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Standard Test Interface Language (SAIL) for Digital Vest Vector Data (standards.iteh.ai)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION



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CONTENTS

FOR	EWORD	6
IEEE	E Introduction	9
1.	Overview	10
	1.1 Scope	
	1.2 Purpose	13
2.	References	13
3.	Definitions, acronyms, and abbreviations	13
	3.1 Definitions	
	3.2 Acronyms and abbreviations	16
4.	Structure of this standard	16
5.	STIL orientation and capabilities tutorial (informative)	17
	5.1 Hello Tester	
	5.2 Basic LS245	
	5.3 STIL timing expressions/"Spec" information	26
	 5.3 STIL timing expressions/"Spec" information. 5.4 Structural test (scan) S.T.A.N.D.A.R.D. P.R.E.V.I.E.W. 	31
	 5.5 Advanced scan 5.6 IEEE Std 1149.1-1990 scan and ards.iten.ai) 	35
	5.7 Multiple data elements per test cycle	
	5.8 Pattern reuse/direct access test <u>IEC.62525:2007</u>	
	5.9 Event data/non-oyelized:STIIa information/s/sist/ba905h61-324c-482c-8h7d-	54
	0178ff0756af/iec-62525-2007	
6.	STIL syntax description	64
	6.1 Case sensitivity	64
	6.2 Whitespace	
	6.3 Reserved words	
	6.4 Reserved characters	
	6.5 Comments	67
	6.6 Token length	67
	6.7 Character strings	67
	6.8 User-defined name characteristics	68
	6.9 Domain names	68
	6.10 Signal and group name characteristics	69
	6.11 Timing name constructs	
	6.12 Number characteristics	
	6.13 Timing expressions and units (time_expr)	
	6.14 Signal expressions (sigref_expr)	
	6.15 WaveformChar characteristics	
	6.16 STIL name spaces and name resolution	74
7.	Statement structure and organization of STIL information	76
	7.1 Top-level statements and required ordering	68
	7.2 Optional top-level statements	
	7.3 STIL files	/0

8.	STIL statement	
	8.1 STIL syntax8.2 STIL example	
9.	Header block	80
	9.1 Header block syntax9.2 Header example	
10.	Include statement	80
	10.1 Include statement syntax	
	10.2 Include example	
	10.3 File path resolution with absolute path notation	
	10.4 File path resolution with relative path notation	
11.	UserKeywords statement	
	11.1 UserKeywords statement syntax	
	11.2 UserKeywords example	
	11.2 Oserkey words example	
12.	UserFunctions statement	
	12.1 UserFunctions statement syntax 12.2 UserFunctions example Standards.iteh.ai)	
	12.2 Oserr unctions example	
13.	Ann statement	
	https://standards.iteh.ai/catalog/standards/sist/ba905b61-324c-482c-8b7d-	
	13.1 Annotations statement syntax 78ff0756af/iec-62525-2007.	
	13.2 Annotations example	83
	•	
14.	Signals block	
	14.1 Signals block syntax	
	14.2 Signals block example	
	11.2 orginals block example	
15.	SignalGroups block	86
	15.1 SignalGroups block syntax	86
	15.2 SignalGroups block example	87
	15.3 Default attribute values	
	15.4 Translation of based data into WaveformChar characters	88
16.	PatternExec block	89
10.		
	16.1 PatternExec block syntax	
	16.2 PatternExec block example	
17.	PatternBurst block	
	17.1 PatternBurst block syntax	91
	17.1 PatternBurst block syntax 17.2 PatternBurst block example	

