

State/Timing Modules Specifications and Characteristics

Key Specifications* and Characteristics

Agilent Model Number	16715A, 16716A, 16717A	16740A, 16741A, 16742A	16750A, 16751A, 16752A	16760A
Maximum state acquisition rate on each channel	16715A, 16716A: 167 Mb/s 16717A, 333 Mb/s [1]	200 Mb/s	400 Mb/s [1]	Full channel: 800 Mb/s Half channel: 1.25 Gb/s
Maximum timing sample rate (half/full channel)	Timing Zoom: 2 GHz (16716A, 16717A only) Conventional: 667/333 MHz Transitional: 333 MHz	Timing Zoom: 2 GHz Conventional: 800/400 MHz Transitional: 400 MHz	Timing Zoom: 2 GHz Conventional: 800/400 MHz Transitional: 400 MHz	Conventional: 800 MHz Transitional: 400 MHz
Channels/module	68	68	68	34
Maximum channels on a single time base and trigger	340 (5 modules)	340 (5 modules)	340 (5 modules)	170 (5 modules)
Memory depth (half/full channel)	16715A, 16717A: 4/2M [2] 16716A: 1M/512K [2]	16740A: 2/1 M [2] 16741A: 8/4 M [2] 16742A 32/16 M [2]	16750A: 8/4M [2] 16751A: 32/16M [2] 16752A: 64/32M [2]	128/64M [5]
Trigger resources	Patterns: 16 Ranges: 15 Edge & Glitch: 2 Timers: (2 per module) -1 Occurrence Counter: [4] Global Counters: 2 Flags: 4	Pattern: 16 Ranges: 15 Edge & Glitch: 2 Timers: (2 per module) -1 Occurrence Counter: 2 Global Counter: 2 Flags: 4	Patterns: 16 Ranges: 15 Edge & Glitch: 2 Timers: (2 per module) -1 Occurrence Counter: [4] Global Counters: 2 Flags: 4	At 800 Mb/s: 4 patterns or 2 ranges, 4 flags, arm in At 200 Mb/s: same as 16751A, 16752A Other speeds: refer to synchronous state analysis (page 98) and asynchronous timing analysis (page 100)
Maximum trigger sequence levels	16	16	16	1.25 Gb/s: 2 800 Mb/s: 4 200 or 400 Mb/s: 16
Maximum trigger sequence speed	16715A, 16716A: 167 MHz 16717A: 333 MHz	200 MHz	400 MHz	1.25 Gb/s
Trigger sequence level branching	4-way arbitrary "IF/THEN/ELSE" branching	4-way arbitrary "IF/THEN/ELSE" branching	4-way arbitrary "IF/THEN/ELSE" branching	800 or 1.25 Gb/s: none 200 Mb/s: arbitrary "IF/THEN/ELSE" branching 400 Mb/s: dedicated next-state branch or reset
Number of state clocks/qualifiers	4	4	4	1 (state clock only)
Setup/hold time*	2.5 ns window adjustable from 4.5/-2.0 ns to -2.0/4.5 ns in 100 ps increments per channel [3]	2.5 ns windows adjustable from 4.5/2.0 ns to -2.0/4.5 ns in 100 ps increments per channel [3]	2.5 ns window adjustable from 4.5/-2.0 ns to -2.0/4.5 ns in 100 ps increments per channel [3]	1 ns window adjustable from 2.5/-1.5 ns to -1.5/2.5 ns 10 ps increments per channel
Threshold range	TTL, ECL, user-definable ± 6.0 V adjustable in 10-mV increments	TTL, ECL, user-definable ± 6.0 V adjustable in 10-mV increments	TTL, ECL, user-definable ± 6.0 V adjustable in 10-mV increments	-3.0 V to 5.0 V adjustable in 10-mV increments

* All specifications noted by an asterisk are the performance standards against which the product is tested.

[1] State speeds greater than 167 MHz (16717A) or 200 MHz (16750A, 16751A, 16752A, 16760A) require a trade-off in features. Refer to "Supplemental Specifications and Characteristics" on page 93 for more information.

[2] Memory depth doubles in half-channel timing mode only.

[3] Minimum setup/hold time specified for a single clock, single edge acquisition. Multi-clock, multi-edge setup/hold window add 0.5 ns.

[4] There is one occurrence counter per trigger sequence level.

[5] Memory depth doubles in half-channel 1.25 Gb/s state mode only.

