



IEEE Standard for SystemVerilog— Unified Hardware Design, Specification, and Verification Language

IEEE Computer Society

Sponsored by the
Design Automation Standards Committee

and the
IEEE Standards Association Corporate Advisory Group

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Approved 11 November 2009
IEEE-SA Standards Board

Abstract: This standard represents a merger of two previous standards: IEEE Std 1364™-2005 Verilog hardware description language (HDL) and IEEE Std 1800-2005 SystemVerilog unified hardware design, specification, and verification language. The 2005 SystemVerilog standard defines extensions to the 2005 Verilog standard. These two standards were designed to be used as one language. Merging the base Verilog language and the SystemVerilog extensions into a single standard provides users with all information regarding syntax and semantics in a single document.

Keywords: assertions, design automation, design verification, hardware description language, HDL, HDVL, PLI, programming language interface, SystemVerilog, Verilog, VPI

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Introduction

This introduction is not a part of IEEE Std 1800-2009, IEEE Standard for SystemVerilog—Unified Hardware Design, Specification, and Verification Language.

The purpose of this standard is to provide the electronic design automation (EDA), semiconductor, and system design communities with a well-defined and official IEEE unified hardware design, specification, and verification standard language. The language is designed to coexist and enhance the hardware description and verification languages (HDVLS) presently used by designers while providing the capabilities lacking in those languages.

SystemVerilog is a unified hardware design, specification, and verification language based on the Accellera SystemVerilog 3.1a extensions to the Verilog HDL [B3]^a, published in 2004. Accellera is a consortium of EDA, semiconductor, and system companies. IEEE Std 1800 enables a productivity boost in design and validation and covers design, simulation, validation, and formal assertion-based verification flows.

SystemVerilog enables the use of a unified language for abstract and detailed specification of the design, specification of assertions, coverage, and testbench verification based on manual or automatic methodologies. SystemVerilog offers application programming interfaces (APIs) for coverage and assertions, a vendor-independent API to access proprietary waveform file formats, and a direct programming interface (DPI) to access proprietary functionality. SystemVerilog offers methods that allow designers to continue to use present design languages when necessary to leverage existing designs and intellectual property. This standardization project will provide the VLSI design engineers with a well-defined IEEE standard, which meets their requirements in design and validation, and which enables a step function increase in their productivity. This standardization project will also provide the EDA industry with a standard to which they can adhere and which they can support in order to deliver their solutions in this area.

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^aThe numbers in brackets correspond to the numbers in the bibliography in [Annex R](#).

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Contents

Part One:

Design and Verification Constructs

1. Overview.....	2
1.1 Scope.....	2
1.2 Purpose.....	2
1.3 Merger of IEEE Std 1364-2005 and IEEE Std 1800-2005.....	3
1.4 Special terms.....	3
1.5 Conventions used in this standard.....	3
1.6 Syntactic description.....	4
1.7 Use of color in this standard.....	5
1.8 Contents of this standard.....	5
1.9 Deprecated clauses.....	8
1.10 Examples.....	8
1.11 Prerequisites.....	8
2. Normative references.....	9
3. Design and verification building blocks.....	11
3.1 General.....	11
3.2 Design elements.....	11
3.3 Modules.....	11
3.4 Programs.....	12
3.5 Interfaces.....	13
3.6 Checkers.....	14
3.7 Primitives.....	14
3.8 Subroutines.....	14
3.9 Packages.....	14
3.10 Configurations.....	15
3.11 Overview of hierarchy.....	15
3.12 Compilation and elaboration.....	16
3.13 Name spaces.....	18
3.14 Simulation time units and precision.....	19
4. Scheduling semantics.....	23
4.1 General.....	23
4.2 Execution of a hardware model and its verification environment.....	23
4.3 Event simulation.....	23
4.4 The stratified event scheduler.....	24
4.5 The SystemVerilog simulation reference algorithm.....	29
4.6 Determinism.....	29
4.7 Nondeterminism.....	30
4.8 Race conditions.....	30
4.9 Scheduling implication of assignments.....	30
4.10 The PLI callback control points.....	32
5. Lexical conventions.....	33
5.1 General.....	33
5.2 Lexical tokens.....	33
5.3 White space.....	33
5.4 Comments.....	33
5.5 Operators.....	33
5.6 Identifiers, keywords, and system names.....	34
5.7 Numbers.....	35
5.8 Time literals.....	40

5.9	String literals	40
5.10	Structure literals	42
5.11	Array literals	43
5.12	Attributes	43
5.13	Built-in methods	45
6.	Data types	47
6.1	General	47
6.2	Data types and data objects	47
6.3	Value set	47
6.4	Singular and aggregate types	48
6.5	Nets and variables	49
6.6	Net types	50
6.7	Net declarations	56
6.8	Variable declarations	58
6.9	Vector declarations	60
6.10	Implicit declarations	61
6.11	Integer data types	62
6.12	Real, shortreal and realtime data types	63
6.13	Void data type	63
6.14	Chandle data type	63
6.15	Class	64
6.16	String data type	64
6.17	Event data type	69
6.18	User-defined types	70
6.19	Enumerations	71
6.20	Constants	77
6.21	Scope and lifetime	84
6.22	Type compatibility	86
6.23	Type operator	89
6.24	Casting	90
7.	Aggregate data types	97
7.1	General	97
7.2	Structures	97
7.3	Unions	99
7.4	Packed and unpacked arrays	102
7.5	Dynamic arrays	106
7.6	Array assignments	109
7.7	Arrays as arguments to subroutines	110
7.8	Associative arrays	111
7.9	Associative array methods	114
7.10	Queues	117
7.11	Array querying functions	121
7.12	Array manipulation methods	121
8.	Classes	127
8.1	General	127
8.2	Overview	127
8.3	Syntax	128
8.4	Objects (class instance)	129
8.5	Object properties and object parameter data	130
8.6	Object methods	130
8.7	Constructors	131
8.8	Static class properties	132
8.9	Static methods	133

8.10	This	133
8.11	Assignment, renaming, and copying.....	134
8.12	Inheritance and subclasses	135
8.13	Overridden members.....	136
8.14	Super	137
8.15	Casting	137
8.16	Chaining constructors	138
8.17	Data hiding and encapsulation	138
8.18	Constant class properties	139
8.19	Virtual methods.....	140
8.20	Abstract classes and pure virtual methods.....	141
8.21	Polymorphism: dynamic method lookup.....	141
8.22	Class scope resolution operator ::	142
8.23	Out-of-block declarations	144
8.24	Parameterized classes	145
8.25	Typedef class	148
8.26	Classes and structures	149
8.27	Memory management	149
9.	Processes.....	151
9.1	General.....	151
9.2	Structured procedures	151
9.3	Block statements	155
9.4	Procedural timing controls.....	161
9.5	Process execution threads	170
9.6	Process control.....	171
9.7	Fine-grain process control	175
10.	Assignment statements	177
10.1	General.....	177
10.2	Overview.....	177
10.3	Continuous assignments	178
10.4	Procedural assignments.....	181
10.5	Variable declaration assignment (variable initialization).....	186
10.6	Procedural continuous assignments.....	186
10.7	Assignment extension and truncation.....	188
10.8	Assignment-like contexts.....	189
10.9	Assignment patterns.....	190
10.10	Unpacked array concatenation.....	194
10.11	Net aliasing	197
11.	Operators and expressions	199
11.1	General.....	199
11.2	Overview.....	199
11.3	Operators.....	200
11.4	Operator descriptions	204
11.5	Operands	224
11.6	Expression bit lengths.....	227
11.7	Signed expressions.....	230
11.8	Expression evaluation rules	231
11.9	Tagged union expressions and member access.....	232
11.10	String literal expressions.....	234
11.11	Operator overloading	235
11.12	Minimum, typical, and maximum delay expressions	237
11.13	Let construct	238
12.	Procedural programming statements	245

