

CERTIFICATE OF CALIBRATION



Issued by: Pico Technology Ltd.

Certificate Number:

of: James House,
Colmworth Business Park,
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PE19 8YP UNITED KINGDOM

9999

Signature:

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Certificate Revision: V 1.00

Signatory: M. Ashcroft

This certificate records compliance with specification after adjustment of the instrument

The instrument has been calibrated in accordance with the manufacturer's verification procedure using standards that are traceable to National Standards. The measurements were made in a controlled environment, ambient temperature during the test is recorded below.

The associated Performance Test Record details the calibration results with a further column indicating the instrument performance relative to the stated specification. The column headed 'Performance Results' indicates compliance or otherwise with the stated specification.

The two possible conditions are indicated as follows:

Pass The equipment complies with the stated specification at the measured points.

Fail The equipment does not comply with the stated specification at the measured points.

To the extent defined on the Performance Test Record, this certificate provides traceability of measurement to recognized consensus standards or ratio type measurements through national standards and to the international system of units of measurement (SI), realised and maintained at the National Physical Laboratory or other recognized national standards laboratories.

This certificate may not be reproduced other than in full, except with the prior written approval of Pico Technology Ltd..

Recalibration due 1 year following shipment from Pico Technology Ltd., this will not be later than 18 months after the certifying verification.

Unit Under Test Description 25 GHz Sampling Oscilloscope
Model 9341-25
Serial Number Sample,

End User: A N Other Industries
Measured: 01 Jan 17
Re-calibration due: 02 Mar 18
Result:

Ambient temperature during test: 23.0 °C ± 1.0 °C

Performance Test Record: Sample

PicoScope 9341-25

25 GHz Sampling Oscilloscope

Performance Test Record

Instrument Model Number: 9341-25
Description: 25 GHz Sampling Oscilloscope
Serial Number / Year: Sample

Date & Type of Calibration: 01 Jan 2017
As Found / As Left: As Left
Test Record Reference: Sample

Ambient Temperature: 23.0 °C ± 1.0 °C

Technicians: Sample
 Sample

This Test Record supports Certificate No: 9999
Certificate issued for end Customer name: A N Other Industries
Market (re)installation date: 01 Mar 2017

Calibration Standards Employed				
	Manufacturer	Model No.	Serial No.	Cal due date
Signal Synthesiser	Hittite	HMC-T2240	SN000283	25 Oct 2017
Power Meter	Agilent	N1914	MY52260009	14 Oct 2017
Power Sensor	Agilent	N8485	MY52230002	28 Oct 2017
DMM	Agilent	34401 A	MY47031479	14 Oct 2017
Pattern Generator	Tektronix	PPG1251	6146879	
Optical Impulse Source	Calmar Laser	FPL-01CFF	881039	

