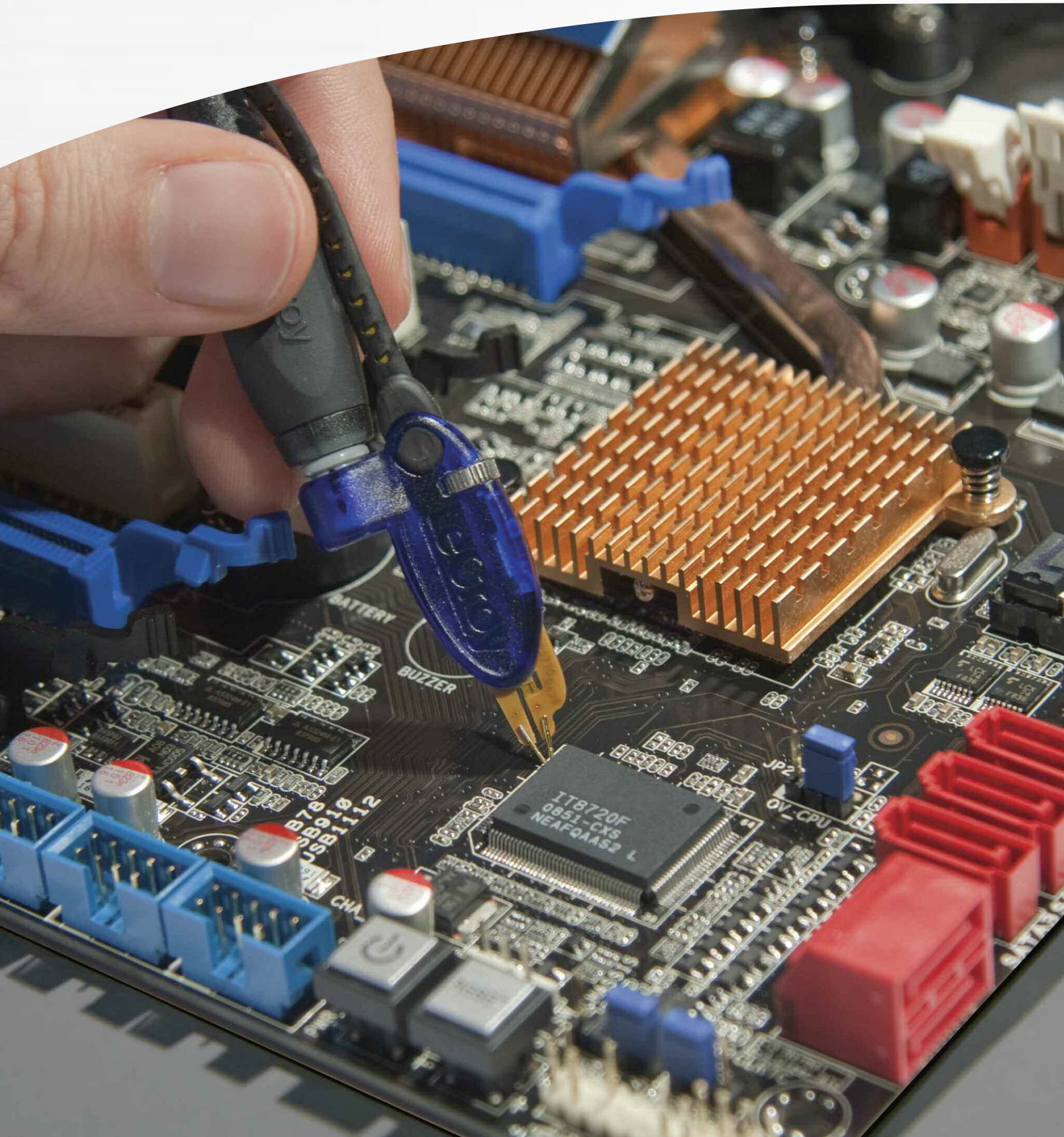
LeCroy

WaveLink® Differential Probe System (4 GHz – 6 GHz)