State/Timing Modules Specifications and Characteristics

Agilent Technologies 16715A, 16716A, 16717A, 16740A, 16741A, 16742A, 16750A, 16751A, 16752A Supplemental Specifications* and Characteristics

Probes (general-purpose lead set)

Input resistance	100 K Ω , \pm 2%
Parasitic tip capacitance	1.5 pF
Minimum voltage swing	500 mV, peak-to-peak
Minimum input overdrive	250 mV
Threshold range	-6V to +6V in 10 mV increments
Threshold accuracy*	\pm (65 mV + 1.5% of settings)
Input dynamic range	\pm 10V about threshold
Maximum input voltage	\pm 40V peak
+5V Accessory current	1/3 amp maximum per pod
Channel assignment	Each group of 34 channels can be assigned to Analyzer 1, Analyzer 2 or remain unassigned

2 GHz Timing Zoom (Agilent 16716A, 16717A, 16740A, 16741A, 16742A, 16750A, 16751A, 16752A only)

Timing analysis sample rate	2 GHz/1 GHz/500 MHz/250 MHz
Sample period accuracy	\pm 50 ps
Channel-to-channel skew	< 1.0 ns
Time interval accuracy	\pm (sample period + channel-to-channel skew + 0.01% of time interval reading)
Memory depth	16 K
Trigger position	Start, center, end, or user defined

Operating Environment

Temperature	Agilent 16700 Series frame: 0° C to 50° C (+32° F to 122° F) Probe lead sets and cables: 0° C to 65° C (+32° F to 149° F)
Humidity	80% relative humidity at + 40° C
Altitude	Operating 4600 m (15,000 ft) Non-operating 15,300 m (50,000 ft)

* All specifications noted by an asterisk are the performance standards against which the product is tested.

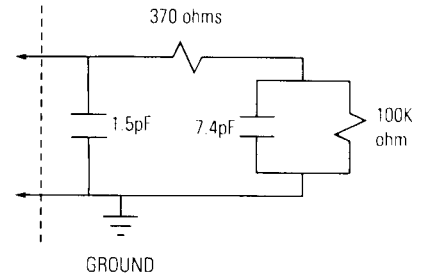


Figure 6.13. Equivalent probe load for the Agilent 16715A, 16716A, 16717A, 16718A, 16719A, 16750A, 16751A, 16752A general-purpose lead set.

State/Timing Modules Specifications and Characteristics

Agilent Technologies 16715A, 16716A, 16717A, 16740A, 16741A, 16742A, 16750A, 16751A, 16752A Supplemental Specifications* and Characteristics

State Mode	16715A, 16716A, 16717A 167 Mb/s State Mode	16740A, 16741A, 16742A 16750A, 16751A, 16752A 200 Mb/s State Mode
Maximum state acquisition rate on each channel	167 Mb/s	200 Mb/s
Channel count	68 per module	68 per module
Maximum channels on a single time base and trigger	340	340
Number of independent analyzers	2, can be set up in state or timing modes	2, can be set up in state or timing modes
Minimum master to master clock time* [1]	5.988 ns	5 ns
Minimum master to slave clock time	2 ns	2 ns
Minimum slave to master clock time	2 ns	2 ns
Minimum slave to slave clock time	5.988 ns	5 ns
Setup/hold time* [1] (single-clock, single-edge)	2.5 ns window adjustable from 4.5/-2.0 ns to -2.0/4.5 ns in 100 ps increments per channel	2.5 ns window adjustable from 4.5/-2.0 ns to -2.0/4.5 ns in 100 ps increments per channel
Setup/hold time* [1] (multi-clock, multi-edge)	3.0 ns window adjustable from 5.0/-2.0 ns to -1.5/4.5 ns in 100 ps increments per channel	3.0 ns window adjustable from 5.0/-2.0 ns to -1.5/4.5 ns in 100 ps increments per channel
Setup/hold time (on individual channels, after running eye finder)	1.25 ns window	1.25 ns window
Minimum state clock pulse width	1.2 ns	1.2 ns
Time tag resolution [2]	4 ns	4 ns
Maximum time count between states	17 seconds	17 seconds
Maximum state tag count between states [2]	2 ³²	2 ³²
Number of state clocks/qualifiers	4	4
Maximum memory depth	16716A: 512K 16715A, 16717A: 2M	16740A: 1M 16741A: 4M 16742A: 16M 16750A: 4M 16751A: 16M 16752A: 32M
Maximum trigger sequence speed	167 MHz	200 MHz
Maximum trigger sequence levels	16	16

* All specifications noted by an asterisk are the performance standards against which the product is tested.

[1] Tested at input signal VH=-0.9V, VL=-1.7V, Slew rate=1V/ns, and threshold=-1.3V.

[2] Time or state tags halve the acquisition memory when there are no unassigned pods.

