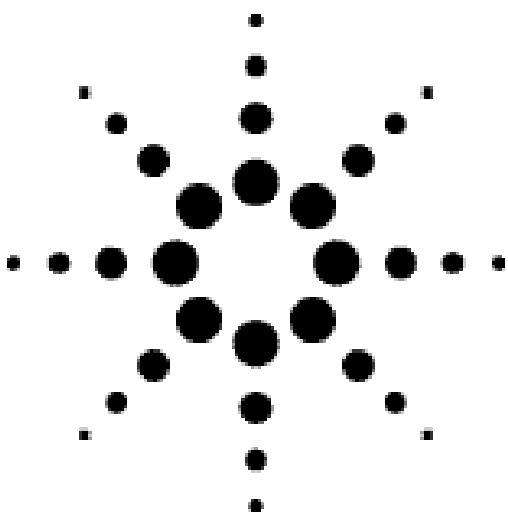


# Agilent Technologies

## 54720D

### Data Sheet



#### Product Specifications

##### Time-Interval Measurement Accuracy Specifications

Real Time  $\pm[(0.2)(\text{sample interval}) + 0.007\%$   
of delta-time marker reading]

Equivalent Time  $\pm(30 \text{ ps} + 0.007\%$  of delta-time marker reading)  
(16 averages)

##### Typical Channel Characteristics

###### ADC Input Sources

(simultaneous 4 plug-in slots, each having its own 2-GSa/s acquisition) ADC. Acquisition memory is 65,536 points per slot.

##### Best Accuracy Calibration

Performing the best accuracy cal on a channel just prior to a series of critical measurements will ensure the most accurate results. This cal adjusts the channel's gain, offset, and linearity, and requires a specific plug-in to stay installed in a specific mainframe slot.

##### Channel Skew Adjustment

The time skew between channels can be manually eliminated all the way to the probe tip to 1-ps resolution.

Probe Calibration A probe calibration routine automatically computes the offset and attenuation created by the probe attached to the channel input.

##### Typical Time Base Characteristics

Time Base Scale (fullscreen is 10 divisions)  
100 ps/div to 20 s/div  
(in 1-2-5 or fine steps)

##### Time Base Position Range (auto sample rate and record length)

Pretrigger: 0 to 10 s or one fullscreen width, whichever is larger.  
Posttrigger: 0 to 10 s or one fullscreen width, whichever is larger.

Trigger Interpolator Resolution: 1 ps

##### Time Base Window

Scale: 1 ps/div to the main time base scale



factor

Position: The window must always stay in the time window defined by the main sweep.

Typical Triggering Characteristics

Sources

All four input plug-in slots can be used for triggering. See plug-in specifications for more details.

Edge Slope Positive/negative

Holdoff Range 60 ns to 320 ms

Pattern Trigger A pattern can be specified using any channel or external trigger input (up to four bits wide). Each of the inputs can be specified as high, low, or don't care with respect to the trigger level setting for that source. Trigger occurs when that pattern is entered or exited.

Glitch Trigger This mode makes it easy to look for glitches greater than or less than specified width on a single source. You can distinguish glitches down to 3 ns  $\pm$  1 ns in width and can capture glitches as narrow as 500 ps in width.

Time-Qualified A trigger will occur on the first edge to exit Pattern Trigger a pattern only if it meets one of these 3 criteria: 1) pattern present <[time] 2) pattern present >[time] 3) pattern present in range >[time1] and <[time2].

The time settings are adjustable from 20 ns to 160 ms [ $\pm(3\% + 2 \text{ ns})$ ] with 10 ns resolution. Filter recovery time is  $\leq$  12 ns.

State Trigger A pattern is specified on any three of the four inputs, with the fourth input used as a clock. Trigger occurs on the rising or falling edge of the input specified as the clock, and when the pattern is present or is not present. Setup time for the pattern with respect to the clock is 10 ns or less; hold time is zero.