18.1 Timing and Waveform Table syntax 93 18.2 Waveform event definitions. 96 18.3 Timing and Waveform Table example. 96 18.4 Rules for timed event ordering and waveform creation 99 18.5 Rules for waveform inheritance. 102 19. Spec and Selector blocks 103 19.1 Spec and Selector block syntax 103 19.2 Spec and Selector block syntax 103 19.2 Spec and Selector block syntax 106 20.1 ScanStructures block syntax 107 20.2 ScanStructures block syntax 107 20.2 ScanStructures block cxample 108 21. STIL Pattern data 109 21.1 Cyclized data 110 21.3 Valtiple-bit cyclized data 110 21.4 Scan data Teh-STANDARD-PREVIEW 111 21.5 Pattern labels 112 22. Waveform Table (W) statement 112 22.1 Vector (V) statement 112 22.2 Waveform Table (W) statement 113 22.4 Call statement 114 22.5 Natement 115 22.7 Match Loop statement 115 22.7 Match Loop statement 116	18.	Timing block and WaveformTable block	92
18.2 Waveform event definitions. 96 18.3 Timing and Waveform Table example 98 18.4 Rules for timed event ordering and waveform creation 99 18.5 Rules for waveform inheritance. 102 19. Spec and Selector blocks 103 19.1 Spec and Selector block syntax 103 19.2 Spec and Selector block syntax 103 19.2 Spec and Selector block syntax 106 20.1 ScanStructures block 106 20.1 ScanStructures block syntax 107 20.2 ScanStructures block example 108 21. STIL Pattern data 109 21.1 Cyclized data 110 21.3 Non-cyclized data 110 21.4 Stille-bit cyclized data 111 21.5 Pattern labels IEC 6252:2007 22.1 Vector (V) statement IEC 6252:2007 22.2 Waveform Table (W) statement 113 22.3 Condition (C) statement 114 22.5 Macro statement 113 22.6 Op statement 114 22.5 Macro statement 116 22.9 Thatch Loop statement 117 23.1 Pattern block syntax 117 24.2 Statemen		18.1 Timing and WaveformTable syntax	93
18.3 Timing and Waveform Table example 99 18.4 Rules for timed event ordering and waveform creation 99 18.5 Rules for timed event ordering and waveform creation 99 19. Spec and Selector blocks 103 19.1 Spec and Selector block syntax 103 19.2 Spec and Selector block syntax 103 19.3 Spec and Selector block syntax 105 20.4 ScanStructures block 106 20.1 ScanStructures block syntax 107 20.2 ScanStructures block example 108 21.1 Cyclized data 109 21.1 Cyclized data 109 21.2 Multiple-bit cyclized data 111 21.4 Scan data jTeth STANDARD PREVIEW 111 21.5 Pattern labels 112 22.1 Vector (V) statement. (Standards.iteh.ai) 22.2 WaveformTable (Wy statement in the provement waverset bit (Standards.iteh.ai) 112 22.1 Vector (V) statement. 111 22.3 Statement. 113 22.4 Call statement. 114 22.5 Macro statement. 115 22.7 Mach Loop statement. 115 22.8 Got statement. 116 23.1 Pattern block			
18.4 Rules for timed event ordering and waveform creation			
18.5 Rules for waveform inheritance 102 19. Spec and Selector blocks 103 19.1 Spec and Selector block syntax 103 19.2 Spec and Selector block example 105 20. ScanStructures block 106 20.1 ScanStructures block syntax 107 20.2 ScanStructures block example 108 21. STIL Pattern data 109 21.1 Cyclized data 109 21.2 Multiple-bit cyclized data 110 21.3 Non-cyclized data 110 21.4 Scan data 109 21.5 Pattern labels 112 22. Structures block waternet 112 23.5 STIL Pattern statements 112 24.1 Vector (V) statement IEC 625252007 22.2 Waveform Table (W) statement 113 22.3 Condition (C) statement 113 22.4 Call statement 114 22.5 Natch Loop statement 115 23.7 Match Loop statement 116 24.2 Stool statement 116 25.2 Stool statement 116 26.1 Stop statement 116 27.1 Match Loop statement 116			
19. Spec and Selector block syntax. 103 19.1 Spec and Selector block syntax. 103 19.2 Spec and Selector block example 105 20. ScanStructures block. 106 20.1 ScanStructures block syntax 107 20.2 ScanStructures block example 108 21. STIL Pattern data 109 21.1 Cyclized data 109 21.2 Multiple-bit cyclized data 110 21.3 Non-cyclized data 111 21.4 Scan data 110 21.5 Pattern labels 112 22. STIL Pattern tabeles (standards.iteh.ai) 21.2 Waveform Table (W) statement 112 22.3 Condition (C) statement 01/3807/350arc=02/25-2007 22.1 Vector (V) statement 01/3807/350arc=02/25-2007 22.1 Vector (V) statement 114 22.5 Macro statement 113 22.4 Call statement 114 22.5 Macro statement 115 22.7 Match Loop statement 116 22.9 BreakPoint statement 116 22.1 Stop statement 116 22.1 Statement 117 23.1 Pattern block 117 <tr< td=""><td></td><td>•</td><td></td></tr<>		•	