12.1	General	245
12.2	Overview	245
12.3	Syntax	245
12.4	Conditional if–else statement	246
12.5	Case statement	251
12.6	Pattern matching conditional statements	256
12.7	Loop statements	260
12.8	Jump statements	264
13.	Tasks and functions (subroutines)	267
13.1	General	267
13.2	Overview	267
13.3	Tasks	267
13.4	Functions	271
13.5	Subroutine calls and argument passing	277
13.6	Import and export functions	282
13.7	Task and function names	282
14.	Clocking blocks	283
14.1	General	283
14.2	Overview	283
14.3	Clocking block declaration	283
14.4	Input and output skews	285
14.5	Hierarchical expressions	286
14.6	Signals in multiple clocking blocks	287
14.7	Clocking block scope and lifetime	287
14.8	Multiple clocking blocks example	287
14.9	Interfaces and clocking blocks	288
14.10	Clocking block events	289
14.11	Cycle delay: ##	289
14.12	Default clocking	290
14.13	Input sampling	291
14.14	Global clocking	292
14.15	Synchronous events	293
14.16	Synchronous drives	293
15.	Interprocess synchronization and communication	299
15.1	General	299
15.2	Overview	299
15.3	Semaphores	299
15.4	Mailboxes	301
15.5	Named events	304
16.	Assertions	309
16.1	General	309
16.2	Overview	309
16.3	Immediate assertions	309
16.4	Deferred assertions	312
16.5	Concurrent assertions overview	316
16.6	Boolean expressions	318
16.7	Sequences	320
16.8	Declaring sequences	323
16.9	Sequence operations	331
16.10	Local variables	353
16.11	Calling subroutines on match of a sequence	359
16.12	System functions	360
16.13	Declaring properties	360

16.14 Multiclock support.....	385
16.15 Concurrent assertions.....	393
16.16 Disable iff resolution.....	410
16.17 Clock resolution.....	412
16.18 Expect statement.....	417
16.19 Clocking blocks and concurrent assertions.....	419
17. Checkers.....	421
17.1 Overview.....	421
17.2 Checker declaration.....	421
17.3 Checker instantiation.....	424
17.4 Context inference.....	427
17.5 Checker procedures.....	427
17.6 Covergroups in checkers.....	428
17.7 Checker variables.....	429
17.8 Functions in checkers.....	435
17.9 Complex checker example.....	435
18. Constrained random value generation.....	437
18.1 General.....	437
18.2 Overview.....	437
18.3 Concepts and usage.....	437
18.4 Random variables.....	440
18.5 Constraint blocks.....	442
18.6 Randomization methods.....	457
18.7 In-line constraints—randomize() with.....	459
18.8 Disabling random variables with rand_mode().....	461
18.9 Controlling constraints with constraint_mode().....	463
18.10 Dynamic constraint modification.....	464
18.11 In-line random variable control.....	464
18.12 Randomization of scope variables—std::randomize().....	465
18.13 Random number system functions and methods.....	467
18.14 Random stability.....	468
18.15 Manually seeding randomize.....	471
18.16 Random weighted case—randcase.....	471
18.17 Random sequence generation—randsequence.....	472
19. Functional coverage.....	483
19.1 General.....	483
19.2 Overview.....	483
19.3 Defining the coverage model: covergroup.....	484
19.4 Using covergroup in classes.....	486
19.5 Defining coverage points.....	488
19.6 Defining cross coverage.....	498
19.7 Specifying coverage options.....	503
19.8 Predefined coverage methods.....	507
19.9 Predefined coverage system tasks and system functions.....	509
19.10 Organization of option and type_option members.....	509
19.11 Coverage computation.....	510
20. Utility system tasks and system functions.....	515
20.1 General.....	515
20.2 Simulation control system tasks.....	516
20.3 Simulation time system functions.....	516
20.4 Timescale system tasks.....	518
20.5 Conversion functions.....	521
20.6 Data query functions.....	522

20.7	Array querying functions	524
20.8	Math functions	526
20.9	Severity tasks	528
20.10	Elaboration system tasks	528
20.11	Assertion control system tasks	530
20.12	Assertion action control system tasks	531
20.13	Assertion system functions	533
20.14	Coverage system functions	534
20.15	Probabilistic distribution functions	534
20.16	Stochastic analysis tasks and functions	536
20.17	Programmable logic array (PLA) modeling system tasks	538
20.18	Miscellaneous tasks and functions	542
21.	I/O system tasks and system functions	543
21.1	General	543
21.2	Display system tasks	543
21.3	File input-output system tasks and system functions	554
21.4	Loading memory array data from a file	565
21.5	Writing memory array data to a file	568
21.6	Command line input	569
21.7	Value change dump (VCD) files	572
22.	Compiler directives	593
22.1	General	593
22.2	Overview	593
22.3	`resetall	593
22.4	`include	594
22.5	`define, `undef and `undefineall	594
22.6	`ifdef, `else, `elsif, `endif, `ifndef	600
22.7	`timescale	603
22.8	`default_nettype	604
22.9	`unconnected_drive and `nounconnected_drive	605
22.10	`celldefine and `endcelldefine	605
22.11	`pragma	605
22.12	`line	606
22.13	`__FILE__ and `__LINE__	607
22.14	`begin_keywords, `end_keywords	608

Part Two:

Hierarchy Constructs

23.	Modules and hierarchy	614
23.1	General	614
23.2	Module definitions	614
23.3	Module instances (hierarchy)	626
23.4	Nested modules	636
23.5	Extern modules	637
23.6	Hierarchical names	638
23.7	Member selects and hierarchical names	641
23.8	Upwards name referencing	642
23.9	Scope rules	644
23.10	Overriding module parameters	646
23.11	Binding auxiliary code to scopes or instances	654
24.	Programs	659
24.1	General	659
24.2	Overview	659

24.3	The program construct	659
24.4	Eliminating testbench races	663
24.5	Blocking tasks in cycle/event mode.....	663
24.6	Programwide space and anonymous programs.....	664
24.7	Program control tasks	664
25.	Interfaces.....	665
25.1	General.....	665
25.2	Overview.....	665
25.3	Interface syntax.....	666
25.4	Ports in interfaces.....	670
25.5	Modports.....	671
25.6	Interfaces and specify blocks.....	677
25.7	Tasks and functions in interfaces.....	678
25.8	Parameterized interfaces.....	684
25.9	Virtual interfaces.....	686
25.10	Access to interface objects.....	691
26.	Packages.....	693
26.1	General.....	693
26.2	Package declarations.....	693
26.3	Referencing data in packages	694
26.4	Using packages in module headers.....	698
26.5	Search order rules	699
26.6	Exporting imported names from packages	701
26.7	The std built-in package.....	702
27.	Generate constructs.....	705
27.1	General.....	705
27.2	Overview.....	705
27.3	Generate construct syntax.....	705
27.4	Loop generate constructs	707
27.5	Conditional generate constructs.....	711
27.6	External names for unnamed generate blocks	714
28.	Gate-level and switch-level modeling	717
28.1	General.....	717
28.2	Overview.....	717
28.3	Gate and switch declaration syntax	717
28.4	and, nand, nor, or, xor, and xnor gates.....	723
28.5	buf and not gates	724
28.6	bufif1, bufif0, notif1, and notif0 gates.....	725
28.7	MOS switches.....	726
28.8	Bidirectional pass switches.....	727
28.9	CMOS switches	728
28.10	pullup and pulldown sources	729
28.11	Logic strength modeling.....	729
28.12	Strengths and values of combined signals	731
28.13	Strength reduction by nonresistive devices	744
28.14	Strength reduction by resistive devices	744
28.15	Strengths of net types.....	744
28.16	Gate and net delays.....	745
29.	User defined primitives (UDPs)	749
29.1	General.....	749
29.2	Overview.....	749
29.3	UDP definition.....	749
29.4	Combinational UDPs.....	753

