

# Specifications

All Specifications TCal  $\pm 5^{\circ}\text{C}$ , 1yr, 99% where Factory TCal =  $23^{\circ}\text{C}$  (Except frequency accuracies 5yr)  
 Uncertainties are fully inclusive of instrument errors, resolution, stability, regulation and traceability to National Standards.  
 In general, nothing further needs to be added to determine test uncertainty ratio against the equipment under calibration.

Voltage Function (Not available via 9550 Active Head)				
	DC Into 1M $\Omega$	DC Into 50 $\Omega$	Square Wave Into 1M $\Omega$	Square Wave Into 50 $\Omega$
Amplitude	$\pm 1\text{ mV}$ to $\pm 200\text{ V}$	$\pm 1\text{ mV}$ to $\pm 5\text{ V}$	40 $\mu\text{V}$ to 200 V pk-pk	40 $\mu\text{V}$ to 5 V pk-pk
Accuracy	$\pm(0.025\% + 25\ \mu\text{V})$		$\geq 1\text{ mV } \pm(0.1\% + 10\ \mu\text{V})$ , $< 1\text{ mV } \pm(1\% + 10\ \mu\text{V}) @ \leq 10\text{ KHz}$	
Ranging	Volt/div factors of 1, 2, 5 or 1, 2, 2.5, 4, 5; or continuously variable			
Deviation	$\pm 11.2\%$ (Including over and under-range)			
Rise/Fall Time			$< 100\text{ V pk-pk } < 150\text{ ns}$ ; $\geq 100\text{ V pk-pk } < 200\text{ ns}$	
Aberrations	$< 2\%$ peak for first 500 ns			
Frequency	10 Hz to 100 kHz			

DC into 1M $\Omega$  available at all heads simultaneously without specification degradation

Edge Function (9550 Active Head supports 25 ps Fast Edge only)					
	500 ps Edge Pulse Into 50 $\Omega$ or 1M $\Omega$	HV Edge Pulse Into 1M $\Omega$	150 ps Fast-Edge (9530 Head Only) Into 50 $\Omega$	70 ps Fast-Edge (9560 Head Only) Into 50 $\Omega$	25 ps Fast-Edge (9550 Head Only) Into 50 $\Omega$
Amplitude	5 mV to 3 V pk-pk	1 mV to 200 V pk-pk NB 1 mV to 5 V pk-pk into 50 $\Omega$	5 mV to 3 V pk-pk	25 mV to 2 V pk-pk	425 mV to 575 mV pk-pk
Polarity	Rising & Falling Return to Ground	Rising & Falling Return to Ground	Rising & Falling Return to Ground	Rising Rising & Falling	Rising & Falling Return to Ground
Rise/Fall Time (10%-90%)	500 ps	$< 100\text{ V pk-pk } < 150\text{ ns}$ $\geq 100\text{ V pk-pk } < 200\text{ ns}$ NB into 50 $\Omega$ $< 100\text{ ns}$	150 ps	70 ps	25 ps
Accuracy	+50 ps to -150 ps	NA	$\pm 25\text{ ps}$	$\pm 12\text{ ps}$	$\pm 3\text{ ps}$
Accuracy (displayed value)	$\pm 35\text{ ps}$	NA	$\pm 12\text{ ps}$	$\pm 8\text{ ps}$	$\pm 1.5\text{ ps}$
Duty Cycle	10%	50%	10%	10%	10%
Aberrations (Into VSWR 1.2:1)	$< \pm 2\%$ pk in 8 GHz $< \pm 1.5\%$ pk in 3 GHz (first 10 ns)	$< \pm 2\%$ pk (first 500 ns)	$< \pm 3\%$ pk in 8 GHz $< \pm 2\%$ pk in 3 GHz (first 1 ns)	$< \pm 4\%$ pk in 20 GHz $< \pm 3\%$ pk in 8 GHz $< \pm 1\%$ pk in 3 GHz (first 700 ps)	$< \pm 5\%$ pk in 20 GHz $< \pm 3\%$ pk in 10 GHz $< \pm 1\%$ pk in 3 GHz (first 200 ps)
Frequency	10 Hz to 2 MHz	10 Hz to 100 kHz	10 Hz to 2 MHz	10 Hz to 1 MHz	10 Hz to 1 MHz
Trigger to Edge delay	25 ns (typical)				
Trigger to Edge jitter	5 ps pk-pk				

Edge speeds faster than 500 ps are not recommended for 1M $\Omega$  input applications. 9560 and 9550 50 $\Omega$  only