19.1 Spec and Selector block syntax			
19.2 Spec and Selector block example 105 20. ScanStructures block 106 20.1 ScanStructures block syntax 107 20.2 ScanStructures block example 108 21. STIL Pattern data 109 21.1 Cyclized data 109 21.2 Multiple-bit cyclized data 110 21.3 Non-cyclized data 111 21.4 Scan data + Toh - STANDARD PREVIEW 111 21.5 Pattern labels 112 22. STIL Pattern statements 112 22.1 Vector (V) statement 112 22.1 Vector (V) statement 112 22.2 Waveform Table (W) statement 113 22.3 Condition (C) statement 114 22.4 Call statement 114 22.5 Macro statement 114 22.6 Goto statement 115 22.7 MatchLoop statement 115 23.8 Goto statement 115 24.10 IDQTestPoint statements 116 25.10 IDQTestPoint statement 117 23.1 Pattern block syntax 117 23.2 Pattern block syntax 117 23.3 Pattern examples 118 24. Procedures and Macr	19.	Spec and Selector blocks	103
19.2 Spec and Selector block example 105 20. ScanStructures block 106 20.1 ScanStructures block syntax 107 20.2 ScanStructures block example 108 21. STIL Pattern data 109 21.1 Cyclized data 109 21.2 Multiple-bit cyclized data 110 21.3 Non-cyclized data 111 21.4 Scan data + Toh - STANDARD PREVIEW 111 21.5 Pattern labels 112 22. STIL Pattern statements 112 22.1 Vector (V) statement 112 22.1 Vector (V) statement 112 22.2 Waveform Table (W) statement 113 22.3 Condition (C) statement 114 22.4 Call statement 114 22.5 Macro statement 114 22.6 Goto statement 115 22.7 MatchLoop statement 115 23.8 Goto statement 115 24.10 IDQTestPoint statements 116 25.10 IDQTestPoint statement 117 23.1 Pattern block syntax 117 23.2 Pattern block syntax 117 23.3 Pattern examples 118 24. Procedures and Macr		19.1 Spec and Selector block syntax	103
20. ScanStructures block 106 20.1 ScanStructures block syntax 107 20.2 ScanStructures block example 108 21. STIL Pattern data 109 21. STIL Pattern data 109 21.1 Cyclized data 110 21.3 Non-cyclized data 111 21.4 Scan data. Teh. STANDARD PREVIEW 21.5 Pattern labels 111 21.4 Standards.iteh.ai) 112 22. STIL Pattern statements (standards.iteh.ai) 22. STIL Pattern statements 112 22.1 Vector (V) statement (statemost.costsba905061-324c-482c-867c-113 22.3 Condition (C) statement 113 22.4 Cal statement 114 22.5 Statement 113 22.4 Cal statement 114 22.5 Gondition (C) statement 115 22.6 Loop statement 115 22.7 MatchLoop statement 116 22.9 BreakPoint statements 116 22.9			
20.1 ScanStructures block syntax 107 20.2 ScanStructures block example 108 21. STIL Pattern data 109 21.1 Cyclized data 109 21.2 Multiple-bit cyclized data 110 21.3 Non-cyclized data 110 21.4 Scan data 110 21.5 Pattern labels 112 21.5 Pattern labels 112 22.5 STIL Pattern statements 112 22.1 Vector (V) statement IEC 625252007 22.2 Waveform Table (W) statement of 0.800/S64786-635525-2007 112 22.3 Condition (C) statement 114 22.4 Call statement 114 22.5 Gloop statement 115 22.7 MatchLoop statement 115 22.8 Gloop statement 116 22.9 BreakPoint statement 116 22.1 I Stop statement 117 23.1 Pattern block 117 23.2 Pattern initialization 118 23.3 Pattern examples 118 24.1 Procedures and MacroDefs blocks 119 24.2 Procedures example 120 24.1 Procedures block 120 24.2 Procedure			
20.2 ScanStructures block example 108 21. STIL Pattern data 109 21.1 Cyclized data 109 21.2 Multiple-bit cyclized data 110 21.3 Non-cyclized data 111 21.4 Scan data 111 21.5 Pattern labels 112 22. STIL Pattern statements 112 (standards.iteh.ai) 112 22. Vector (V) statement IEC 625252007 22.1 Vector (V) statement IEC 625252007 22.2 Waveform Table (W) statement 113 22.3 Condition (C) statement 113 22.4 Call statement 114 22.5 Marco statement 114 22.6 Loop statement 114 22.7 MatchLoop statement 115 22.8 Goto statement 116 22.9 BreakPoint statements 116 22.9 BreakPoint statement 116 22.9 Distatement 117 23. Pattern block 117 23. Pattern block syntax 117 24.1 Procedures and MacroDefs blocks 118 23.2 Pattern initialization 118 23.3 Pattern block syntax 120	20.	ScanStructures block	106