EXCEPTIONAL WAVEFORM FIDELITY

Features

Bandwidth
D610/620: 6 GHz
D410/D420: 4 GHz
D600A-AT: 6 GHz
D300A-AT: 3 GHz
D500PT: 5 GHz

Dynamic Range
D610/D410: 2.5 V_{p-p}
D620/D420: 5 V_{p-p}
D600A-AT: 4.8 V_{p-p}
D300A-AT: 4.8 V_{p-p}
D500PT: 4.8 V_{p-p}

System Noise
D610: 2.8 mV_{rms}
D620: 4.8 mV_{rms}
D410: 2.3 mV_{rms}
D420: 4.3 mV_{rms}
D600A-AT: 5.8 mV_{rms}
D300A-AT: 5.0 mV_{rms}
D500PT: 5.8 mV_{rms}

DC Input Resistance
D610/D620, D410/D420 — 100 kΩ Diff., 50 kΩ CM
D600A-AT, D500PT, D300A-AT — 4 kΩ Diff., 2 kΩ CM

Flexible Tip Connection (D6x0/D3x0 only)
– PT Browser Tip
– SI Solder-In Lead
– QC Quick Connect
– SP Square Pin
– HiTemp Solder-In Lead

Serial Data
WaveLink probes support the following serial data standards, but are not limited to: XAUI, USB 1.1/2.0, PCI Express® 1.1, HDMI, DisplayPort, DDRI/II/III, FB-DIMM



The WaveLink Differential Probe Series is a high bandwidth active differential probes series. These probes are suited for signal integrity measurements in high-speed digital systems.

WaveLink®

WaveLink® probes provide industry leading technology for wideband signal connection to test instruments. The first differential probes to employ SiGe technology, they deliver full system bandwidth when used with WaveRunner,® WavePro,® WaveMaster,® DDA and SDA oscilloscopes up to 6 GHz.

WaveLink probes:

- Maintain good loading characteristics across the frequency span
- Optimized for gain, noise and bandwidth for optimal performance
- Offer broad range of dynamic range and noise over gain settings by incorporating automatic probe attenuation changes

WaveLink is the first differential probe to use a unique calibration process to achieve superb waveform fidelity for routine voltage measurements.

Calibration coefficients "fine tune" the frequency response of each WaveLink probe and are individually determined during factory calibration and programmed into the probe. The SDA, DDA, WaveMaster, WaveRunner, or WavePro Series oscilloscopes read this data and use it to digitally compensate the entire system response for superior fidelity.

Signal Fidelity

WaveLink probes virtually eliminate distortion when measuring signals. This benefit is particularly useful in eye pattern measurements, now routine for systems using fast serial parallel data bus architecture.

All WaveLink probes offer:

- Superior loading characteristics
- Precise frequency response with outstanding fidelity for high-speed signals

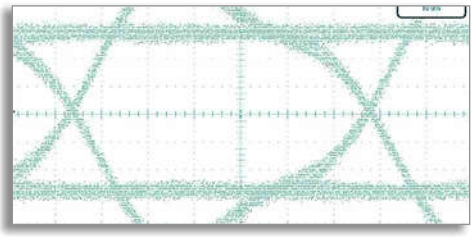
Both low loading and frequency response flatness are needed to ensure the signal fidelity required to measure performance accurately.

Tip Flexibility

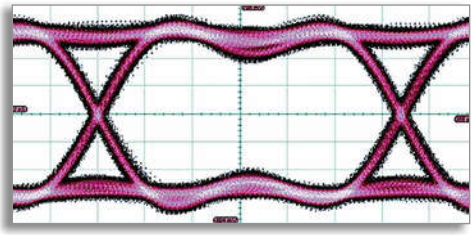
WaveLink test leads make connecting to test points very simple. The wide variety of tips offered provide confidence that the most challenging test points can be probed.

The Solder-In, PT Browser, Quick Connect, and Square Pin lead sets are rated for multiple insertions and offer field replacement tips for user value, while giving the best signal fidelity as a system to the test points.