29.5	Level-sensitive sequential UDPs	754
29.6	Edge-sensitive sequential UDPs	754
29.7	Sequential UDP initialization	755
29.8	UDP instances.....	757
29.9	Mixing level-sensitive and edge-sensitive descriptions.....	758
29.10	Level-sensitive dominance	759
30.	Specify blocks.....	761
30.1	General.....	761
30.2	Overview.....	761
30.3	Specify block declaration.....	761
30.4	Module path declarations.....	762
30.5	Assigning delays to module paths	771
30.6	Mixing module path delays and distributed delays	775
30.7	Detailed control of pulse filtering behavior.....	776
31.	Timing checks.....	785
31.1	General.....	785
31.2	Overview.....	785
31.3	Timing checks using a stability window.....	788
31.4	Timing checks for clock and control signals	795
31.5	Edge-control specifiers	804
31.6	Notifiers: user-defined responses to timing violations	805
31.7	Enabling timing checks with conditioned events	807
31.8	Vector signals in timing checks	808
31.9	Negative timing checks.....	809
32.	Backannotation using the standard delay format (SDF).....	815
32.1	General.....	815
32.2	Overview.....	815
32.3	The SDF annotator.....	815
32.4	Mapping of SDF constructs to SystemVerilog.....	815
32.5	Multiple annotations	820
32.6	Multiple SDF files	821
32.7	Pulse limit annotation	821
32.8	SDF to SystemVerilog delay value mapping.....	822
32.9	Loading timing data from an SDF file.....	822
33.	Configuring the contents of a design	825
33.1	General.....	825
33.2	Overview.....	825
33.3	Libraries	826
33.4	Configurations	828
33.5	Using libraries and configs	834
33.6	Configuration examples.....	835
33.7	Displaying library binding information	837
33.8	Library mapping examples	837
34.	Protected envelopes	841
34.1	General.....	841
34.2	Overview.....	841
34.3	Processing protected envelopes	841
34.4	Protect pragma directives.....	843
34.5	Protect pragma keywords.....	845

Part Three:
Application Programming Interfaces

35. Direct programming interface (DPI).....	862
35.1 General.....	862
35.2 Overview.....	862
35.3 Two layers of the DPI.....	863
35.4 Global name space of imported and exported functions.....	864
35.5 Imported tasks and functions.....	865
35.6 Calling imported functions.....	872
35.7 Exported functions.....	874
35.8 Exported tasks.....	875
35.9 Disabling DPI tasks and functions.....	875
36. Programming language interface (PLI/VPI) overview.....	877
36.1 General.....	877
36.2 PLI purpose and history.....	877
36.3 User-defined system task and system function names.....	878
36.4 User-defined system task and system function arguments.....	879
36.5 User-defined system task and system function types.....	879
36.6 User-supplied PLI applications.....	879
36.7 PLI include files.....	879
36.8 VPI sizetf, compiletf and calltf routines.....	879
36.9 PLI mechanism.....	880
36.10 VPI access to SystemVerilog objects and simulation objects.....	882
36.11 List of VPI routines by functional category.....	883
36.12 VPI backwards compatibility features and limitations.....	885
37. VPI object model diagrams.....	891
37.1 General.....	891
37.2 VPI Handles.....	891
37.3 VPI object classifications.....	892
37.4 Key to data model diagrams.....	898
37.5 Module.....	901
37.6 Interface.....	902
37.7 Modport.....	902
37.8 Interface task or function declaration.....	902
37.9 Program.....	903
37.10 Instance.....	904
37.11 Instance arrays.....	906
37.12 Scope.....	907
37.13 IO declaration.....	908
37.14 Ports.....	909
37.15 Reference objects.....	910
37.16 Nets.....	913
37.17 Variables.....	917
37.18 Packed array variables.....	920
37.19 Variable select.....	921
37.20 Memory.....	922
37.21 Variable drivers and loads.....	922
37.22 Object Range.....	923
37.23 Typespec.....	924
37.24 Structures and unions.....	926
37.25 Named events.....	927
37.26 Parameter, spec param, def param, param assign.....	928
37.27 Class definition.....	929

37.28 Class typespec	930
37.29 Class variables and class objects	932
37.30 Constraint, constraint ordering, distribution	934
37.31 Primitive, prim term	935
37.32 UDP	936
37.33 Intermodule path	936
37.34 Constraint expression	937
37.35 Module path, path term	937
37.36 Timing check	938
37.37 Task and function declaration	939
37.38 Task and function call	940
37.39 Frames	942
37.40 Threads	943
37.41 Delay terminals	943
37.42 Net drivers and loads	944
37.43 Continuous assignment	945
37.44 Clocking block	946
37.45 Assertion	947
37.46 Concurrent assertions	948
37.47 Property declaration	949
37.48 Property specification	950
37.49 Sequence declaration	951
37.50 Sequence expression	952
37.51 Immediate assertions	953
37.52 Multiclock sequence expression	954
37.53 Let	954
37.54 Simple expressions	955
37.55 Expressions	956
37.56 Atomic statement	959
37.57 Event statement	960
37.58 Process	960
37.59 Assignment	961
37.60 Event control	961
37.61 While, repeat	962
37.62 Waits	962
37.63 Delay control.....	962
37.64 Repeat control	963
37.65 Forever	963
37.66 If, if-else	963
37.67 Case, pattern	964
37.68 Expect	965
37.69 For	965
37.70 Do-while, foreach	965
37.71 Alias statement	966
37.72 Disables.....	967
37.73 Return statement	967
37.74 Assign statement, deassign, force, release.....	967
37.75 Callback	968
37.76 Time queue	968
37.77 Active time format.....	969
37.78 Attribute	970
37.79 Iterator.....	971
37.80 Generates	972
38. VPI routine definitions.....	975