20.2 ScanStructures block example 108 21. STIL Pattern data 109 21.1 Cyclized data 109 21.2 Multiple-bit cyclized data 110 21.3 Non-cyclized data 111 21.4 Scan data 111 21.5 Pattern labels 112 22. STIL Pattern statements 112 22. STIL Pattern statements 112 22. Vector (V) statement IEC 625252007 22.1 Vector (V) statement 112 22.2 Waveform Table (W) statement 113 22.3 Condition (C) statement 113 22.4 Call statement 114 22.5 Macro statement 114 22.6 Loop statement 114 22.7 MatchLoop statement 115 22.8 Goto statement 116 22.9 BreakPoint statements 116 22.9 BreakPoint statement 116 22.9 Littern block 117 23. Pattern block syntax 117 24. Procedures and MacroDefs blocks 118 23.1 Pattern block syntax 117 23.2 Pattern initialization 118 23.3 Pattern block syntax 117		20.1 ScanStructures block syntax	107
21. STIL Pattern data 109 21.1 Cyclized data 109 21.2 Multiple-bit cyclized data 110 21.3 Non-cyclized data 111 21.4 Son-cyclized data 111 21.5 Pattern labels 111 21.5 Pattern labels 112 22. STIL Pattern statements 112 22.1 Vector (V) statement IEC 625252007 22.2 Waveform Table (W) statement 112 22.2 Condition (C) statement 113 22.3 Condition (C) statement 113 22.4 Call statement 114 22.5 Macro statement 114 22.6 Goto statement 115 22.7 MatchLoop statement 115 22.8 Goto statement 116 22.9 BreakPoint statement 116 22.9 BreakPoint statement 116 22.1 I Stop statement 117 23.1 Pattern block 117 23.2 Pattern initialization 118 23.3 Pattern examples 118 24.1 Procedures and MacroDefs blocks 119 24.2 Procedures example 120 24.1 Procedures block 120			
21.1 Cyclized data. 109 21.2 Multiple-bit cyclized data 110 21.3 Non-cyclized data 111 21.4 Scan data. 117 21.5 Pattern labels 112 (standards.iteh.ai) 22. STIL Pattern statements IEC 625252007 22.1 Vector (V) statement 112 22.1 Vector (V) statement 22.0 Waveform Table (W) statement of Statt Mit Mit Mit Mit Mit Mit Mit Mit Mit M		20.2 Seanou detaies block example	100
21.2 Multiple-bit cyclized data 110 21.3 Non-cyclized data 111 21.4 Scan data 111 21.5 Pattern labels 112 21.7 Still Pattern statements 112 22. STIL Pattern statements 112 22. STIL Vector (V) statement 112 22. Waveform Table (W) statement 112 22. Waveform Table (W) statement 112 22. Waveform Table (W) statement 113 22.3 Condition (C) statement 01/880/36a/6c-65252-2007 113 22.4 Call statement 114 114 22.5 Macro statement 114 114 22.6 Loop statement 115 115 22.7 MatchLoop statement 115 115 22.8 Goto statement 116 116 22.10 IDDQTestPoint statements 116 116 22.11 Stop statement 117 117 23. Pattern block 117 117 23. Pattern block syntax 117 24. Procedures and MacroDefs blocks 118 24. Procedures and MacroDefs blocks 118 24.	21.	STIL Pattern data	109
21.2 Multiple-bit cyclized data 110 21.3 Non-cyclized data 111 21.4 Scan data 111 21.5 Pattern labels 112 21.7 Vector (V) statement 112 22. STIL Pattern statements 112 22. Vector (V) statement 112 22. VaveformTable (W) statement 112 22. WaveformTable (W) statement 113 22. Condition (C) statement 113 22. Condition (C) statement 113 22. Condition (C) statement 114 22. Sourdition (C) statement 113 22. Condition (C) statement 114 22. Condition (C) statement 113 22. Condition (C) statement 114 22. Sourdition (C) statement 114 22. Condition (C) statement 115 22. Condition (C) statement 115 22. Condition (C) statement 115 22. Procedures statement 116 22. Pattern block syntax 117 23. Pattern b		21.1 Cuplicad data	100
21.3 Non-cyclized data 111 21.4 Scan data Ten STANDARD PREVIEW 111 21.5 Pattern labels 112 (standards.iteh.ai) 112 22. STIL Pattern statements 112 22.1 Vector (V) statement IEC 625252007 22.2 WaveformTable (W) statement 112 22.3 Condition (C) statement 113 22.4 Call statement 114 22.5 Macro statement 114 22.6 Loop statement 114 22.7 MatchLoop statement 115 22.8 Goto statement 114 22.9 BreakPoint statements 116 22.10 IDDQTestPoint statement 116 22.11 Stop statement 117 23.1 Pattern block 117 23.2 Pattern block 117 23.1 Pattern block syntax 117 24.1 Procedures and MacroDefs blocks 118 24.1 Procedures block 120 24.2 Procedures example 120 24.3 MacroDefs block 120 24.4 Scan testing 120 24.4 Scan testing 120 <td></td> <td></td> <td></td>			