An assortment of hands-free probe holders ease the challenge of connecting multiple leads to a board.



3.125 Gb/s XAUI signal measured with system using a probe with good frequency flatness, but excessive loading.



Same signal measured with WaveLink D610-PT. Low loading and flat frequency response combine to maintain the fidelity in the eye pattern.

Serial Data

Serial data signals all vary in signal characteristics and connection type. WaveLink features a wide dynamic range and offset to accommodate a wide input voltage range. WaveLink's automatic probe attenuation network allows an input voltage up to ±5 V_{p-p} with the lowest system noise for measuring small signals.

Single-ended Measurements

WaveLink differential probes offer enhanced capabilities to make single-ended measurements with low loading and improved CMRR. Single-ended measurements on DDR signals with D6x0/D4x0 probes utilize ±3 V offset range to return a more accurate and repeatable measurement.

Probe Positioners

Multiple probe connections are often necessary to properly debug board level problems. WaveLink probes afford a variety of hands free positioners to offer stable and accurate probe tip placement to make perfect contact without the worry of hand probing errors.



FreeHand with PT Tip and Wand.



EZ-Probe Positioner.



XYZ Positioner with PT Tip.

FLEXIBLE INTERCONNECTION OPTIONS



WaveLink Differential Amplifer Small Tip Modules

The D610/D410 and D620/D420 probes provide superior electrical characteristics to provide the best signal fidelity.

- Lowest noise performance for accurate measurements
- High DC impedance
- Low loading for minimum signal disturbance
- High sensitivity for probing low voltage signals

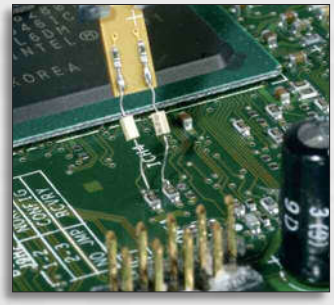
The D6x0/D4x0 probes are superior to single-ended probes for measuring ground referenced signals. Placing the probe will not alter local ground variation, and the measured signal won't be distorted by this variation.

Best-in-class mechanical design for optimum utility:

- Small tip, high bandwidth differential probe
- Four interconnect configurations for flexibility
- Very small form factor for accessing tight spaces

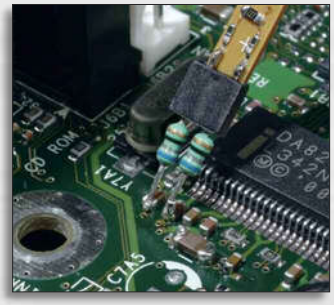
Each of the interchangeable leads is a thin, highly flexible 145 mm (5.7") long lead connecting the tip and the D610/D620 and D410/D420 probe tip module.

Five Different Tips for Interconnect Flexibility



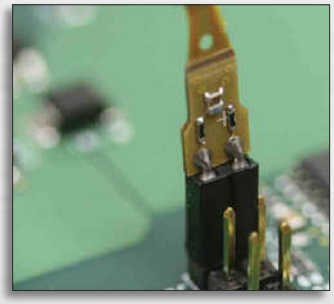
A. Solder-In Lead (SI)

The Solder-In interconnect lead features the smallest physical tip size of any high bandwidth differential probe and the highest level of electrical performance. Two very small damping resistors are directly soldered into the connect points providing a reliable, intermittence-free electrical connection. The resistors have highly flexible leads allowing connection to input points with a wide range of input spacing.



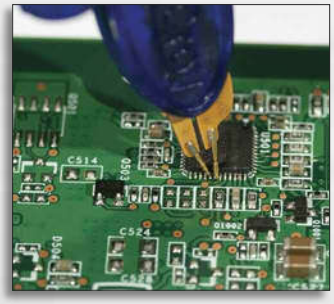
B. Quick Connect (QC) (D6xx only)

The Quick Connect interconnect lead enables you to quickly move the probe between multiple test points on the test circuit. Just solder a pair of leaded damping resistors at each location where interconnection is required. A small connector mounted on the probe tip plugs into the damping resistors, letting you quickly move between sets of test points.