Timing Marker Function (Not available via 9550 Active Head)				
Styles	Square	Sine	Pulse	Narrow Triangle
Period	9.0091 ns to 55 s	450.5 ps to 9.009 ns 9500/600 (909.1 ns min) 9560 (180.19 ps min)	900.91 ns to 55 s	900.91 ns to 55 s
Ranging	Time/div ranging 1, 2, 5 or 1, 2, 2.5, 4, 5 or continuously variable			
Deviation	$\pm 45\%$ (Including over-range)			
Rise/fall Times	1 ns typ.	NA	1 ns typ.	2.5% of period
Timing Accuracy	$< 83\ \mu\text{s } \pm 0.25\text{ ppm}$ , $\geq 83\ \mu\text{s } \pm 3\text{ ppm}$			
Amplitude	100 mV to 1 V pk-pk			
Sub-Division	Every tenth marker can be set to higher amplitude for periods $\geq 1\ \mu\text{s}$ for all waveshapes			

Line frequency timing markers are available in Square waveform. Jitter wrt Line zero crossing  $\pm 20\ \mu\text{s}$  pk-pk  
 Periods below 2 ns are not recommended for 1M $\Omega$  input applications. 9560 50 $\Omega$  only

# Specifications

## Leveled Sine Function (Not available via 9550 Active Head)

	9500B/600	9500B/1100	9500B/3200 & 9530	9500B/3200 & 9560
<b>Frequency Range</b>	0.1 Hz to 600 MHz	0.1 Hz to 1.1 GHz	0.1 Hz to 3.2 GHz	0.1 Hz to 6.4 GHz
<b>Amplitude (pk-pk) (into 50Ω)</b>	0.1 Hz - 550 MHz 5 mV to 5 V	0.1 Hz - 550 MHz 5 mV to 5 V	0.1 Hz - 550 MHz 5 mV to 5 V	0.1 Hz - 550 MHz 5 mV to 5 V
	550 MHz-600 MHz 5 mV to 3 V	550 MHz-1.1 GHz 5 mV to 3 V	550 MHz-2.5 GHz 5 mV to 3 V	550 MHz-2.5 GHz 5 mV to 3 V
			2.5 GHz - 3.2 GHz 5 mV to 2 V	2.5 GHz - 3.2 GHz 5 mV to 2 V
			3.2 GHz - 6.4 GHz 25 mV to 2 V	
<b>Accuracy</b>	±1.5% at single Ref Frequency (50 kHz - 10 MHz)			
<b>Flatness wrt Ref Frequency Into VSWR of 1.6:1 (1.2:1)</b>	0.1 Hz - 300 MHz ±2.0%	0.1 Hz - 300 MHz ±2.0%	0.1 Hz - 300 MHz ±2.0%	0.1 Hz - 300 MHz ±2.0%
	300 MHz - 550 MHz ±3% (±2.5%)	300 MHz - 550 MHz ±3% (±2.5%)	300 MHz - 550 MHz ±3% (±2.5%)	300 MHz - 550 MHz ±2.5% (±2.5%)
	550 MHz - 600 MHz ±4% (±3.5%)	550 MHz - 1.1 GHz ±4% (±3.5%)	550 MHz - 1.1 GHz ±4% (±3.5%)	550 MHz - 3.0 GHz ±3.5% (±3.0%)
			1.1 GHz - 3.2 GHz ±5% (±4%)	3.0 GHz - 6.0 GHz ±5.0% (±4.0%)
<b>Harmonic Purity</b>	2nd Harmonic <-35 dBc, 3rd Harmonic <-40 dBc in 12 GHz			
<b>Non &amp; Sub Harm Purit</b>	<-40 dBc			<-35 dBc

Periods below 2 ns are not recommended for 1MΩ input applications. 9560 50Ω only

## Dual Sine Function (Not available via 9550 Active Head and specification limited to Heads of the same type)

	9500B/600	9500B/1100	9500B/3200 & 9530	9500B/3200 & 9560
<b>Frequency Range</b>	0.1 Hz to 600 MHz	0.1 Hz to 1.1 GHz	0.1 Hz to 3.2 GHz	0.1 Hz to 3.2 GHz
<b>Time Alignment</b>	±25 ps Any Channel to Any Channel			

Periods below 2 ns are not recommended for 1MΩ input applications. 9560 50Ω only

## Input Impedance Functions (Not available via 9550 Active Head)

<b>Resistance Measurement</b>	10Ω-40Ω	40Ω-90Ω	90Ω-150Ω	50kΩ-800kΩ	800kΩ-1.2MΩ	1.2MΩ-12MΩ
<b>Accuracy</b>	±0.5%	±0.1%	±0.5%	±0.5%	±0.1%	±0.5%

(Not available via 9550 and 9560 Active Head)

<b>Capacitance Measurement</b>	1 pF to 35 pF	35 pF to 95 pF				
<b>Accuracy</b>	±2% ±0.25 pF	±3% ±0.25 pF				