State/Timing Modules Specifications and Characteristics

Agilent Technologies 16715A, 16716A, 16717A, 16740A, 16741A, 16742A, 16750A, 16751A, 16752A Supplemental Specifications* and Characteristics (continued)

State Mode	16715A, 16716A, 16717A 167 Mb/s State Mode	16740A, 16741A, 16742A 16750A, 16751A, 16752A 200 Mb/s State Mode
Trigger sequence level branching	4 way arbitrary "IF/THEN/ELSE" branching	4 way arbitrary "IF/THEN/ELSE" branching
Trigger position	Start, center, end, or user defined	Start, center, end, or user defined
Trigger resources	16 Patterns evaluated as =, ≠, >, <, ≥, ≤ 15 Ranges evaluated as in range, not in range (2 Timers per module) -1 2 Global counters 1 Occurrence counter per sequence level 4 Flags	16 Patterns evaluated as =, ≠, >, <, ≥, ≤ 15 Ranges evaluated as in range, not in range (2 Timers per module) -1 2 Global counters 1 Occurrence counter per sequence level 4 Flags
Trigger resource conditions	Arbitrary Boolean combinations	Arbitrary Boolean combinations
Trigger actions	Goto Trigger and fill memory Trigger and goto Store/don't store sample Turn on/off default storing Timer start/stop/pause/resume Global counter increment/reset Occurrence counter reset Flag set/clear	Goto Trigger and fill memory Trigger and goto Store/don't store sample Turn on/off default storing Timer start/stop/pause/resume Global counter increment/reset Occurrence counter reset Flag set/clear
Store qualification	Default and per sequence level	Default and per sequence level
Maximum global counter	16,777,215	16,777,215
Maximum occurrence counter	16,777,215	16,777,215
Maximum pattern/range width	32 bits	32 bits
Timers value range	100 ns to 5497 seconds	100 ns to 5497 seconds
Timer resolution	5 ns	5 ns
Timer accuracy	10 ns + .01%	10 ns + .01%
Timer reset latency	70 ns	70 ns
Data in to trigger out (BNC port)	150 ns, typical	150 ns, typical
Flag set/reset to evaluation	110 ns, typical	110 ns, typical

* All specifications noted by an asterisk are the performance standards against which the product is tested.

State/Timing Modules Specifications and Characteristics

Agilent Technologies 16715A, 16716A, 16717A, 16740A, 16741A, 16742A, 16750A, 16751A, 16752A Supplemental Specifications* and Characteristics (continued)

State Mode	16715A, 16716A, 16717A 167 Mb/s State Mode	16750A, 16751A, 16752A 400 Mb/s State Mode
Maximum state acquisition rate on each channel	333 Mb/s	400 Mb/s
Channel count	(Number of modules x 68) - 34	(Number of modules x 68) - 34
Maximum channels on a single time base and trigger	306	306
Number of independent analyzers	1, when 333 MHz state mode is selected the second analyzer is turned off	1, when 400 MHz state mode is selected the second analyzer is turned off
Minimum master to master clock time* [1]	3.003 ns	2.5 ns
Setup/hold time* [1] (single-clock, single-edge)	2.5 ns window adjustable from 4.5/-2.0 ns to -2.0/4.5 ns in 100 ps increments per channel	2.5 ns window adjustable from 4.5/-2.0 ns to -2.0/4.5 ns in 100 ps increments per channel
Setup/hold time* [1] (single-clock, multi-edge)	3.0 ns window adjustable from 5.0/-2.0 ns to -1.5/4.5 ns in 100 ps increments per channel	3.0 ns window adjustable from 5.0/-2.0 ns to -1.5/4.5 ns in 100 ps increments per channel
Setup/hold time (on individual channels after running eye finder)	1.25 ns window	1.25 ns window
Minimum state clock pulse width	1.2 ns	1.2 ns
Time tag resolution [2]	4 ns	4 ns
Maximum time count between states	17 seconds	17 seconds
Number of state clocks	1	1
Maximum memory depth	16717A: 2M	16750A: 4M 16751A: 16M 16752A: 32M
Maximum trigger sequence speed	333 MHz	400 MHz
Maximum trigger sequence levels	15	15
Trigger sequence level branching	Dedicated next state branch or reset	Dedicated next state branch or reset
Trigger position	Start, center, end, or user defined	Start, center, end, or user defined

* All specifications noted by an asterisk are the performance standards against which the product is tested.

[1] Tested at input signal VH=-0.9V, VL=-1.7V, Slew rate=1V/ns, and threshold=-1.3V.

[2] Time or state tags halve the acquisition memory when there are no unassigned pods.