Performance Test Calibration Certificate 9999	Test Conditions	Minimum	Actual	Maximum	Performance Results
VERTICAL (Channels 1 & 2)					
Nominal Input Impedance	<i>50 Ω ± 1 Ω</i>				
Channel 1: Input Impedance		49.0 Ω		51.0 Ω	
Channel 2: Input Impedance		49.0 Ω		51.0 Ω	
DC Voltage Accuracy	<i>± 2% of full scale ± 2 mV</i>				
Channel 1 without Digital Feedback (Multi-valued acquisition)	Scale: 5 mV/div	-2.8 mV		2.8 mV	
	Offset: 0 mV				
	Input: 0 mV				
	Scale: 200 mV/div	366 mV		434 mV	
	Offset: 0 mV				
	Input: 400 mV				
	Scale: 200 mV/div	-434 mV		-366 mV	
	Offset: 0 mV				
	Input: -400 mV				
Channel 1 with Digital Feedback (Single-valued acquisition)	Scale: 5 mV/div	-2.8 mV		2.8 mV	
	Offset: 0 mV				
	Input: 0 mV				
	Scale: 500 mV/div	868 mV		1032 mV	
	Offset: 0 mV				
	Input: 950 mV				
	Scale: 500 mV/div	-1032 mV		-868 mV	
	Offset: 0 mV				
	Input: -950 mV				
Channel 2 without Digital Feedback (Multi-valued acquisition)	Scale: 5 mV/div	-2.8 mV		2.8 mV	
	Offset: 0 mV				
	Input: 0 mV				
	Scale: 200 mV/div	366 mV		434 mV	
	Offset: 0 mV				
	Input: 400 mV				
	Scale: 200 mV/div	-434 mV		-366 mV	
	Offset: 0 mV				
	Input: -400 mV				
Channel 2 with Digital Feedback (Single-valued acquisition)	Scale: 5 mV/div	-2.8 mV		2.8 mV	
	Offset: 0 mV				
	Input: 0 mV				
	Scale: 500 mV/div	868 mV		1032 mV	
	Offset: 0 mV				
	Input: 950 mV				
	Scale: 500 mV/div	-1032 mV		-868 mV	
	Offset: 0 mV				
	Input: -950 mV				
RMS Noise 15 GHz Models	<i>Full Bandwidth <2 mV, Narrow Bandwidth <1.5 mV</i>				
Channel 1: RMS Noise, Full Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		2 mV	
Channel 1: RMS Noise, Narrow Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		1.5 mV	
Channel 2: RMS Noise, Full Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		2 mV	
Channel 2: RMS Noise, Full Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		1.5 mV	
RMS Noise 20 GHz Models	<i>Full Bandwidth <2 mV, Narrow Bandwidth <1.5 mV</i>				
Channel 1: RMS Noise, Full Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		2 mV	
Channel 1: RMS Noise, Narrow Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		1.5 mV	
Channel 2: RMS Noise, Narrow Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		2 mV	
Channel 2: RMS Noise, Full Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		1.5 mV	
RMS Noise 25 GHz Models	<i>Full Bandwidth <2 mV, Narrow Bandwidth <1.5 mV</i>				
Channel 1: RMS Noise, Full Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		2.5 mV	
Channel 1: RMS Noise, Narrow Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		1.5 mV	
Channel 2: RMS Noise, Narrow Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		2.5 mV	
Channel 2: RMS Noise, Full Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		1.5 mV	

Performance Test Calibration Certificate 9999	Test Conditions	Minimum	Actual	Maximum	Performance Results
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VERTICAL (Channels 1 & 2 continued)					
Bandwidth	Full Bandwidth DC to 20 GHz, Narrow Bandwidth DC to 10 GHz				
Channel 1: Full Bandwidth	Frequency: 100 MHz, Input: 100 µW		1		
	Frequency: 4 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 6 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 8 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 10 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 12 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 14 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 15 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 16 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 17 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 18 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 19 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 20 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 22 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 23 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 24 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 25 GHz, Input: 100 µW	-3 dB		3 dB	
Channel 1: Narrow Bandwidth	Frequency: 100 MHz, Input: 100 µW		1		
	Frequency: 4 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 6 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 8 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 9 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 10 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 11 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 12 GHz, Input: 100 µW	-3 dB		3 dB	
Channel 2: Full Bandwidth	Frequency: 100 MHz, Input: 100 µW		1		
	Frequency: 4 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 6 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 8 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 10 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 12 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 14 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 15 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 16 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 17 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 18 GHz, Input: 100 µW	-3 dB		3 dB	

Performance Test Calibration Certificate 9999	Test Conditions	Minimum	Actual	Maximum	Performance Results
	Frequency: 19 GHz, Input: 100 μ W	-3 dB		3 dB	
	Frequency: 20 GHz, Input: 100 μ W	-3 dB		3 dB	
	Frequency: 22 GHz, Input: 100 μ W	-3 dB		3 dB	
	Frequency: 23 GHz, Input: 100 μ W	-3 dB		3 dB	
	Frequency: 24 GHz, Input: 100 μ W	-3 dB		3 dB	
	Frequency: 25 GHz, Input: 100 μ W	-3 dB		3 dB	
Channel 2: Narrow Bandwidth	Frequency: 100 MHz, Input: 100 μ W		1		
	Frequency: 4 GHz, Input: 100 μ W	-3 dB		3 dB	
	Frequency: 6 GHz, Input: 100 μ W	-3 dB		3 dB	
	Frequency: 8 GHz, Input: 100 μ W	-3 dB		3 dB	
	Frequency: 9 GHz, Input: 100 μ W	-3 dB		3 dB	
	Frequency: 10 GHz, Input: 100 μ W	-3 dB		3 dB	
	Frequency: 11 GHz, Input: 100 μ W	-3 dB		3 dB	
	Frequency: 12 GHz, Input: 100 μ W	-3 dB		3 dB	