38.1	General	975
38.2	vpi_chk_error()	975
38.3	vpi_compare_objects()	976
38.4	vpi_control()	978
38.5	vpi_flush()	979
38.6	vpi_get()	979
38.7	vpi_get64()	980
38.8	vpi_get_cb_info()	980
38.9	vpi_get_data()	981
38.10	vpi_get_delays()	982
38.11	vpi_get_str()	984
38.12	vpi_get_systf_info()	985
38.13	vpi_get_time()	986
38.14	vpi_get_userdata()	987
38.15	vpi_get_value()	987
38.16	vpi_get_value_array()	993
38.17	vpi_get_vlog_info()	997
38.18	vpi_handle()	998
38.19	vpi_handle_by_index()	999
38.20	vpi_handle_by_multi_index()	999
38.21	vpi_handle_by_name()	1000
38.22	vpi_handle_multi()	1001
38.23	vpi_iterate()	1001
38.24	vpi_mcd_close()	1002
38.25	vpi_mcd_flush()	1003
38.26	vpi_mcd_name()	1003
38.27	vpi_mcd_open()	1004
38.28	vpi_mcd_printf()	1005
38.29	vpi_mcd_vprintf()	1006
38.30	vpi_printf()	1006
38.31	vpi_put_data()	1007
38.32	vpi_put_delays()	1009
38.33	vpi_put_userdata()	1012
38.34	vpi_put_value()	1012
38.35	vpi_put_value_array()	1015
38.36	vpi_register_cb()	1019
38.37	vpi_register_systf()	1027
38.38	vpi_release_handle()	1030
38.39	vpi_remove_cb()	1031
38.40	vpi_scan()	1031
38.41	vpi_vprintf()	1032
39.	Assertion API	1033
39.1	General	1033
39.2	Overview	1033
39.3	Static information	1033
39.4	Dynamic information	1034
39.5	Control functions	1038
40.	Code coverage control and API	1043
40.1	General	1043
40.2	Overview	1043
40.3	SystemVerilog real-time coverage access	1044
40.4	FSM recognition	1049
40.5	VPI coverage extensions	1051
41.	Data read API	1057

Part Four:

Annexes

Annex A (normative) Formal syntax	1060
A.1 Source text	1060
A.2 Declarations	1068
A.3 Primitive instances	1079
A.4 Instantiations	1081
A.5 UDP declaration and instantiation	1082
A.6 Behavioral statements	1084
A.7 Specify section	1090
A.8 Expressions	1094
A.9 General	1100
A.10 Footnotes (normative)	1102
Annex B (normative) Keywords	1105
Annex C (normative) Deprecation	1107
C.1 General	1107
C.2 Constructs that have been deprecated	1107
C.3 Accellera SystemVerilog 3.1a-compatible access to packed data	1108
C.4 Constructs identified for deprecation	1108
Annex D (informative) Optional system tasks and system functions	1111
D.1 General	1111
D.2 \$countdrivers	1111
D.3 \$getpattern	1112
D.4 \$input	1113
D.5 \$key and \$nokey	1113
D.6 \$list	1113
D.7 \$log and \$nolog	1114
D.8 \$reset, \$reset_count, and \$reset_value	1114
D.9 \$save, \$restart, and \$incsave	1115
D.10 \$scale	1116
D.11 \$scope	1116
D.12 \$showscopes	1116
D.13 \$showvars	1116
D.14 \$readmemb and \$readmemh	1117
Annex E (informative) Optional compiler directives	1119
E.1 General	1119
E.2 `default_decay_time	1119
E.3 `default_trireg_strength	1119
E.4 `delay_mode_distributed	1120
E.5 `delay_mode_path	1120
E.6 `delay_mode_unit	1120
E.7 `delay_mode_zero	1120
Annex F (normative) Formal semantics of concurrent assertions	1121
F.1 General	1121
F.2 Overview	1121
F.3 Abstract syntax	1122
F.4 Rewriting algorithms	1128
F.5 Semantics	1132
F.6 Extended expressions	1141
F.7 Recursive properties	1141
Annex G (normative) Std package	1145
G.1 General	1145
G.2 Overview	1145

G.3	Semaphore	1145
G.4	Mailbox	1145
G.5	Randomize	1146
G.6	Process	1146
Annex H	(normative) DPI C layer	1147
H.1	General	1147
H.2	Overview	1147
H.3	Naming conventions	1148
H.4	Portability	1148
H.5	svdpi.h include file	1148
H.6	Semantic constraints	1149
H.7	Data types	1152
H.2	Argument passing modes	1155
H.3	Context tasks and functions	1158
H.4	Include files	1163
H.5	Arrays	1166
H.6	Open arrays	1168
H.7	SV3.1a-compatible access to packed data (deprecated functionality)	1174
Annex I	(normative) svdpi.h	1181
I.1	General	1181
I.2	Overview	1181
I.3	Source code	1181
Annex J	(normative) Inclusion of foreign language code	1191
J.1	General	1191
J.2	Overview	1191
J.3	Location independence	1192
J.4	Object code inclusion	1192
Annex K	(normative) vpi_user.h	1195
K.1	General	1195
K.2	Source code	1195
Annex L	(normative) vpi_compatibility.h	1213
L.1	General	1213
L.2	Source code	1213
Annex M	(normative) sv_vpi_user.h	1217
M.1	General	1217
M.2	Source code	1217
Annex N	(normative) Algorithm for probabilistic distribution functions	1227
N.1	General	1227
N.2	Source code	1227
Annex O	(informative) Encryption/decryption flow	1235
O.1	General	1235
O.2	Overview	1235
O.3	Tool vendor secret key encryption system	1235
O.4	IP author secret key encryption system	1236
O.5	Digital envelopes	1237
Annex P	(informative) Glossary	1239
Annex Q	(informative) Mapping of IEEE Std 1364-2005 and IEEE Std 1800-2005 clauses into IEEE Std 1800-2009	1243
Annex R	(informative) Bibliography	1247

List of figures

Figure 4-1—Event scheduling regions	28
Figure 6-1—Simulation values of a trireg and its driver	53
Figure 6-2—Simulation results of a capacitive network	54
Figure 6-3—Simulation results of charge sharing	55
Figure 7-1—VInt type with packed qualifier	102
Figure 7-2—Instr type with packed qualifier	102
Figure 9-1—Intra-assignment repeat event control utilizing a clock edge	170
Figure 14-1—Sample and drive times including skew with respect to the positive edge of the clock	286
Figure 16-1—Sampling a variable in a simulation time step	317
Figure 16-2—Concatenation of sequences	322
Figure 16-3—Value change expressions	337
Figure 16-4—Future value change	341
Figure 16-5—ANDing (and) two sequences	343
Figure 16-6—ANDing (and) two sequences, including a time range	344
Figure 16-7—ANDing (and) two Boolean expressions	344
Figure 16-8—Intersecting two sequences.....	345
Figure 16-9—ORing (or) two Boolean expressions	346
Figure 16-10—ORing (or) two sequences.....	347
Figure 16-11—ORing (or) two sequences, including a time range	348
Figure 16-12—Match with throughout restriction fails.....	350
Figure 16-13—Match with throughout restriction succeeds	351
Figure 16-14—Conditional sequence matching	367
Figure 16-15—Conditional sequences.....	368
Figure 16-16—Results without the condition.....	368
Figure 16-17—Clocking blocks and concurrent assertion	419
Figure 17-1—Non-deterministic free checker variable	430
Figure 18-1—Example of randc	442
Figure 18-2—Global constraints	451
Figure 18-3—Truth tables for conjunction, disjunction, and negation rules.....	455
Figure 21-1—Creating the 4-state VCD file.....	572
Figure 21-2—Creating the extended VCD file.....	582
Figure 23-1—Scopes available to upward name referencing	646
Figure 28-1—Schematic diagram of interconnections in array of instances.....	723
Figure 28-2—Scale of strengths	731
Figure 28-3—Combining unequal strengths.....	731
Figure 28-4—Combination of signals of equal strength and opposite values	732
Figure 28-5—Weak x signal strength.....	732
Figure 28-6—Bufifs with control inputs of x	733
Figure 28-7—Strong H range of values.....	733