TV Trigger Standard TV systems: 525 lines 60 Hz  
625 lines 50 Hz  
875 lines 60 Hz  
User defined

Event-Delayed Trigger The trigger is qualified by an edge. The delay can be specified as a number of occurrences of a rising or falling edge of any of the inputs. After the delay, an occurrence of a rising or falling edge of any of the inputs will generate the trigger. The trigger occurrence value is selectable from 1 to 16,000,000. The maximum edge counting rate is 70 MHz. Edges occurring <30 ns after the qualifying edge may not be detected.

Time-Delayed Trigger The trigger is qualified by an edge. The

delay is selectable from 30 ns to 160 ms.  
After the delay, an occurrence of a rising  
or falling edge on any one selected input  
will generate the trigger.

Functions and Measurements  
Functions Magnify Invert Add  
Subtract Multiply Divide  
Versus Integrate Differentiate  
Min Max FFT (mag)  
Histograms  
Measurement limit testing  
Waveform mask testing  
Color graded display

Measurements V(ampltd) V(base) V(top)  
Preshoot Overshoot V p-p  
V(time) V(min) V(max)  
V(rms) V(avg) V(upper)  
V(middle) V(lower) FFT(freq)  
FFT(mag) FFT(deltafreq) FFT(deltamag)  
Duty cycle Delta time Period  
Frequency T(fall) T(rise)  
T(max) T(min) T(volt)  
+ width - width

Histograms p-p median mean  
std dev  $u \pm 1$  sigma  $u \pm 2$  sigma  
 $u \pm 3$  sigma hits peak

Autoscale Can find repetitive signals:  
> 50 Hz  
< 1/2 max sample rate  
duty cycle > 1 %  
amplitude > 50 mV p-p  
(HP 54722A > 150 mV p-p)  
Display Update and HPIB Throughput  
Maximum Display Update Rate: 550 Kpixels/s typical

Maximum HP-IB Transfer Rate: 500 Kbytes/s typical

Throughput Waveforms/second Measurements/second

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Measurement Vpp Period  
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Front Panel Capture > 170 > 44 > 39  
and Transfer Rate  
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HP-IB Capture and > 50 > 33 > 31  
Transfer Rate  
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This throughput data was taken in the real-time sampling mode (250  
MSa/s) with 512-point records on screen, no measurements, no inter-  
polation, fast draw mode, infinite persistence, markers off, math  
off, and one channel acquisition. Vpp does not require threshold  
detection, but Period does.

Effective Bits  
Effective Bits 1 MHz 10 MHz 100 MHz 250 MHz 500 MHz 1 GHz  
(HP 54721A System)  
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Real Time (4 GSa/s)  
with fs/4 filter  
interpolation 7.5 7.5 7.2 6.7 6.7 6.2  
without fs/4 filter

interpolation 7.0 7.0 6.6 6.1 5.9 5.3

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Digital Bandwidth

Limit (fs/20 FIR 8.0 7.9 8.2 7.8 - -  
Filter)  
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Typical effective bits of resolution describes the dynamic performance of an ADC sine wave curve fit test. The inputs used are 90% of full scale amplitude sine waves.

FFT

Update rate for 1024 point record is 70 ms. Magnitude accuracy 0.26 db (3%) near dc to -3 db at max bandwidth.

Environmental Characteristics

Temperature Operating +10° C to +40° C  
Nonoperating -40° C to +70° C

Humidity Operating Up to 95% relative humidity  
(noncondensing) at +40° C  
Nonoperating Up to 90% relative humidity  
at +65° C

Altitude Operating Up to 4,600 meters (15,000 feet)  
Nonoperating Up to 15,300 meters (50,000 feet)

Voltage 90 to 132 or 198 to 264 VAC, 48 to 66 Hz

Power 1200 VA; 650 W

Weight Net 26.4 kg (58 lbs)  
Shipping 33.6 kg (74 lbs)