21.4 Scan dataTeh STANDARD PREVIEW 111 21.5 Pattern labels 112 (standards.iteh.ai) 112 22. STIL Pattern statements 112 22.1 Vector (V) statement 112 (625252007) 22.2 Waveform Table (W) statement 112 22.3 Condition (C) statement 113 22.4 Call statement 114 22.5 Macro statement 114 22.6 Loop statement 115 22.7 MatchLoop statement 115 22.8 Goto statement 115 22.9 BreakPoint statements 116 22.10 IDDQTestPoint statement 116 22.11 Stop statement 117 23. Pattern block 117 23. Pattern block syntax 117 23. Pattern block syntax 117 24. Procedures and MacroDefs blocks 118 24. Procedures block 119 24. Procedures block 119 24. Procedures block 119 24. Procedures block 119 24. Procedures block 120 24. Procedures block 120 24. Procedures block 120		1 2	
22. STIL Pattern statements 112 22. Vector (V) statement IEC 62525:2007 22. Waveform Table (W) statement 113 22. Condition (C) statement 114 22. Statement 114 22. Statement 114 22. Macro statement 115 22. Macro statement 115 22. Macro statement 116 22. Procedures statement 116 22. BreakPoint statement 117 23. Pattern block 117 23. Pattern block syntax 117 23. Pattern block syntax 118 23. Pattern examples		21.5 Non-cyclized data	111 111
22. STIL Pattern statements 112 22. Vector (V) statement IEC 62525:2007 22. Waveform Table (W) statement 113 22. Condition (C) statement 114 22. Statement 114 22. Statement 114 22. Macro statement 115 22. Macro statement 115 22. Macro statement 116 22. Procedures statement 116 22. BreakPoint statement 117 23. Pattern block 117 23. Pattern block syntax 117 23. Pattern block syntax 118 23. Pattern examples		21.5 Pattern labels	112
22.1 Vector (V) statement 112 22.2 Waveform Table (W) statement 113 22.3 Condition (C) statement 113 22.4 Call statement 114 22.5 Macro statement 114 22.6 Loop statement 114 22.7 MatchLoop statement 115 22.7 MatchLoop statement 115 22.7 MatchLoop statement 116 22.9 BreakPoint statements 116 22.1 I Stop statement 116 22.1 Stop statement 117 23.1 Pattern block 117 23.2 Pattern block 117 23.3 Pattern block 118 24.1 Procedures and MacroDefs blocks 118 24.1 Procedures block 119 24.2 Procedures lock 120 24.3 MacroDefs block 120 24.4 Scan testing 120		(standards itah ai)	112
22.4 Call statement. 114 22.5 Macro statement. 114 22.6 Loop statement. 115 22.7 MatchLoop statement. 115 22.8 Goto statement. 116 22.9 BreakPoint statements. 116 22.10 IDDQTestPoint statement 116 22.11 Stop statement 117 22.12 ScanChain statement 117 23.1 Pattern block 117 23.2 Pattern initialization 118 23.3 Pattern examples 118 24. Procedures and MacroDefs blocks. 118 24.1 Procedures block 119 24.2 Procedures example 120 24.4 Scan testing 120 24.4 Scan testing 120	22.	STIL Pattern statements.	112
22.4 Call statement. 114 22.5 Macro statement. 114 22.6 Loop statement. 115 22.7 MatchLoop statement. 115 22.8 Goto statement. 116 22.9 BreakPoint statements. 116 22.10 IDDQTestPoint statement 116 22.11 Stop statement 117 22.12 ScanChain statement 117 23.1 Pattern block 117 23.2 Pattern initialization 118 23.3 Pattern examples 118 24. Procedures and MacroDefs blocks. 118 24.1 Procedures block 119 24.2 Procedures example 120 24.4 Scan testing 120 24.4 Scan testing 120		IEC 62525:2007	110
22.4 Call statement. 114 22.5 Macro statement. 114 22.6 Loop statement. 115 22.7 MatchLoop statement. 115 22.8 Goto statement. 116 22.9 BreakPoint statements. 116 22.10 IDDQTestPoint statement 116 22.11 Stop statement 117 22.12 ScanChain statement 117 23.1 Pattern block 117 23.2 Pattern initialization 118 23.3 Pattern examples 118 24. Procedures and MacroDefs blocks. 118 24.1 Procedures block 119 24.2 Procedures example 120 24.4 Scan testing 120 24.4 Scan testing 120		22.1 Vector (V) statement.	112
22.4 Call statement. 114 22.5 Macro statement. 114 22.6 Loop statement. 115 22.7 MatchLoop statement. 115 22.8 Goto statement. 116 22.9 BreakPoint statements. 116 22.10 IDDQTestPoint statement 116 22.11 Stop statement 117 22.12 ScanChain statement 117 23.1 Pattern block 117 23.2 Pattern initialization 118 23.3 Pattern examples 118 24. Procedures and MacroDefs blocks. 118 24.1 Procedures block 119 24.2 Procedures example 120 24.4 Scan testing 120 24.4 Scan testing 120		22.2 Waveform Table (W) statement 0178ff0756af/iec-62525-2007	113