Figure 28-8—Strong L range of values	733
Figure 28-9—Combined signals of ambiguous strength	734
Figure 28-10—Range of strengths for an unknown signal	734
Figure 28-11—Ambiguous strengths from switch networks	735
Figure 28-12—Range of two strengths of a defined value	735
Figure 28-13—Range of three strengths of a defined value	735
Figure 28-14—Unknown value with a range of strengths	736
Figure 28-15—Strong X range	736
Figure 28-16—Ambiguous strength from gates	736
Figure 28-17—Ambiguous strength signal from a gate	737
Figure 28-18—Weak 0	737
Figure 28-19—Ambiguous strength in combined gate signals	737
Figure 28-20—Elimination of strength levels	738
Figure 28-21—Result showing a range and the elimination of strength levels of two values	739
Figure 28-22—Result showing a range and the elimination of strength levels of one value	740
Figure 28-23—A range of both values	741
Figure 28-24—Wired logic with unambiguous strength signals	741
Figure 28-25—Wired logic and ambiguous strengths	743
Figure 28-26—Trireg net with capacitance	748
Figure 29-1—Module schematic and simulation times of initial value propagation	757
Figure 30-1—Module path delays	763
Figure 30-2—Difference between parallel and full connection paths	769
Figure 30-3—Module path delays longer than distributed delays	776
Figure 30-4—Module path delays shorter than distributed delays	776
Figure 30-5—Example of pulse filtering	777
Figure 30-6—On-detect versus on-event	779
Figure 30-7—Current event cancellation problem and correction	781
Figure 30-8—NAND gate with nearly simultaneous input switching where one event is scheduled prior to another that has not matured	782
Figure 30-9—NAND gate with nearly simultaneous input switching with output event scheduled at same time	783
Figure 31-1—Sample \$timeskew	797
Figure 31-2—Sample \$timeskew with remain_active_flag set	798
Figure 31-3—Sample \$fullskew	800
Figure 31-4—Data constraint interval, positive setup/hold	809
Figure 31-5—Data constraint interval, negative setup/hold	810
Figure 31-6—Timing check violation windows	813
Figure 37-1—Example of object relationships diagram	893
Figure 37-2—Accessing a class of objects using tags	894
Figure 38-1—s_vpi_error_info structure definition	976
Figure 38-2—s_cb_data structure definition	981

Figure 38-3—s_vpi_delay structure definition.....	982
Figure 38-4—s_vpi_time structure definition	982
Figure 38-5—s_vpi_systf_data structure definition	985
Figure 38-6—s_vpi_time structure definition	986
Figure 38-7—s_vpi_value structure definition.....	988
Figure 38-8—s_vpi_vecval structure definition.....	988
Figure 38-9—s_vpi_strengthval structure definition.....	988
Figure 38-10—s_vpi_vlog_info structure definition.....	997
Figure 38-11—s_vpi_delay structure definition.....	1010
Figure 38-12—s_vpi_time structure definition	1010
Figure 38-13—s_vpi_value structure definition.....	1014
Figure 38-14—s_vpi_time structure definition	1014
Figure 38-15—s_vpi_vecval structure definition	1015
Figure 38-16—s_vpi_strengthval structure definition.....	1015
Figure 38-17—s_cb_data structure definition	1019
Figure 38-18—s_vpi_systf_data structure definition	1027
Figure 39-1—Assertions with global clocking future sampled value functions	1038
Figure 40-1—Hierarchical instance example	1046
Figure 40-2—FSM specified with pragmas.....	1051

List of tables

Table 3-1—Time unit strings.....	19
Table 4-1—PLI callbacks.....	32
Table 5-1—Specifying special characters in string literals.....	41
Table 6-1—Net types.....	50
Table 6-2—Truth table for wire and tri nets.....	51
Table 6-3—Truth table for wand and triand nets.....	52
Table 6-4—Truth table for wor and trior nets.....	52
Table 6-5—Truth table for tri0 net.....	56
Table 6-6—Truth table for tri1 net.....	56
Table 6-7—Default values.....	60
Table 6-8—Integer data types.....	62
Table 6-9—String operators.....	66
Table 6-10—Enumeration element ranges.....	73
Table 6-11—Differences between specparams and parameters.....	83
Table 7-1—Value read from a nonexistent associative array entry.....	114
Table 8-1—Comparison of pointer and handle types.....	129
Table 9-1—fork-join control options.....	157
Table 9-2—Detecting posedge and negedge.....	163
Table 9-3—Intra-assignment timing control equivalence.....	169
Table 10-1—Legal left-hand forms in assignment statements.....	177
Table 11-1—Operators and data types.....	201
Table 11-2—Operator precedence and associativity.....	202
Table 11-3—Arithmetic operators defined.....	205
Table 11-4—Power operator rules.....	206
Table 11-5—Unary operators defined.....	206
Table 11-6—Examples of modulus and power operators.....	206
Table 11-7—Data type interpretation by arithmetic operators.....	207
Table 11-8—Definitions of relational operators.....	208
Table 11-9—Definitions of equality operators.....	209
Table 11-10—Wildcard equality and wildcard inequality operators.....	209
Table 11-11—Bitwise binary and operator.....	211
Table 11-12—Bitwise binary or operator.....	211
Table 11-13—Bitwise binary exclusive or operator.....	212
Table 11-14—Bitwise binary exclusive nor operator.....	212
Table 11-15—Bitwise unary negation operator.....	212
Table 11-16—Reduction unary and operator.....	213
Table 11-17—Reduction unary or operator.....	213
Table 11-18—Reduction unary exclusive or operator.....	213
Table 11-19—Results of unary reduction operations.....	214

Table 11-20—Ambiguous condition results for conditional operator	215
Table 11-21—Bit lengths resulting from self-determined expressions	228
Table 16-1—Operator precedence and associativity	331
Table 16-2—Global clocking future sampled value functions	341
Table 16-3—Sequence and property operator precedence and associativity	363
Table 18-1—rand_mode argument	462
Table 18-2—constraint_mode argument	463
Table 19-1—Instance-specific coverage options	503
Table 19-2—Coverage options per-syntactic level	505
Table 19-3—Coverage group type (static) options	505
Table 19-4—Coverage type options	507
Table 19-5—Predefined coverage methods	507
Table 20-1—Diagnostics for \$finish	516
Table 20-2—\$timeformat units_number arguments	519
Table 20-3—\$timeformat default value for arguments	520
Table 20-4—SystemVerilog to C real math function cross-listing	527
Table 20-5—VPI callbacks for assertion control tasks	531
Table 20-6—VPI callbacks for assertion action control tasks	532
Table 20-7—Types of queues of \$q_type values	536
Table 20-8—Argument values for \$q_exam system task	537
Table 20-9—Status code values	537
Table 20-10—PLA modeling system tasks	538
Table 21-1—Escape sequences for printing special characters	544
Table 21-2—Escape sequences for format specifications	545
Table 21-3—Format specifications for real numbers	547
Table 21-4—Logic value component of strength format	550
Table 21-5—Mnemonics for strength levels	550
Table 21-6—Explanation of strength formats	551
Table 21-7—Types for file descriptors	555
Table 21-8—\$fscanf input field characters	559
Table 21-9—Rules for left-extending vector values	578
Table 21-10—How the VCD can shorten values	578
Table 21-11—Keyword commands	579
Table 21-12—VCD type mapping	591
Table 22-1—IEEE Std 1364-1995 reserved keywords	610
Table 22-2—IEEE Std 1364-2001 additional reserved keywords	611
Table 22-3—IEEE Std 1364-2005 additional reserved keywords	611
Table 22-4—IEEE Std 1800-2005 additional reserved keywords	612
Table 22-5—IEEE Std 1800-2009 additional reserved keywords	612
Table 23-1—Net types resulting from dissimilar port connections	635