## Pulse Width Function (Not available via 9550 Active Head)

<b>Pulse Width</b>	1 n to 100 ns
<b>Accuracy</b>	< ±5% ±200 ps
<b>Adjustment Resolution</b>	1 ns to 4 ns, <50 ps 4 ns to 20 ns <250 ps 20 ns to 100 ns <1 ns
<b>Rise and Fall Time</b>	<450 ps
<b>Aberrations</b>	< ±5% pk (typical)
<b>Width Stability</b>	< 10 ps pk-pk 10 mins/1°C
<b>Pulse Jitter (wrt Trigger)</b>	<5 ps pk-pk
<b>Frequency</b>	1 kHz to 1 MHz
<b>Amplitude</b>	1V pk-pk into 50Ω

# Specifications

## Other Output Functions (Not available via 9550 Active Head)

Current	DC	Squarewave
Amplitude	$\pm 100 \mu\text{A}$ to $\pm 100 \text{ mA}$	$\pm 100 \mu\text{A}$ to $\pm 100 \text{ mA}$ pk-pk
Accuracy	$\pm(0.25\% + 0.5 \mu\text{A})$	
Duty Cycle & Symmetry		50%, symmetrical about ground
Rise Time and Aberrations		<150 ns and $<\pm 2\%$ pk
Requires 9530 or 9510 Head and BNC Current adaptor		
Composite Video Output		
Amplitude	1.0 V pk-pk	
Pattern (Full Raster)	White, Grey or Black	
Sync Polarity	Positive or Negative	
Standards	625-line 50 Hz, 525-line 60 Hz	
Trigger Output	Composite Sync or Odd Field Start	
9560 50 $\Omega$ only		
Auxiliary Input		
Signal Routing	Rear SMA input, passive and switched 50 $\Omega$ path to any Active Head	
Maximum Input	$\pm 40 \text{ V}$ pk-pk, $\pm 400 \text{ mA}$ pk-pk	
Insertion Loss (Into 50 $\Omega$ )	to 100 MHz <2.5 dB, to 500 MHz <4 dB, to 1 GHz <6 dB	
Reference Frequency	Input (BNC)	Output (BNC)
Frequency Range	1M Hz to 20 MHz in 1 MHz steps	1 MHz or 10 MHz
Level (typical)	90 mV - 1 V pk-pk	Into 50 $\Omega$ 1V pk-pk, Into 1 M 2V pk-pk
Lock Range	$\pm 50 \text{ ppm}$	

## General Specifications

Environmental	Operating	Storage
Temperature	5°C to 40°C	0°C to 50°C Transit <100hrs -20°C to 60°C
Humidity (non-condensing)	<90% 5°C to 30°C <75% 30°C to 40°C	<95% 0°C to 50°C
Safety	Designed to and documented to EN61010-1-11993/A21995 CE and ETL marked	
EMC (including options)		
Radiated Emissions	EN55011/22 FCC Rules part 15 sub-part J class B	
Radiated Immunity	EN50082-1	
Conducted Emissions	EN55011 1991 Class B	
Conducted Immunity	EN50082-1	
Harmonics	EN61000-3-2	
Shock and Vibration	MIL-T-28800 type III, class 5, style E.	
Line Voltage	95 V to 132 V rms 209 V to 264 V rms Installation Cat II	
Line Frequency	48 Hz to 63 Hz	
Power Consumption	<400 VA	
Warm-up	20 minutes	
	9500 Base Unit	95xx Active Heads
Dimensions	H x W x D 133 x 427 x 440 mm 5.24 x 16.8 x 17.3 ins	H x W x D 65 x 31 x 140 mm 2.56 x 1.22 x 5.51 ins
Weight	12 kg (27 lbs) approx.	0.45 kg (1 lb) approx.
Warranty Period	1-year	3-year Active Plus CarePlan

## Other Output Functions

Overload Pulse	
Amplitude	5 V to 20 V into 50
Polarity	Positive / Negative
Duration	0.2 s to 100 s (subject to pulse energy limits)
Energy Power in 50	1.6 J to 50 J 0.5 W to 8 W
Trigger	Manual Max Rep Rate 0.3 Hz (Internally Limited)
Zero Skew	
Unadjusted Skew	< $\pm 25 \text{ ps}$ ch to ch
Adjusted Skew	< $\pm 5 \text{ ps}$ ch to ch
Skew Temp Coef	<0.2 ps/°C
Rise and Fall Time	450 ps typ
Relative Jitter	<7 ps pk-pk
Input Leakage Function	
Open Circuit Output	Leakage < $\pm 50 \text{ pA}$
Short Circuit Output	Offset < $\pm 15 \mu\text{V}$
LF Linear Ramp	
Waveforms	1 V pk-pk triangle symmetrical about ground
Linearity	< $\pm 0.1\%$ deviation over 10 - 90%
Ramp Time	1 ms, 10 ms, 100 ms or 1 s