Performance Test Calibration Certificate 9999	Test Conditions	Minimum	Actual	Maximum	Performance Results
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HORIZONTAL					
Time base Accuracy	$\pm 100 \text{ ppm}$				
	Frequency: 10 kHz Delay: 0 ms and 100 ms Delta Delay	-10 μs		10 μs	
Delta Time Interval Accuracy. Real Time Sampling	$\pm 0.2\%$ of of Delta Time Interval or Full Horizontal Scale, whichever is greater				
	Frequency: 2 Hz Scale: 100 ms/div Period	499 ms		501 ms	
	Frequency: 20 Hz Scale: 10 ms/div Period	49.9 ms		50.1 ms	
	Frequency: 200 Hz Scale: 1 ms/div Period	4.99 ms		5.01 ms	
	Frequency: 2 kHz Scale: 100 $\mu\text{s}/\text{div}$ Period	499 μs		501 μs	
	Frequency: 20 kHz. Scale: 10 $\mu\text{s}/\text{div}$ Period	49.9 μs		50.1 μs	
	Frequency: 100 kHz Scale: 2 $\mu\text{s}/\text{div}$ Period	9.98 μs		10.02 μs	
Delta Time Interval Accuracy. Random Equivalent Time	$\pm 0.2\% \pm 4 \text{ ns}$ of Delta Time Interval or Full Horizontal Scale, whichever is greater				
	Frequency: 2 kHz Scale: 100 $\mu\text{s}/\text{div}$ Period	499 μs		501 μs	
	Frequency: 50 kHz Scale: 5 $\mu\text{s}/\text{div}$ Period	19.956 μs		20.044 μs	
	Frequency: 500 kHz Scale: 500 ns/div Period	1.992 μs		2.008 μs	
	Frequency: 5 MHz Scale: 50 ns/div Period	195.6 ns		204.4 ns	

Performance Test Calibration Certificate 9999	Test Conditions	Minimum	Actual	Maximum	Performance Results
HORIZONTAL (continued)					
Delta Time Interval Accuracy. Sequential Equivalent Time	<i>± 0.2% ± 10 ps of Delta Time Interval</i>				
	Frequency: 100 Hz Scale: 3.2 ms/div Period	9.98 ms		10.02 ms	
	Frequency: 1 kHz Scale: 200 µs/div Period	0.998 ms		1.002 ms	
	Frequency: 10 kHz Scale: 20 µs/div Period	99.8 µs		100.2 µs	
	Frequency: 100 kHz Scale: 2 µs/div Period	9.98 µs		10.02 µs	
	Frequency: 1 MHz Scale: 200 ns/div Period	0.998 µs		1.002 µs	
	Frequency: 2 MHz Scale: 100 ns/div Period	499 ns		501 ns	
	Frequency: 5 MHz Scale: 50 ns/div Period	199.59 ns		200.41 ns	
	Frequency: 10 MHz Scale: 20 ns/div Period	99.79 ns		100.21 ns	
	Frequency: 20 MHz Scale: 10 ns/div Period	49.89 ns		50.11 ns	
	Frequency: 50 MHz Scale: 5 ns/div Period	19.95 ns		20.05 ns	
	Frequency: 100 MHz Scale: 2 ns/div Period	9.97 ns		10.03 ns	
	Frequency: 200 MHz Scale: 1 ns/div Period	4.98 ns		5.02 ns	
	Frequency: 500 MHz Scale: 500 ps/div Period	1.986 ns		2.014 ns	
	<i>± 10 ps or ± 1% ± 3 ps of Delta Time Interval, whichever is smaller</i>				
	Frequency: 1 GHz Scale: 200 ps/div Period	0.99 ns		1.01 ns	
	Frequency: 2 GHz Scale: 100 ps/div Period	492 ps		508 ps	
	Frequency: 5 GHz Scale: 50 ps/div Period	195 ps		205 ps	
	Frequency: 10 GHz Scale: 20 ps/div Period	96 ps		104 ps	
	Frequency: 14 GHz Scale: 200 ps/div Trend: On				
	Period Maximum	67.7 ps		75.1 ps	
	Period Minimum	67.7 ps		75.1 ps	