Table 26-1—Scoping rules for package importation.....	700
Table 28-1—Built-in gates and switches.....	718
Table 28-2—Valid gate types for strength specifications	719
Table 28-3—Truth tables for multiple input logic gates	724
Table 28-4—Truth tables for multiple output logic gates	725
Table 28-5—Truth tables for three-state logic gates	726
Table 28-6—Truth tables for MOS switches	727
Table 28-7—Strength levels for scalar net signal values	730
Table 28-8—Strength reduction rules.....	744
Table 28-9—Rules for propagation delays.....	745
Table 29-1—UDP table symbols.....	752
Table 29-2—Initial statements in UDPs and modules.....	755
Table 29-3—Mixing of level-sensitive and edge-sensitive entries	759
Table 30-1—List of valid operators in state-dependent path delay expression.....	766
Table 30-2—Associating path delay expressions with transitions	773
Table 30-3—Calculating delays for x transitions	774
Table 31-1—\$setup arguments	788
Table 31-2—\$hold arguments	789
Table 31-3—\$setuphold arguments	790
Table 31-4—\$removal arguments	792
Table 31-5—\$recovery arguments	793
Table 31-6—\$recrem arguments	794
Table 31-7—\$skew arguments	796
Table 31-8—\$timeskew arguments.....	797
Table 31-9—\$fullskew arguments.....	799
Table 31-10—\$width arguments	801
Table 31-11—\$period arguments	802
Table 31-12—\$nochange arguments	803
Table 31-13—Notifier value responses to timing violations	805
Table 32-1—Mapping of SDF delay constructs to SystemVerilog declarations.....	816
Table 32-2—Mapping of SDF timing check constructs to SystemVerilog.....	817
Table 32-3—SDF annotation of interconnect delays	819
Table 32-4—SDF to SystemVerilog delay value mapping	822
Table 32-5—mtm_spec argument	823
Table 32-6—scale_type argument.....	824
Table 34-1—protect pragma keywords	844
Table 34-2—Encoding algorithm identifiers.....	848
Table 34-3—Encryption algorithm identifiers	850
Table 34-4—Message digest algorithm identifiers.....	855
Table 36-1—VPI routines for simulation-related callbacks	883

Table 36-2—VPI routines for system task or system function callbacks	884
Table 36-3—VPI routines for traversing SystemVerilog hierarchy	884
Table 36-4—VPI routines for accessing properties of objects	884
Table 36-5—VPI routines for accessing objects from properties.....	884
Table 36-6—VPI routines for delay processing	884
Table 36-7—VPI routines for logic and strength value processing.....	884
Table 36-8—VPI routines for simulation time processing	885
Table 36-9—VPI routines for miscellaneous utilities	885
Table 36-10—Summary of VPI incompatibilities across standard versions.....	886
Table 37-1—Part-select parent expressions	958
Table 38-1—Return error constants for vpi_chk_error().....	976
Table 38-2—Size of the s_vpi_delay->da array	983
Table 38-3—Return value field of the s_vpi_value structure union	989
Table 38-4—Size of the s_vpi_delay->da array	1010
Table 38-5—Value format field of cb_data_p->value->format	1021
Table 38-6—cbStmt callbacks.....	1023
Table 40-1—Coverage control return values.....	1045
Table 40-2—Instance coverage permutations	1046
Table 40-3—Assertion coverage results.....	1053
Table B.1—Reserved keywords	1105
Table D.1—Argument return value for \$countdriver function.....	1112
Table H.1—Mapping data types	1153
Table N.1—SystemVerilog to C function cross-listing.....	1227
Table Q.1—Mapping of LRM clauses	1243

List of syntax excerpts

Syntax 5-1—Syntax for system tasks and system functions (excerpt from Annex A).....	35
Syntax 5-2—Syntax for integer and real numbers (excerpt from Annex A).....	36
Syntax 5-3—Syntax for attributes (excerpt from Annex A).....	44
Syntax 6-1—Syntax for net declarations (excerpt from Annex A).....	57
Syntax 6-2—Syntax for variable declarations (excerpt from Annex A).....	59
Syntax 6-3—User-defined types (excerpt from Annex A).....	70
Syntax 6-4—Enumerated types (excerpt from Annex A).....	72
Syntax 6-5—Parameter declaration syntax (excerpt from Annex A).....	78
Syntax 6-6—Casting (excerpt from Annex A).....	90
Syntax 7-1—Structure declaration syntax (excerpt from Annex A).....	97
Syntax 7-2—Union declaration syntax (excerpt from Annex A).....	99
Syntax 7-3—Dynamic array new constructor syntax (excerpt from Annex A).....	107
Syntax 7-4—Declaration of queue dimension (excerpt from Annex A).....	118
Syntax 7-5—Array method call syntax (not in Annex A).....	121
Syntax 8-1—Class syntax (excerpt from Annex A).....	129
Syntax 9-1—Syntax for structured procedures (excerpt from Annex A).....	151
Syntax 9-2—Syntax for sequential block (excerpt from Annex A).....	155
Syntax 9-3—Syntax for parallel block (excerpt from Annex A).....	156
Syntax 9-4—Delay and event control syntax (excerpt from Annex A).....	162
Syntax 9-5—Syntax for wait statement (excerpt from Annex A).....	167
Syntax 9-6—Syntax for intra-assignment delay and event control (excerpt from Annex A).....	168
Syntax 9-7—Syntax for process control statements (excerpt from Annex A).....	171
Syntax 10-1—Syntax for continuous assignment (excerpt from Annex A).....	178
Syntax 10-2—Blocking assignment syntax (excerpt from Annex A).....	182
Syntax 10-3—Nonblocking assignment syntax (excerpt from Annex A).....	183
Syntax 10-4—Syntax for procedural continuous assignments (excerpt from Annex A).....	186
Syntax 10-5—Assignment patterns syntax (excerpt from Annex A).....	191
Syntax 10-6—Syntax for net aliasing (excerpt from Annex A).....	197
Syntax 11-1—Operator syntax (excerpt from Annex A).....	200
Syntax 11-2—Conditional operator syntax (excerpt from Annex A).....	215
Syntax 11-3—Inside expression syntax (excerpt from Annex A).....	218
Syntax 11-4—Streaming concatenation syntax (excerpt from Annex A).....	220
Syntax 11-5—With expression syntax (excerpt from Annex A).....	222
Syntax 11-6—Tagged union syntax (excerpt from Annex A).....	232
Syntax 11-7—Operator overloading syntax (excerpt from Annex A).....	235
Syntax 11-8—Syntax for min:typ:max expression (excerpt from Annex A).....	238
Syntax 11-9—Let syntax (excerpt from Annex A).....	239
Syntax 12-1—Procedural statement syntax (excerpt from Annex A).....	246
Syntax 12-2—Syntax for if-else statement (excerpt from Annex A).....	246

