Model 9500 Specifications

Specifications (Total Uncertainties for 1 year, T_{cal} ± 5°C. Frequency specifications valid for 5 years)

DC Voltage

Amplitude:	±1mV to ±200V into 1MΩ ±1mV to ±5V into 50Ω
Accuracy:	±(0.025% + 25µV)
Ranging:	1, 2, 5 or 1, 2, 2.5, 4, 5 or continuous
Deviation:	±11.2%

Squarewave

Amplitude:	
Range:	40µV to 200V pk-pk into 1MΩ 40µV to 5V pk-pk into 50Ω
Polarity:	Positive, negative or symmetrical about ground
Accuracy (10Hz to 10kHz):	
<1mV	±(1% + 10µV)
1mV-21mV	±(0.10% + 20µV)
21mV-556mV	±(0.10% + 1µV)
556mV-210V	±(0.05% + 1µV)
Ranging:	1, 2, 5 or 1, 2, 2.5, 4, 5 or continuous
Deviation:	±11.2%
Rise/Fall Time:	
<100V	<150ns
≥100V	<200ns
Aberrations:	<2% peak for first 500ns
Frequency:	
Range:	10Hz to 100kHz
Accuracy:	±10ppm (±0.25ppm with Option 100)
Ranging:	1, 2, 5 or 1, 2, 2.5, 4, 5 or continuous

Low-Edge Pulse

Amplitude:	
Range:	5mV to 3V pk-pk into 50Ω
Accuracy:	±3%
Ranging:	1, 2, 5 or 1, 2, 2.5, 4, 5 or continuous
Deviation:	±11.2%
Rise/Fall Time:	500ps return to ground
Mark/Space Ratio:	1:9
Aberrations:	<2% peak for first 10ns <0.25% peak 10 ns to 1µs <0.1% peak beyond 1µs
Frequency:	
Range:	10Hz to 2MHz
Accuracy:	±10ppm (±0.25ppm with Option 100)
Ranging:	1, 2, 5 or 1, 2, 2.5, 4, 5 or continuous

High-Edge Pulse

Amplitude:	
Range:	1V to 200V pk-pk into 1MΩ 1V to 5V pk-pk into 50Ω
Accuracy:	±3%
Ranging:	1, 2, 5 or 1, 2, 2.5, 4, 5 or continuous
Deviation:	±11.2%
Rise/Fall Time:	
<100V	<150ns
>=100V	<200ns
Mark/Space Ratio:	1:1
Aberrations:	<2% peak for first 500ns <0.1% peak 500ns to 100µs <0.01% peak beyond 100µs
Frequency:	10Hz to 100kHz
Accuracy:	±10ppm (±0.25ppm with Option 100)
Ranging:	1, 2, 5 or 1, 2, 2.5, 4, 5 or continuous

Fast-Edge (only available on Model 9520 and Model 9530 Active Heads)

Amplitude:	
Range:	5mV to 3V pk-pk into 50Ω
Accuracy:	±3%
Ranging:	1, 2, 5 or 1, 2, 2.5, 4, 5 or continuous
Deviation:	±11.2%
Rise/Fall Time:	150ps return to ground
Mark/Space Ratio:	1:9
Aberrations:	<3% peak for first 1ns <2% peak 1 ns to 10ns <0.25% peak 10 ns to 50ns
Frequency:	
Range:	10Hz to 2MHz
Accuracy:	±10ppm (±0.25ppm with Option 100)
Ranging:	1, 2, 5 or 1, 2, 2.5, 4, 5 or continuous

Timing Markers

Styles:	Square/Sine, Pulse or Narrow Triangle
Square/Sine:	
Period Square:	10ns to 50s
Period Sine:	
9500/400	2.0ns to 10ns
9500/600	1.0ns to 10ns
9500/1100	0.5ns to 10ns
9500/3200	0.5ns to 10ns
Pulse:	
Period:	1µs to 50s
Rise/Fall Time:	<700ps
Narrow Triangle:	
Period:	1µs to 50s
Rise/Fall Time:	2.5% of period
Ranging:	1, 2, 5 or 1, 2, 2.5, 4, 5 or continuous for period of all waveshapes
Timing Accuracy:	
Normal:	±10ppm
With Option 100:	±0.25ppm
Timing Jitter:	≤10ps pk-pk
Deviation:	±45% for period
Amplitude:	100mV to 1V pk-pk
Sub-Division:	Every 10th marker can be set to higher amplitude for periods ≥1µs for all waveshapes

Leveled Sine and Dual Sine

Frequency	
Range:	
9500/400	0.1 Hz to 400 MHz
9500/600	0.1 Hz to 600 MHz
9500/1100	0.1 Hz to 1.1 GHz
9500/3200	0.1 Hz to 3.2 GHz
Accuracy:	
Normal:	±12ppm
With Option 100:	±0.25ppm for f ≥ 12kHz ±3ppm max for f < 12kHz
Deviation:	±11.2%
Amplitude (Leveled Sine into 50Ω):	
0.1Hz - 550MHz	4.44mV to 5.560V pk-pk
550MHz - 2.5GHz	4.44mV to 3.336V pk-pk
2.5GHz - 3.2GHz	4.44mV to 2.224V pk-pk
Accuracy	±1.5% at 50 kHz
Flatness (Leveled Sine relative to 50kHz):	
0.1Hz - 100MHz	±1.5%
100MHz - 550MHz	±3%
550MHz - 1.1GHz	±4%
1.1GHz - 3.2GHz	±5%
Ranging:	1, 2, 5 or 1, 2, 2.5, 4, 5 or continuous
Sine Purity:	
2nd Harmonic	<-35dBc
3rd Harmonic	<-40dBc
All Other Spurious Signals	<-40dBc (typical)