Performance Test Calibration Certificate 9999	Test Conditions	Minimum	Actual	Maximum	Performance Results
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EXTERNAL DIRECT TRIGGER					
External Direct Trigger Bandwidth and Sensitivity	100 mV p-p DC to 100 MHz. Increasing linearly from 100 mV p-p at 100 MHz to 200 mV p-p at 2.5 GHz				
	Frequency: 100 MHz. Input: 100 mV p-p. Frequency	99 MHz		101 MHz	
	Frequency: 2.5 GHz. Input: 200 mV p-p. Frequency	2.475 GHz		2.525 GHz	
RMS External Direct Trigger Jitter	2.0 ps + 20 ppm of delay setting				
	Frequency: 2.5 GHz Input: 600 mV p-p Delay: 0 ns RMS Jitter	None		≤ 2 ps	
	Frequency: 2.5 GHz Input: 600 mV p-p Delay: 100 ns RMS Jitter	None		≤ 4 ps	
	Frequency: 2.5 GHz Input: 600 mV p-p Delay: 1 us RMS Jitter	None		≤ 22 ps	
External Direct Trigger Nominal Input Impedance	50 Ω ± 3 Ω				
	Input Impedance	47.0 Ω		53.0 Ω	
External Direct Trigger Delay	<30 ns				
	Minimum Delay CH1 / CH2	None		30 ns	

INTERNAL DIRECT TRIGGER					
Internal Direct Trigger Bandwidth and Sensitivity	100 mV p-p DC to 10 MHz. Increasing linearly from 100 mV p-p at 10 MHz to 400 mV p-p at 100 MHz				
Channel 1	Frequency: 10 MHz. Input: 100 mV p-p. Frequency	9.9 MHz		10.1 MHz	
	Frequency: 100 MHz. Input: 400 mV p-p. Frequency	99 MHz		101 MHz	
Channel 2	Frequency: 10 MHz. Input: 100 mV p-p. Frequency	9.9 MHz		10.1 MHz	
	Frequency: 100 MHz. Input: 400 mV p-p. Frequency	99 MHz		101 MHz	
RMS Internal Direct Trigger Jitter	30 ps + 20 ppm of delay setting				
Channel 1	Frequency: 100 MHz Input: 600 mV p-p Delay: 0 ns RMS Jitter	None		≤ 30 ps	
Channel 2	Frequency: 100 MHz Input: 600 mV p-p Delay: 0 ns RMS Jitter	None		≤ 30 ps	

Performance Test Calibration Certificate 9999	Test Conditions	Minimum	Actual	Maximum	Performance Results
EXTERNAL PRESCALE TRIGGER					
External Prescaled Trigger Bandwidth and Sensitivity	<i>200 mV p-p to 2 V p-p from 1 GHz to 14 GHz (sine wave input)</i>				
	Frequency: 1 GHz. Input: 200 mV p-p. Frequency	0.99 GHz		1.01 GHz	
	Frequency: 2 GHz. Input: 200 mV p-p. Frequency	1.98 GHz		2.02 GHz	
	Frequency: 4 GHz. Input: 200 mV p-p. Frequency	3.96 GHz		4.04 GHz	
	Frequency: 8 GHz. Input: 200 mV p-p. Frequency	7.92 GHz		8.08 GHz	
	Frequency: 10 GHz. Input: 200 mV p-p. Frequency	9.9 GHz		10.1 GHz	
	Frequency: 12 GHz. Input: 200 mV p-p. Frequency	11.88 GHz		12.12 GHz	
	Frequency: 14 GHz. Input: 200 mV p-p. Frequency	13.86 GHz		14.14 GHz	
	Frequency: 15 GHz. Input: 200 mV p-p. Frequency	14.85 GHz		15.15 GHz	
RMS Prescaled Trigger Jitter	<i>2.0 ps + 20 ppm of delay setting</i>				
	Frequency: 1 GHz Input: 600 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 2 ps	
	Frequency: 2 GHz Input: 600 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 2 ps	
	Frequency: 4 GHz Input: 600 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 2 ps	
	Frequency: 8 GHz Input: 600 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 2 ps	
	Frequency: 10 GHz Input: 600 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 2 ps	
	Frequency: 12 GHz Input: 600 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 2 ps	
	Frequency: 14 GHz Input: 600 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 2 ps	
	Frequency: 15 GHz Input: 600 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 2 ps	

