSD for TSFs	325
Annex J (informative) Support for ATLAS nouns and modifiers	333
J.1 Signal and test definition (STD) support for ATLAS signals	333
J.2 STD support for ATLAS nouns	333
J.3 STD support for C/ATLAS noun modifiers	336
J.4 Support for C/ATLAS extensions	344
Annex K (informative) Guide for maximizing test platform independence	345
K.1 Introduction	345
K.2 Guiding principles	345
K.3 Best practice rules	345
Annex L (informative) IEEE download web-site material associated with this document	349
Annex M (informative) Bibliography	350
Annex N (informative) Participants	352

Standard for Signal and Test Definition

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1641 (2022)	91/1933/FDIS	91/1945/RVD

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IEEE Standard for Signal and Test Definition

Developed by the

Test and Diagnosis for Electronic Systems Standards Committee (SCC20)

on

IEEE Standards and Standards Innovations (S&SI)

Strategic Management and Delivery Committee (SMDC)

Approved 21 September 2022

IEEE SA Standards Board

Abstract: The means to define and describe signals used in testing are provided in this standard. 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

This introduction is not part of IEEE Std 1641™-2022, IEEE Standard for Signal and Test Definition.

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 shall be the same regardless of the equipment that 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 P1641 Working Group (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.

IEEE Standard for Signal and Test Definition

1. Overview

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 shall in turn facilitate information transfer, test reuse, and broader application of test information—accessible through commercially available development tools.

1.3 Word Usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*).

The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (*should* equals *is recommended that*).^{6, 7}

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted to*).

The word *can* is used for statements of possibility and capability, whether material, physical, or causal (*can* equals *is able to*).

⁶ The use of the word *must* is deprecated and cannot be used when stating mandatory requirements, *must* is used only to describe unavoidable situations

⁷ The use of *will* is deprecated and cannot be used when stating mandatory requirements, *will* is only used in statements of fact.

1.4 Application

This signal and test definition (STD) standard provides the capability to model, 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 standards of various automatic test systems (ATSS). STD may be used to create truly portable test requirements. It facilitates test information to pass freely between the design, test, evaluation and maintenance phases of a project and enables the same models and information to be used directly across project phases. This more efficient re-use of models and information directly leads to reduced life-cycle costs.

1.5 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.