22.5 Macro statement 114 22.6 Loop statement 115 22.7 MatchLoop statement 115 22.8 Goto statement 116 22.9 BreakPoint statements 116 22.10 IDDQTestPoint statement 116 22.11 Stop statement 116 22.12 ScanChain statement 117 23. Pattern block 117 23.1 Pattern block syntax 117 23.2 Pattern initialization 118 23.3 Pattern examples 118 24. Procedures and MacroDefs blocks 118 24.1 Procedures block 119 24.2 Procedures block 119 24.3 MacroDefs block 120 24.4 Scan testing 120			
22.6 Loop statement. 115 22.7 MatchLoop statement. 115 22.8 Goto statement 116 22.9 BreakPoint statements. 116 22.10 IDDQTestPoint statement 116 22.11 Stop statement 117 22.12 ScanChain statement 117 23. Pattern block 117 23.1 Pattern block syntax 117 23.2 Pattern initialization 118 23.3 Pattern examples 118 24. Procedures and MacroDefs blocks 118 24.1 Procedures block 119 24.2 Procedures block 120 24.3 MacroDefs block 120 24.4 Scan testing 120			
22.7 MatchLoop statement. 115 22.8 Goto statement 116 22.9 BreakPoint statements. 116 22.10 IDDQTestPoint statement 116 22.11 Stop statement 117 22.12 ScanChain statement 117 23. Pattern block 117 23.1 Pattern block syntax 117 23.2 Pattern initialization 118 23.3 Pattern examples 118 24. Procedures and MacroDefs blocks 118 24.1 Procedures block 119 24.2 Procedures block 119 24.3 MacroDefs block 120 24.4 Scan testing 120 24.4 Scan testing 120			
22.8 Goto statement 116 22.9 BreakPoint statements 116 22.10 IDDQTestPoint statement 116 22.11 Stop statement 117 22.12 ScanChain statement 117 23. Pattern block 117 23.1 Pattern block syntax 117 23.2 Pattern block syntax 117 23.3 Pattern block syntax 117 24. Procedures and MacroDefs blocks 118 24. Procedures block 119 24.2 Procedures block 119 24.3 MacroDefs block 120 24.4 Scan testing 120			
22.9 BreakPoint statements. 116 22.10 IDDQTestPoint statement 116 22.11 Stop statement. 117 22.12 ScanChain statement 117 23. Pattern block 117 23.1 Pattern block syntax 117 23.2 Pattern initialization 118 23.3 Pattern examples 118 24. Procedures and MacroDefs blocks. 118 24.1 Procedures block 119 24.2 Procedures block 119 24.3 MacroDefs block. 120 24.4 Scan testing 120 24.4 Scan testing 120		1	
22.10 IDDQTestPoint statement11622.11 Stop statement11722.12 ScanChain statement11723. Pattern block11723.1 Pattern block syntax11723.2 Pattern initialization11823.3 Pattern examples11824. Procedures and MacroDefs blocks11824.1 Procedures block11924.2 Procedures block11924.3 MacroDefs block12024.4 Scan testing120			
22.11 Stop statement11722.12 ScanChain statement11723. Pattern block11723.1 Pattern block syntax11723.2 Pattern initialization11823.3 Pattern examples11824. Procedures and MacroDefs blocks11824.1 Procedures block11924.2 Procedures block11924.3 MacroDefs block12024.4 Scan testing120			
22.12 ScanChain statement11723. Pattern block11723.1 Pattern block syntax11723.2 Pattern initialization11823.3 Pattern examples11824. Procedures and MacroDefs blocks11824.1 Procedures block11924.2 Procedures block11924.3 MacroDefs block12024.4 Scan testing120			
23.1 Pattern block syntax11723.2 Pattern initialization11823.3 Pattern examples11824. Procedures and MacroDefs blocks11824.1 Procedures block11924.2 Procedures example12024.3 MacroDefs block12024.4 Scan testing120		•	
23.2 Pattern initialization11823.3 Pattern examples11824. Procedures and MacroDefs blocks11824.1 Procedures block11924.2 Procedures example12024.3 MacroDefs block12024.4 Scan testing120	23.	Pattern block	117
23.2 Pattern initialization11823.3 Pattern examples11824. Procedures and MacroDefs blocks11824.1 Procedures block11924.2 Procedures example12024.3 MacroDefs block12024.4 Scan testing120		23.1 Pattern block syntax	117
23.3 Pattern examples11824. Procedures and MacroDefs blocks11824.1 Procedures block11924.2 Procedures example12024.3 MacroDefs block12024.4 Scan testing120			
24. Procedures and MacroDefs blocks			
24.1 Procedures block11924.2 Procedures example12024.3 MacroDefs block12024.4 Scan testing120		ľ	
24.2 Procedures example 120 24.3 MacroDefs block 120 24.4 Scan testing 120	24.	Procedures and MacroDefs blocks	118
24.2 Procedures example 120 24.3 MacroDefs block 120 24.4 Scan testing 120		24.1 Procedures block	119
24.3 MacroDefs block12024.4 Scan testing120			
24.4 Scan testing 120			
		24.4 Scan testing	120
		24.5 Procedure and Macro Data substitution	121