Performance Test Calibration Certificate 9999	Test Conditions	Minimum	Actual	Maximum	Performance Results
EXTERNAL CLOCK RECOVERY TRIGGER (PicoScope 9302 / 9321 only)					
External Clock Recovery Trigger Bandwidth and Sensitivity	<i>100 mV p-p from 6.5 Mb/s to 100 Mb/s. 20 mV p-p from >100 Mb/s to 11.3 Gb/s</i>				
	Data Rate: 800 Mbps. Input: 20 mV p-p. Frequency	792 MHz		808 MHz	
	Data Rate: 1.25 Gbps. Input: 20 mV p-p. Frequency	1.2375 GHz		1.2625 GHz	
	Data Rate: 2.5 Gbps. Input: 20 mV p-p. Frequency	2.475 GHz		2.525 GHz	
	Data Rate: 5 Gbps. Input: 20 mV p-p. Frequency	4.95 GHz		5.05 GHz	
	Data Rate: 8.5 Gbps. Input: 20 mV p-p. Frequency	8.415 GHz		8.585 GHz	
	Data Rate: 10 Gbps. Input: 20 mV p-p. Frequency	9.9 GHz		10.1 GHz	
	Data Rate: 11.3 Gbps. Input: 20 mV p-p. Frequency	11.187 GHz		11.413 GHz	
RMS External Clock Recovery Trigger Jitter	<i>1.5 ps + 1% of Unit Interval</i>				
	Data Rate: 800 Mbps Input: 300 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 14 ps	
	Frequency: 1.25 Gbps Input: 300 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 9.5 ps	
	Frequency: 2.5 Gbps Input: 300 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 5.5 ps	
	Frequency: 5 Gbps Input: 300 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 3.5 ps	
	Frequency: 8.5 Gbps Input: 300 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 2.67 ps	
	Frequency: 10 Gbps Input: 300 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 2.5 ps	
	Frequency: 11.3 Gbps Input: 300 mV p-p, Delay: 0 ns RMS Jitter	None		≤ 2.38 ps	

Performance Test Calibration Certificate 9999	Test Conditions	Minimum	Actual	Maximum	Performance Results
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STEP RECOVERY DIODE TDT / TDR SYSTEM (PicoScope 9311 only)

TDT Step Amplitude	7 V max @ 50 Ohm, ± 10%				
Positive Pulse Output Amplitude 7 V	Output High Level	6.3 V		7.7 V	
Negative Pulse Output Amplitude 7 V	Output Low Level	-7.7 V		-6.3 V	
Pulse	60 ps or less @ 50 Ohm external termination				
Transition Time					
Positive Pulse Output: Smooth Amplitude 5 V	Rise Time, 10% to 90%	None		≤ 60 ps	
Negative Pulse Output: Smooth Amplitude 5 V	Fall Time, 10% to 90%	None		≤ 60 ps	
TDT System Incident	60 ps or less @ 50 Ohm external termination				
Transition Time					
Positive Pulse Output: Smooth Amplitude 5 V	Rise Time, 10% to 90%	None		≤ 60 ps	
Negative Pulse Output: Smooth Amplitude 5 V	Fall Time, 10% to 90%	None		≤ 60 ps	
TDT System Reflected	65 ps or less @ 50 Ohm external termination				
Transition Time					
Positive Pulse Output: Smooth Amplitude 5 V	Rise Time, 10% to 90%	None		≤ 65 ps	
Negative Pulse Output: Smooth Amplitude 5 V	Fall Time, 10% to 90%	None		≤ 65 ps	
TDT System Aberrations	≤+20%, -10% first 2 ns, ≤±7% to 10 ns, ≤±2% to 500 ns after the step transition.				
Positive Pulse Output Amplitude: 5V	First 2 ns	-10%		20%	
	2 ns to 10 ns	-7%		7%	
	10 ns to 500 ns	-2%		2%	
Negative Pulse Output Amplitude: 5V	First 2 ns	-10%		20%	
	2 ns to 10 ns	-7%		7%	
	10 ns to 500 ns	-2%		2%	
Trigger to Pulse RMS Jitter	1.5 ps maximum				
Positive Pulse Output	Delay: minimum	None		≤ 1.5 ps	
Negative Pulse Output	Delay: minimum	None		≤ 1.5 ps	
TDT / TDR System RMS Jitter	3 ps maximum				
Positive Pulse Output	Delay: minimum	None		≤ 3 ps	
Negative Pulse Output	Delay: minimum	None		≤ 3 ps	