Syntax 12-3—Syntax for case statements (excerpt from Annex A)	251
Syntax 12-4—Pattern syntax (excerpt from Annex A)	256
Syntax 12-5—Loop statement syntax (excerpt from Annex A)	260
Syntax 12-6—Jump statement syntax (excerpt from Annex A)	264
Syntax 13-1—Task syntax (excerpt from Annex A)	268
Syntax 13-2—Function syntax (excerpt from Annex A)	272
Syntax 13-3—Task or function call syntax (excerpt from Annex A)	278
Syntax 14-1—Clocking block syntax (excerpt from Annex A)	284
Syntax 14-2—Cycle delay syntax (excerpt from Annex A)	289
Syntax 14-3—Default clocking syntax (excerpt from Annex A)	290
Syntax 14-4—Global clocking syntax (excerpt from Annex A)	292
Syntax 14-5—Synchronous drive syntax (excerpt from Annex A)	294
Syntax 15-1—Event trigger syntax (excerpt from Annex A)	305
Syntax 15-2—Wait_order event sequencing syntax (excerpt from Annex A)	306
Syntax 16-1—Immediate assertion syntax (excerpt from Annex A)	310
Syntax 16-2—Deferred immediate assertion syntax (excerpt from Annex A)	312
Syntax 16-3—Sequence syntax (excerpt from Annex A)	320
Syntax 16-4—Sequence concatenation syntax (excerpt from Annex A)	321
Syntax 16-5—Declaring sequence syntax (excerpt from Annex A)	324
Syntax 16-6—Sequence repetition syntax (excerpt from Annex A)	332
Syntax 16-7—And operator syntax (excerpt from Annex A)	342
Syntax 16-8—Intersect operator syntax (excerpt from Annex A)	344
Syntax 16-9—Or operator syntax (excerpt from Annex A)	345
Syntax 16-10—First_match operator syntax (excerpt from Annex A)	348
Syntax 16-11—Throughout construct syntax (excerpt from Annex A)	350
Syntax 16-12—Within construct syntax (excerpt from Annex A)	351
Syntax 16-13—Assertion variable declaration syntax (excerpt from Annex A)	353
Syntax 16-14—Variable assignment syntax (excerpt from Annex A)	354
Syntax 16-15—Subroutine call in sequence syntax (excerpt from Annex A)	359
Syntax 16-16—Property construct syntax (excerpt from Annex A)	362
Syntax 16-17—Implication syntax (excerpt from Annex A)	366
Syntax 16-18—Followed-by syntax (excerpt from Annex A)	370
Syntax 16-19—Property statement case syntax (excerpt from Annex A)	378
Syntax 16-20—Concurrent assert construct syntax (excerpt from Annex A)	394
Syntax 16-21—Default clocking and default disable syntax (excerpt from Annex A)	410
Syntax 16-22—Expect statement syntax (excerpt from Annex A)	418
Syntax 17-1—Checker declaration syntax (excerpt from Annex A)	422
Syntax 17-2—Checker instantiation syntax (excerpt from Annex A)	424
Syntax 18-1—Random variable declaration syntax (excerpt from Annex A)	440
Syntax 18-2—Constraint syntax (excerpt from Annex A)	443

Syntax 18-3—Constraint distribution syntax (excerpt from Annex A)	446
Syntax 18-4—Constraint implication syntax (excerpt from Annex A)	447
Syntax 18-5—If–else constraint syntax (excerpt from Annex A)	448
Syntax 18-6—Foreach iterative constraint syntax (excerpt from Annex A)	449
Syntax 18-7—Solve...before constraint ordering syntax (excerpt from Annex A)	452
Syntax 18-8—Static constraint syntax (excerpt from Annex A)	453
Syntax 18-9—In-line constraint syntax (excerpt from Annex A)	459
Syntax 18-10—Scope randomize function syntax (not in Annex A)	465
Syntax 18-11—Randcase syntax (excerpt from Annex A)	471
Syntax 18-12—Randsequence syntax (excerpt from Annex A)	473
Syntax 18-13—Random production weights syntax (excerpt from Annex A)	474
Syntax 18-14—If–else conditional random production syntax (excerpt from Annex A)	475
Syntax 18-15—Case random production syntax (excerpt from Annex A)	475
Syntax 18-16—Repeat random production syntax (excerpt from Annex A)	476
Syntax 18-17—Rand join random production syntax (excerpt from Annex A)	476
Syntax 18-18—Random production syntax (excerpt from Annex A)	478
Syntax 19-1—Covergroup syntax (excerpt from Annex A)	484
Syntax 19-2—Coverage point syntax (excerpt from Annex A)	488
Syntax 19-3—Transition bin syntax (excerpt from Annex A)	492
Syntax 19-4—Cross coverage syntax (excerpt from Annex A)	498
Syntax 20-1—Syntax for simulation control tasks (not in Annex A)	516
Syntax 20-2—Syntax for time system functions (not in Annex A)	516
Syntax 20-3—Syntax for \$printtimescale (not in Annex A)	518
Syntax 20-4—Syntax for \$timeformat (not in Annex A)	519
Syntax 20-5—Type name function syntax (not in Annex A)	522
Syntax 20-6—Size function syntax (not in Annex A)	523
Syntax 20-7—Range function syntax (not in Annex A)	524
Syntax 20-8—Array querying function syntax (not in Annex A)	524
Syntax 20-9—Severity system task syntax (not in Annex A)	528
Syntax 20-10—Elaboration system task syntax (excerpt from Annex A)	529
Syntax 20-11—Assertion control syntax (not in Annex A)	530
Syntax 20-12—Assertion action control syntax (not in Annex A)	531
Syntax 20-13—Assertion system function syntax (not in Annex A)	533
Syntax 20-14—Syntax for \$random (not in Annex A)	534
Syntax 20-15—Syntax for probabilistic distribution functions (not in Annex A)	535
Syntax 20-16—Syntax for PLA modeling system task (not in Annex A)	538
Syntax 20-17—System function syntax (not in Annex A)	542
Syntax 21-1—Syntax for \$display and \$write system tasks (not in Annex A)	544
Syntax 21-2—Syntax for \$strobe system tasks (not in Annex A)	553
Syntax 21-3—Syntax for \$monitor system tasks (not in Annex A)	553