Annex A (informative) Glossary	125
Annex B (informative) STIL data model	126
Annex C (informative) GNU GZIP reference	131
Annex D (informative) Binary STIL data format	132
Annex E (informative) LS245 design description	136
Annex F (informative) STIL FAQs and language design decisions	138
Annex G (informative) List of participants	142

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

STANDARD TEST INTERFACE LANGUAGE (STIL) FOR DIGITAL TEST VECTOR DATA

FOREWORD

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IEEE Std	FDIS	Report on voting
1450(1999)	93/247/FDIS	93/258/RVD

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IEEE Standard Test Interface Language (STIL) for Digital Test Vector Data

Sponsor

Test Technology Standards Committee of the iTeh STANDARD PREVIEW IEEE Computer Society (standards.iteh.ai)

Approved 18 March 1999

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Abstract: Standard Test Interface Language (STIL) provides an interface between digital test generation tools and test equipment. A test description language is defined that: (a) facilitates the transfer of digital test vector data from CAE to ATE environments; (b) specifies pattern, format, and timing information sufficient to define the application of digital test vectors to a DUT; and (c) supports the volume of test vector data generated from structured tests.

-8-

Keywords: automatic test pattern generator (ATPG), built-in self-test (BIST), computer-aided engineering (CAE), cyclize, device under test (DUT), digital test vectors, event, functional vectors, pattern, scan vectors, signal, structural vectors, timed event, waveform, waveshape

IEEE Introduction

Standard Test Interface Language (STIL) was initially developed by an ad-hoc consortium of test equipment vendors, computer-aided engineering (CAE) and computer-aided design (CAD) vendors, and integrated circuit (IC) manufacturers, to address the lack of a common solution for transferring digital test data from the generation environment to the test equipment.

The need for a common interchange format for large volumes of digital test data was identified as an overriding priority for the work; as such, the scope of the work was constrained to those aspects of the test environment that contribute significantly to the volume issue, or are necessary to support the comprehension of that data. Binary representations of data were a key consideration in these efforts, resulting in a proposal to incorporate the compression of files as part of this standard.

Limiting the scope of any standards project is a difficult thing to do, especially for a room full of engineers. However, issues that did not impact the scope as identified were dropped from consideration in this version of the standard. Subclause 1.1 covers, specifically, the capabilities that are not intended to be part of this first standard.

Early work in this consortium consisted of identifying the requirements necessary/to address this problem and reviewing existing options and languages in the industry. All options proposed fell short of addressing the requirements, and the consortium started to define a new language. This work was executed with heavy leverage from some existing languages and environments, and STIL owes much to the groundwork established by these other languages.

IEC 62525:2007 https://standards.iteh.ai/catalog/standards/sist/ba905b61-324c-482c-8b7d-0178ff0756af/iec-62525-2007

STANDARD TEST INTERFACE LANGUAGE (STIL) FOR DIGITAL TEST VECTOR DATA

1. Overview

Standard Test Interface Language (STIL) is a standard language that provides an interface between digital test generation tools and test equipment. STIL may be directly generated as an output language of a test generation tool, or it may be used as an intermediate format for subsequent processing. Figure 1 shows STIL usage in a "pipe" format. This is meant solely as a visual analogy to emphasize the high-volume/high-throughput requirements. It is not meant to represent physical structures or implementation requirements.

STIL is a representation of information needed to define digital test operations in manufacturing tests. STIL is not intended to define how the tester implements that information. While the purpose of STIL is to pass test data into the test environment, the overall STIL language is inherently more flexible than any particular tester. Constructs may be used in a STIL file that exceed the capability of a particular tester. In some circumstances, a translator for a particular type of test equipment may be capable of restructuring the data to support that capability on the tester; in other circumstances, separate tools may operate on that data to provide that restructuring. In all circumstances, it is desirable to provide the capability to check the data against the constraints of a tester. This capability is referred to as Tester Rules Checking and is the domain of tools that operate on STIL data. As such, Tester Rules Checking operations are outside the scope of this standard.

Figure 2 shows how STIL fits into the data flow between computer-aided engineering (CAE)/simulation and the test environment. In this figure, STIL is shown as both the input and output of "STIL Manipulation Tools." STIL represents patterns as a series of cyclized waveforms that are executed sequentially. The waveform representation can be as simple as a "print-on-change" set of events, or a complex set of parameterized events. Hence, tools may be required to manipulate the data according to the requirements of a particular class of device, simulation, or tester. The output of that manipulation is still represented in STIL.

Another issue presented in Figure 2 is the need for data from the tester to be transmitted back to the CAE/simulation environment for the purpose of correlating simulation data to tester data. Although this is recognized as an important aspect of testing digital devices, it does not represent the data volume that the patterns themselves do, and is not specifically supported in this version of the standard.