Performance Test Calibration Certificate 9999	Test Conditions	Minimum	Actual	Maximum	Performance Results
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TUNNEL DIODE TDT / TDR SYSTEM (PicoScope 9312 only)					
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TDT Step Amplitude	200 mV @ 50 Ohm, ± 10% on an offset of 90 mV max.				
Positive Pulse Output	Output High Level	230 mV		310 mV	
Negative Pulse Output	Output Low Level	50 mV		90 mV	
TDT System Incident Transition Time	40 ps or less @ 50 Ohm external termination				
Positive Pulse Output	Rise Time, 10% to 90%	None		≤ 40 ps	
Negative Pulse Output	Fall Time, 10% to 90%	None		≤ 40 ps	
TDR System Incident Transition Time	45 ps or less @ 50 Ohm external termination				
Positive Pulse Output	Rise Time, 10% to 90%	None		≤ 45 ps	
Negative Pulse Output	Fall Time, 10% to 90%	None		≤ 45 ps	
TDT System Reflected Transition Time	50 ps or less @ 50 Ohm external termination				
Positive Pulse Output	Rise Time, 10% to 90%	None		≤ 50 ps	
Negative Pulse Output	Fall Time, 10% to 90%	None		≤ 50 ps	
TDT System Aberrations	≤+20%, -15% first 2 ns, ≤±7% to 10 ns, ≤±3% to 15 ns, ≤±2% to 300 ns after the step transition.				
Positive Pulse Output	First 2 ns	-15%		20%	
	2 ns to 10 ns	-7%		7%	
	10 ns to 500 ns	-3%		3%	
	10 ns to 500 ns	-2%		2%	
Negative Pulse Output	First 2 ns	-15%		20%	
	2 ns to 10 ns	-7%		7%	
	10 ns to 500 ns	-3%		3%	
	10 ns to 500 ns	-2%		2%	
TDT / TDR System RMS Jitter	2.2 ps maximum				
Positive Pulse Output	Delay: minimum	None		≤ 2.2 ps	
Negative Pulse Output	Delay: minimum	None		≤ 2.2 ps	

OPTICAL CHANNEL (PicoScope 9321 only)					
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Unfiltered Optical Bandwidth	DC to 9 GHz				
	Full BW	9 GHz		None	
	Narrow BW	-			
RMS Noise					
	850 nm	None		6 μW	
	1310 nm			4 μW	
	1550 nm			4 μW	