Syntax 21-4—Syntax for \$fopen and \$fclose system tasks (not in Annex A)	554
Syntax 21-5—Syntax for file output system tasks (not in Annex A)	556
Syntax 21-6—Syntax for formatting data tasks (not in Annex A)	557
Syntax 21-7—Syntax for file read system functions (not in Annex A)	558
Syntax 21-8—Syntax for file positioning system functions (not in Annex A)	563
Syntax 21-9—Syntax for file flush system task (not in Annex A)	564
Syntax 21-10—Syntax for file I/O error detection system function (not in Annex A)	564
Syntax 21-11—Syntax for end-of-file file detection system function (not in Annex A)	564
Syntax 21-12—Syntax for memory load system tasks (not in Annex A)	565
Syntax 21-13—Writemem system task syntax (not in Annex A)	568
Syntax 21-14—Syntax for \$dumpfile task (not in Annex A)	573
Syntax 21-15—Syntax for \$dumpvars task (not in Annex A)	573
Syntax 21-16—Syntax for \$dumpoff and \$dumpon tasks (not in Annex A)	574
Syntax 21-17—Syntax for \$dumpall task (not in Annex A)	575
Syntax 21-18—Syntax for \$dumplimit task (not in Annex A)	575
Syntax 21-19—Syntax for \$dumpflush task (not in Annex A)	575
Syntax 21-20—Syntax for output 4-state VCD file (not in Annex A)	577
Syntax 21-21—Syntax for \$dumpports task (not in Annex A)	582
Syntax 21-22—Syntax for \$dumpportsoff and \$dumpportson system tasks (not in Annex A)	583
Syntax 21-23—Syntax for \$dumpportsall system task (not in Annex A)	584
Syntax 21-24—Syntax for \$dumpportslimit system task (not in Annex A)	584
Syntax 21-25—Syntax for \$dumpportsflush system task (not in Annex A)	585
Syntax 21-26—Syntax for \$vcdclose keyword (not in Annex A)	585
Syntax 21-27—Syntax for output extended VCD file (not in Annex A)	587
Syntax 21-28—Syntax for extended VCD node information (not in Annex A)	587
Syntax 21-29—Syntax for value change section (not in Annex A)	589
Syntax 22-1—Syntax for include compiler directive (not in Annex A)	594
Syntax 22-2—Syntax for text macro definition (not in Annex A)	595
Syntax 22-3—Syntax for text macro usage (not in Annex A)	596
Syntax 22-4—Syntax for undef compiler directive (not in Annex A)	600
Syntax 22-5—Syntax for conditional compilation directives (not in Annex A)	600
Syntax 22-6—Syntax for timescale compiler directive (not in Annex A)	603
Syntax 22-7—Syntax for default_nettype compiler directive (not in Annex A)	605
Syntax 22-8—Syntax for pragma compiler directive (not in Annex A)	606
Syntax 22-9—Syntax for line compiler directive (not in Annex A)	607
Syntax 22-10—Syntax for begin_keywords and end_keywords compiler directives (not in Annex A)	608
Syntax 23-1—Module declaration syntax (excerpt from Annex A)	615
Syntax 23-2—Non-ANSI style module header declaration syntax (excerpt from Annex A)	616
Syntax 23-3—Non-ANSI style port declaration syntax (excerpt from Annex A)	617
Syntax 23-4—ANSI style list_of_port_declarations syntax (excerpt from Annex A)	620

Syntax 23-5—Module item syntax (excerpt from Annex A)	626
Syntax 23-6—Module instance syntax (excerpt from Annex A)	627
Syntax 23-7—Syntax for hierarchical path names (excerpt from Annex A).....	639
Syntax 23-8—Syntax for upward name referencing (not in Annex A)	642
Syntax 23-9—Bind construct syntax (excerpt from Annex A)	655
Syntax 24-1—Program declaration syntax (excerpt from Annex A)	660
Syntax 25-1—Interface syntax (excerpt from Annex A).....	666
Syntax 25-2—Modport clocking declaration syntax (excerpt from Annex A)	676
Syntax 25-3—Virtual interface declaration syntax (excerpt from Annex A).....	686
Syntax 26-1—Package declaration syntax (excerpt from Annex A).....	694
Syntax 26-2—Package import syntax (excerpt from Annex A).....	695
Syntax 26-3—Package import in header syntax (excerpt from Annex A)	699
Syntax 26-4—Package export syntax (excerpt from Annex A)	701
Syntax 26-5—Std package import syntax (not in Annex A).....	703
Syntax 27-1—Syntax for generate constructs (excerpt from Annex A).....	707
Syntax 28-1—Syntax for gate instantiation (excerpt from Annex A)	718
Syntax 29-1—Syntax for UDPs (excerpt from Annex A).....	750
Syntax 29-2—Syntax for UDP instances (excerpt from Annex A).....	757
Syntax 30-1—Syntax for specify block (excerpt from Annex A)	761
Syntax 30-2—Syntax for module path declaration (excerpt from Annex A).....	762
Syntax 30-3—Syntax for simple module path (excerpt from Annex A).....	763
Syntax 30-4—Syntax for edge-sensitive path declaration (excerpt from Annex A)	764
Syntax 30-5—Syntax for state-dependent paths (excerpt from Annex A).....	765
Syntax 30-6—Syntax for path delay value (excerpt from Annex A)	772
Syntax 30-7—Syntax for PATHPULSE\$ pulse control (excerpt from Annex A)	777
Syntax 30-8—Syntax for pulse style declarations (excerpt from Annex A).....	779
Syntax 30-9—Syntax for showcanceled declarations (excerpt from Annex A).....	780
Syntax 31-1—Syntax for system timing checks (excerpt from Annex A)	786
Syntax 31-2—Syntax for time check conditions and timing check events (excerpt from Annex A).....	787
Syntax 31-3—Syntax for \$setup (excerpt from Annex A)	788
Syntax 31-4—Syntax for \$hold (excerpt from Annex A)	789
Syntax 31-5—Syntax for \$setuphold (excerpt from Annex A).....	790
Syntax 31-6—Syntax for \$removal (excerpt from Annex A)	792
Syntax 31-7—Syntax for \$recovery (excerpt from Annex A).....	792
Syntax 31-8—Syntax for \$recrem (excerpt from Annex A)	793
Syntax 31-9—Syntax for \$skew (excerpt from Annex A)	795
Syntax 31-10—Syntax for \$timeskew (excerpt from Annex A).....	796
Syntax 31-11—Syntax for \$fullskew (excerpt from Annex A).....	799
Syntax 31-12—Syntax for \$width (excerpt from Annex A)	801
Syntax 31-13—Syntax for \$period (excerpt from Annex A)	802

Syntax 31-14—Syntax for \$nochange (excerpt from Annex A)	803
Syntax 31-15—Syntax for edge-control specifier (excerpt from Annex A).....	804
Syntax 31-16—Syntax for controlled timing check events (excerpt from Annex A)	807
Syntax 32-1—Syntax for \$sdf_annotate system task (not in Annex A).....	823
Syntax 33-1—Syntax for cell (excerpt from Annex A).....	826
Syntax 33-2—Syntax for declaring library in library map file (excerpt from Annex A).....	827
Syntax 33-3—Syntax for include command (excerpt from Annex A).....	828
Syntax 33-4—Syntax for configurations (excerpt from Annex A)	829
Syntax 35-1—DPI import declaration syntax (excerpt from Annex A).....	869
Syntax 35-2—DPI export declaration syntax (excerpt from Annex A)	874

Part One: Design and Verification Constructs

IEEE Standard for SystemVerilog— Unified Hardware Design, Specification, and Verification Language

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1. Overview

1.1 Scope

This SystemVerilog standard (IEEE Std 1800) is a Unified Hardware Design, Specification, and Verification language. IEEE Std 1364™-2005 Verilog is a design language. Both standards were approved by the IEEE-SASB in November 2005. This standard creates new revisions of the IEEE 1364 Verilog and IEEE 1800 SystemVerilog standards, which include errata fixes and resolutions, enhancements, enhanced assertion language, merger of Verilog Language Reference Manual (LRM) and SystemVerilog 1800 LRM into a single LRM, integration with Verilog-AMS, and ensures interoperability with other languages such as SystemC and VHDL.

1.2 Purpose

The purpose of this project is to provide the EDA, Semiconductor, and System Design communities with a solid and well-defined IEEE Unified Hardware Design, Specification and Verification standard language, while resolving errata and developing enhancements to the current IEEE 1800 SystemVerilog standard. The language is designed to co-exist, be interoperable, possibly merge, and enhance those hardware description languages presently used by designers.