State/Timing Modules Specifications and Characteristics

Agilent Technologies 16715A, 16716A, 16717A, 16740A, 16741A, 16742A, 16750A, 16751A, 16752A Supplemental Specifications* and Characteristics (continued)

State Mode	16715A, 16716A, 16717A 167 Mb/s State Mode	16750A, 16751A, 16752A 400 Mb/s State Mode
Trigger resources	8 Patterns evaluated as =, ≠, >, <, ≥, ≤ 4 Ranges evaluated as in range, not in range 2 Occurrence counters 4 Flags	8 Patterns evaluated as =, ≠, >, <, ≥, ≤ 4 Ranges evaluated as in range, not in range 2 Occurrence counters 4 Flags
Trigger resource conditions	Arbitrary Boolean combinations	Arbitrary Boolean combinations
Trigger actions	Goto Trigger and fill memory	Goto Trigger and fill memory
Store qualification	Default	Default
Maximum occurrence counter	16,777,215	16,777,215
Maximum pattern/range width	32 bits	32 bits
Data in to trigger out (BNC port)	150 ns, typical	150 ns, typical
Flag set/reset to evaluation	110 ns, typical	110 ns, typical
Timing Mode	16715A, 16716A, 16717A	16740A, 16741A, 16742A, 16750A, 16751A, 16752A
Timing analysis sample rate (half/full channel)	667/333 MHz	800/400 MHz
Channel count	68 per module	68 per module
Maximum channels on a single time base and trigger	340	340
Number of independent analyzers	2, can be setup in state or timing modes	2, can be setup in state or timing modes
Sample period (full channel)	3 ns to 1 ms	2.5 ns to 1 ms
Sample period (half channel)	1.5 ns	1.25 ns
Minimum data pulse width for data capture		
Conventional timing	1.75 ns	1.5 ns
Transitional timing	3.9 ns	3.8 ns
For trigger sequencing	6.1 ns	5.1 ns
Sample period accuracy	±(100 ps + .01% of sample period)	±(100 ps + .01% of sample period)
Channel-to-channel skew	< 1.5 ns	< 1.5 ns
Time interval accuracy	± (sample period + channel-to-channel skew + .01% of time interval reading)	± (sample period + channel-to-channel skew + .01% of time interval reading)
Minimum detectable glitch	1.5 ns	1.5 ns
Memory depth (half/full channel)	16716A: 1M/512K 16715A, 16717A: 4/2M	16750A: 8/4M 16751A: 32/16M 16752A: 64/32M

* All specifications noted by an asterisk are the performance standards against which the product is tested.

State/Timing Modules Specifications and Characteristics

Agilent Technologies 16715A, 16716A, 16717A, 16740A, 16741A, 16742A, 16750A, 16751A, 16752A Supplemental Specifications* and Characteristics (continued)

Timing Mode (continued)	16715A, 16716A, 16717A	16740A, 16741A, 16742A 16750A, 16751A, 16752A
Maximum trigger sequence speed	167 MHz	200 MHz
Maximum trigger sequence levels	16	16
Trigger sequence level branching	4 way arbitrary "IF/THEN/ELSE" branching	4 way arbitrary "IF/THEN/ELSE" branching
Trigger position	Start, center, end, or user defined	Start, center, end, or user defined
Trigger resources	16 Patterns evaluated as =, ≠, >, <, ≥, ≤ 15 Ranges evaluated as in range, not in range 2 Edge/glitch (2 Timers per module) -1 2 Global counters 1 Occurrence counter per sequence level 4 Flags	16 Patterns evaluated as =, ≠, >, <, ≥, ≤ 15 Ranges evaluated as in range, not in range 2 Edge/glitch (2 Timers per module) -1 2 Global counters 1 Occurrence counter per sequence level 4 Flags
Trigger resource conditions	Arbitrary Boolean combinations	Arbitrary Boolean combinations
Trigger actions	Goto Trigger and fill memory Trigger and goto Timer start/stop/pause/resume Global counter increment/reset Occurrence counter reset Flag set/clear	Goto Trigger and fill memory Trigger and goto Timer start/stop/pause/resume Global counter increment/reset Occurrence counter reset Flag set/clear
Maximum global counter	16,777,215	16,777,215
Maximum occurrence counter	16,777,215	16,777,215
Maximum pattern/range width	32 bits	32 bits
Timer value range	100 ns to 5497 seconds	100 ns to 5497 seconds
Timer resolution	5 ns	5 ns
Timer accuracy	±10 ns + .01%	±10 ns + .01%
Greater than duration	6 ns to 100 ms in 6 ns increments	6 ns to 100 ms in 6 ns increments
Less than duration	12 ns to 100 ms in 6 ns increments	12 ns to 100 ms in 6 ns increments
Timer reset latency	70 ns	70 ns
Data in to trigger out (BNC port)	150 ns, typical	150 ns, typical
Flag set/reset to evaluation	110 ns, typical	110 ns, typical

* All specifications noted by an asterisk are the performance standards against which the product is tested.