Performance Test Calibration Certificate 9999	Test Conditions	Minimum	Actual	Maximum	Performance Results
VERTICAL (Channels 3 & 4)					
Nominal Input Impedance	<i>50 Ω ± 1 Ω</i>				
Channel 3: Input Impedance		49.0 Ω		51.0 Ω	
Channel 4: Input Impedance		49.0 Ω		51.0 Ω	
DC Voltage Accuracy	<i>± 2% of full scale ± 2 mV</i>				
Channel 3 without Digital Feedback (Multi-valued acquisition)	Scale: 5 mV/div	-2.8 mV		2.8 mV	
	Offset: 0 mV				
	Input: 0 mV				
	Scale: 200 mV/div	366 mV		434 mV	
	Offset: 0 mV				
	Input: 400 mV				
	Scale: 200 mV/div	-434 mV		-366 mV	
	Offset: 0 mV				
	Input: -400 mV				
Channel 3 with Digital Feedback (Single-valued acquisition)	Scale: 5 mV/div	-2.8 mV		2.8 mV	
	Offset: 0 mV				
	Input: 0 mV				
	Scale: 500 mV/div	868 mV		1032 mV	
	Offset: 0 mV				
	Input: 950 mV				
	Scale: 500 mV/div	-1032 mV		-868 mV	
	Offset: 0 mV				
	Input: -950 mV				
Channel 4 without Digital Feedback (Multi-valued acquisition)	Scale: 5 mV/div	-2.8 mV		2.8 mV	
	Offset: 0 mV				
	Input: 0 mV				
	Scale: 200 mV/div	366 mV		434 mV	
	Offset: 0 mV				
	Input: 400 mV				
	Scale: 200 mV/div	-434 mV		-366 mV	
	Offset: 0 mV				
	Input: -400 mV				
Channel 4 with Digital Feedback (Single-valued acquisition)	Scale: 5 mV/div	-2.8 mV		2.8 mV	
	Offset: 0 mV				
	Input: 0 mV				
	Scale: 500 mV/div	868 mV		1032 mV	
	Offset: 0 mV				
	Input: 950 mV				
	Scale: 500 mV/div	-1032 mV		-868 mV	
	Offset: 0 mV				
	Input: -950 mV				
RMS Noise 15 GHz Models	<i>Full Bandwidth <2 mV, Narrow Bandwidth <1.5 mV</i>				
Channel 3: RMS Noise, Full Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		2 mV	
Channel 3: RMS Noise, Narrow Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		1.5 mV	
Channel 4: RMS Noise, Narrow Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		2 mV	
Channel 4: RMS Noise, Full Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		1.5 mV	
RMS Noise 20 GHz Models	<i>Full Bandwidth <2 mV, Narrow Bandwidth <1.5 mV</i>				
Channel 3: RMS Noise, Full Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		2 mV	
Channel 3: RMS Noise, Narrow Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		1.5 mV	
Channel 4: RMS Noise, Narrow Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		2 mV	
Channel 4: RMS Noise, Full Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		1.5 mV	
RMS Noise 25 GHz Models	<i>Full Bandwidth <2 mV, Narrow Bandwidth <1.5 mV</i>				
Channel 3: RMS Noise, Full Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		2.5 mV	
Channel 3: RMS Noise, Narrow Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		1.5 mV	
Channel 4: RMS Noise, Narrow Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		2.5 mV	
Channel 4: RMS Noise, Full Bandwidth	Scale: 5 mV/div. Offset: 0 V.	None		1.5 mV	

Performance Test Calibration Certificate 9999	Test Conditions	Minimum	Actual	Maximum	Performance Results
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VERTICAL (Channels 3 & 4 continued)					
Full Bandwidth DC to 20 GHz, Narrow Bandwidth DC to 10 GHz					
Channel 3: Full Bandwidth	Frequency: 100 MHz, Input: 100 µW		1		
	Frequency: 4 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 6 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 8 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 10 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 12 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 14 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 15 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 16 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 17 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 18 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 19 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 20 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 22 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 23 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 24 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 25 GHz, Input: 100 µW	-3 dB		3 dB	
Channel 3: Narrow Bandwidth	Frequency: 100 MHz, Input: 100 µW		1		
	Frequency: 4 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 6 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 8 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 9 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 10 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 11 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 12 GHz, Input: 100 µW	-3 dB		3 dB	
Channel 4: Full Bandwidth	Frequency: 100 MHz, Input: 100 µW				
	Frequency: 4 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 6 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 8 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 10 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 12 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 14 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 15 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 16 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 17 GHz, Input: 100 µW	-3 dB		3 dB	
	Frequency: 18 GHz, Input: 100 µW	-3 dB		3 dB	

Performance Test Calibration Certificate 9999	Test Conditions	Minimum	Actual	Maximum	Performance Results
	Frequency: 19 GHz, Input: 100 μ W	-3 dB		3 dB	
	Frequency: 20 GHz, Input: 100 μ W	-3 dB		3 dB	
	Frequency: 22 GHz, Input: 100 μ W	-3 dB		3 dB	