Input Impedance

Resistance Measurement:

Range:	10Ω - 150Ω and 50kΩ - 12MΩ
Accuracy:	
(Ω) 10 - 40	±0.5%
40 - 90	±0.1%
90 - 150	±0.5%
50k - 800k	±0.5%
800k - 1.2M	±0.1%
1.2M - 12M	±0.5%

Capacitance Measurement:

Range:	1pF to 95pF
Accuracy:	
1pF - 35pF	2% ± 0.25pF
35pF - 95pF	3% ± 0.25pF

Current

Amplitude:	
DC:	±100µA to ±100mA
Squarewave:	100µA to 100mA pk-pk
Accuracy:	±(0.25% + 0.5µA)
Frequency:	10Hz to 100kHz
Accuracy:	±10ppm (±0.25ppm with Option 100)
Ranging:	1, 2, 5 or 1, 2, 2.5, 4, 5 or continuous

Composite Video Output

Amplitude:	1.0V, 0.7V, 0.3V
Pattern:	White, Grey or Black
Sync Polarity:	Positive or negative
Standards:	625-line 50Hz or 525-line 60Hz

LF Linear Ramp

Waveforms:	1V pk-pk symmetrical triangle
Ramp Time:	1ms to 1s

Overload Pulse

Amplitude:	5V to 20V into 50Ω
Polarity:	Positive or negative
Duration:	0.2s to 100s
Trigger:	Manual

Zero Skew

Unadjusted Skew:	±50ps channel to channel
Adjusted Skew:	±5ps channel to channel
Frequency Range:	10Hz to 100MHz

Short/Open Output

Output Leakage:	
Open Circuit:	±50pA
Short Circuit:	±15µV

Auxiliary Input

Signal Routing:	Rear input to any Active Head
Maximum Input:	
Voltage:	±40V pk-pk
Current:	±400mA pk-pk

Trigger

Amplitude:	≥1V pk-pk into 50Ω
Risetime:	<700ps
Rate:	
User Selectable:	f (up to 120 MHz), f/10 or f/100
Free Run:	100Hz

Reference Frequency Input

Frequency Range:	1MHz to 20MHz in 1MHz steps
Level:	90 mV to 1V pk-pk (typical)
Lock Range:	±50ppm

Reference Frequency Output

Frequency:	1MHz or 10MHz
Level:	
Into 50Ω:	1V pk-pk (typical)
Into 1MΩ:	2V pk-pk (typical)

Environment

Temperature:	
Operating:	5°C to 40°C
Storage:	0°C to 50°C
Humidity: (non-condensing)	
Operating:	<90% over 5°C to 30°C
	<75% over 30°C to 40°C
Storage:	<95% over 0°C to 50°C

Power

Voltage:	95V to 132V rms
	or 209V to 264V rms
Frequency:	48Hz to 63Hz
Consumption:	400 VA
Warm-up:	20 minutes

Dimensions

Model 9500 Mainframe:	
H x W x D	133 x 427 x 440 mm
	(5.24 x 16.8 x 17.3 inches)
Weight:	12 kg approx. (27 lbs approx.)
Module 9510, 9520 or 9530:	
H x W x D	65 x 31 x 140 mm
	(2.56 x 1.22 x 5.51 inches)
Weight:	0.45 kg approx. (1 lb approx.)

Safety

Designed to UL3111 and EN61010-1-1:1993/A2:1995.
CE Marked

EMC (including options)

Emissions:	EN55011:1991
Immunity:	EN50082-1:1992

FCC Rules part 15 sub-part J class B

Warranty

Period:	
Mainframe	1-year
Active Heads	3-year Active Plus CarePlan

Ordering Information

Model 9500/400	400 MHz High-Performance Oscilloscope Calibration Workstation, complete with Windows™ Automated IEEE-488 Calibration Software, GPIB Interface and Security Key, Inventory Management Software and Scope Procedures. A Certificate of Traceable Calibration and a Trigger Lead are also included. (Note: Requires one 9510 or 9520 Output Module)
Model 9500/600	600 MHz High-Performance Oscilloscope Calibration Workstation (otherwise as above)
Model 9500/1100	1.1 GHz High-Performance Oscilloscope Calibration Workstation (otherwise as above)
Model 9500/3200	3.2 GHz High-Performance Oscilloscope Calibration Workstation (otherwise as above)
Model 9510	1.1 GHz Active Head with 500 ps pulse risetime (3-year *Active Plus CarePlan* warranty)
Model 9520	1.1 GHz Active Head with 150 ps and 500 ps pulse risetime (3-year *Active Plus CarePlan* warranty)
Model 9530	3.2 GHz Active Head with 150 ps and 500 ps pulse risetime (3-year *Active Plus CarePlan* warranty)
Option 5	5-Channel Output (allows any mix of 9510/9520/9530 Heads up to a total of five. Upper frequency limited by Model 9500 mainframe.)
Option 10	Blank 256-Kbyte FLASH PCMCIA card (for procedure mode procedures)
Option 30	Blank 256-Kbyte battery-backed SRAM PCMCIA card (for procedure mode results)
Option 40	PCMCIA Read/Write Module (for desktop or tower PC)
Option 50	Tracker Ball
Option 60	Soft Carrying Case
Option 90	Rack Mounting Kit
Option 100	High-Stability Crystal Reference
Software Option 10	Software Support Program (access to all procedures, software updates and enhancements produced by Wavetek's Software Support Group over a 12-month period.)