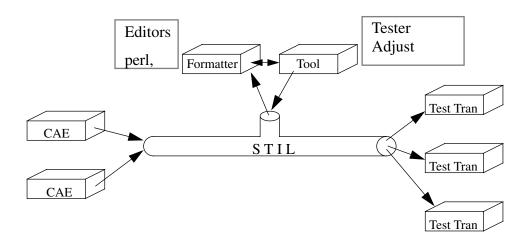


Figure 1—A conduit for transporting data from CAE to ATE

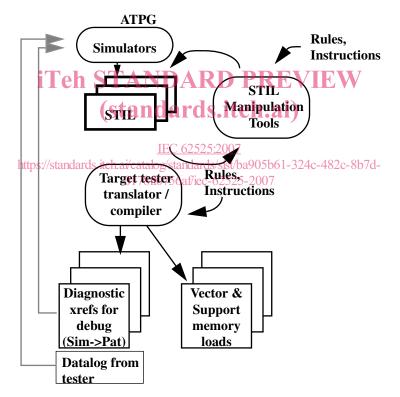


Figure 2—STIL usage model

1.1 Scope

This standard defines a test description language that:

- a) Facilitates the transfer of large volumes of digital test vector data from CAE environments to automated test equipment (ATE) environments;
- b) Specifies pattern, format, and timing information sufficient to define the application of digital test vectors to a device under test (DUT);
- c) Supports the volume of test vector data generated from structured tests such as scan/automatic test pattern generation (ATPG), integral test techniques such as built-in self test (BIST), and functional test specifications for IC designs and their assemblies, in a format optimized for application in ATE environments.

In setting the scope for any standard, some issues are defined to not be pertinent to the initial project. The following is a partial list of issues that were dropped from the scope of this initial project:

- Levels: A key aspect of a digital test program is the ability to establish voltage and current parameters (levels) for signals under test. Level handling is not explicitly defined in the current standard, as this information is both compact (not presenting a transportation issue) and commonly established independently of digital test data, requiring different support mechanisms outside the current scope of this standard. Termination values may affect levels.
- Diagnostic/fault-tracing information: The goal of this standard is to optimally present data that needs to be moved onto ATE. While diagnostic data, fault identification data, and macro/design element correspondence data can fall into this category (and is often fairly large), this standard is also focused on integrated circuit and assemblies test, and most debug/failure analysis occurs separately from the ATE for these structures. Note that return of failure information (for off-ATE analysis) is also not part of the standard as currently defined.2007
- Datalogging mechanisms, formatting, and control usually are not defined as part of this current standard.
- Parametric tests are not defined as an integral part of this standard, except for optional pattern labels that identify potential locations for parametric tests, such as I_{DDQ} tests or alternating current (AC) timing tests.
- Program flow: Test sequencing and ordering are not defined as part of the current standard except as necessary to define collections of digital patterns meant to execute as a unit.
- Binning constructs are not part of the current standard.
- Analog or mixed-signal test: While this is an area of concern for many participants, at this point transfer of analog test data does not contribute to the same transportation issue seen with digital data.
- Algorithmic pattern constructs (such as sequences commonly used for memory test) are not currently defined as part of the standard.
- Parallel test/multisite test constructs are not an integral part of the current environment.
- User input and user control/options are not part of the current standard.
- Characterization tools, such as shmoo plots, are not defined as part of the current standard.

1.2 Purpose

This standard addresses a need in the integrated circuit $(IC)^1$ test industry to define a standard mechanism for transferring the large volumes of digital test data from the generation environment through to test. The environment today contains unique output formats of existing CAE tools, individual test environments of IC manufacturers, and proprietary IC ATE input interfaces. As each of these three arenas solves individual problems, together they have created a morass of interfaces, translators, and software environments that provide no opportunity to leverage common goals and result in much wasted efforts re-engineering solutions. As device density increases, the magnitude of test data threatens to shift the test bottleneck from the generation process to the processes necessary solely to maintain and transport this data. These two factors threaten to eliminate any productive work performed in this area unless a viable standard is defined.

With a common standard for CAE and IC ATE environments, the generation, movement, and processing of this test data is greatly facilitated. This standard also allows for immediate access to test equipment supporting this standard, which benefits both ATE and IC vendors reviewing this equipment.

This standard also serves as a catalyst for the development of a set of standard third party interface tools to both test and design aspects of IC device generation.

2. References

This standard shall be used in conjunction with the following standards. If the following publications are superseded by an approved revision, the revision shall apply. **PREVIEW**

IEEE Std 100-1996, The IEEE Standard Dictionary of Electrical and Electronics Terms, Sixth Edition.²

IEEE Std 260.1-1993, American National Standard Letter Symbols for Units of Measurement (SI Units, Customary Inch-Pound Units, and Certain Other Units), sist/ba905b61-324c-482c-8b7d-

0178ff0756af/iec-62525-2007

ISO 2955:1983, Information processing—Representation of SI and other units in systems with limited character sets.³

ISO/IEC 9899:1999, Programming languages—C.⁴

3. Definitions, acronyms, and abbreviations

3.1 Definitions

For the purposes of this standard, the following terms and definitions apply. Additional terminology specific to this standard is found in Annex A. IEEE Std 100-1996, *The IEEE Standard Dictionary of Electrical and Electronics Terms, Sixth Edition*, should be referenced for terms not defined in this document.

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³ISO publications are available from the ISO Central Secretariat, Case Postale 56, 1 rue de Varembé, CH-1211, Genève 20, Switzerland/Suisse (http://www.iso.ch/). ISO publications are also available in the United States from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA (http://www.ansi.org/).

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