C. Square Pin (SP)

Many applications, such as IC characterization boards, use standard 0.025" square pins for interconnect. The Square Pin interconnect lead directly mates with a pair of 0.025" (0.635 mm) square pins that are mounted on standard 0.100" (2.54 mm) centers.

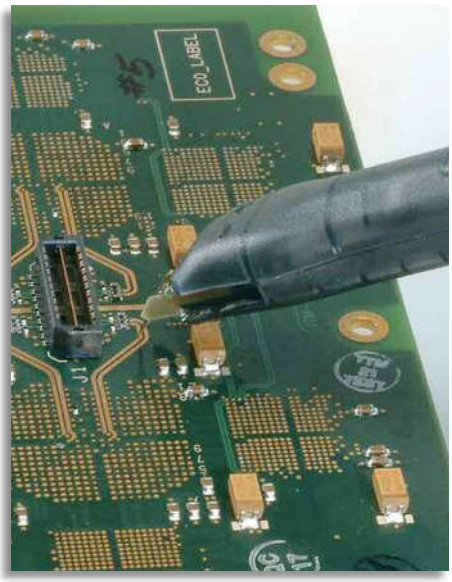


D. Positioner Tip (PT)

The PT positioner tips provides spring loaded leads to allow for easy probing. The adjustable wheel allows for precise probing, allowing a spread up to 0.14". The small form factor provides a convenient grip for hand probing, or use the wand or XYZ positioner for more precise placement.

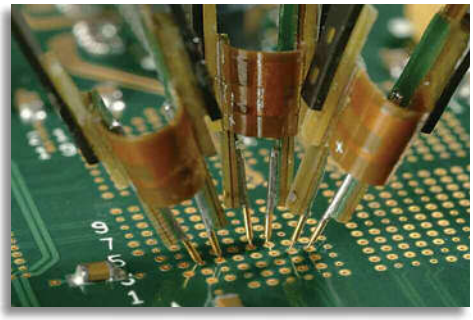
BROWSER OPTIONS

WaveLink Differential Amplifier Modules with Adjustable Tip



WaveLink adjustable tip probes are designed to provide an optimum mechanical connection for signal measurement.

- Built-in thumbwheel for precise positioning of tip—stays put after adjustment
- Maintains sharp points for good contact
- Tips made of "NiTiNOL," a super-elastic nickel-titanium alloy
- Flexes as you apply pressure
- Consistently returns to original form



WaveLink 5 GHz Differential Amplifier Module with Positioner Tip

The probe has a very thin form factor, allowing multiple probes to be used when several channels are required to monitor signals from the same small IC.



E. High Temperature (HiTemp) Cables and Solder-In Lead

The 90 cm HiTemp cables and Solder-In lead can be used for controlled situations where the differential amplifier module needs to be removed from the extreme temperature environment. Ideally suited for testing scenarios where the temperature can fluctuate from -40 °C to +105 °C.

PT Browser Tip Leads



The PT browser tip offers two options to pair with the appropriate probe body, providing the best scope/probe combination. The Dx10-PT and Dx20-PT browser tips are used with the D610/D620 for 6 GHz bandwidth probing needs, while a pairing with the D410/D420 amplifiers are rated to 4 GHz bandwidth. The PT positioner tip offers the most flexibility in a browser probe to provide the best signal fidelity in an easy to use form factor. The PT browser tip offers superior noise and loading characteristics. The PT can be used with a variety of holders and accessories to allow for ease in hand browsing, or flexibility to use a positioner for hands free probing.

The small form factor makes probing small pitch ICs easy, with a tip spread of 0.14", adjustable with a thumb wheel. The probe tips offer a field replaceable spring tip (with a flex of 0.6 mm) to allow robust contact with DUT contacts.

COMPATIBILITY CHART

4 GHz–6 GHz

WaveLink configurations compatible with oscilloscopes from 4 GHz to 6 GHz.



Platform Cable Assembly

ProLink
WL-PLink
WaveLink

Differential Amplifiers Small Tip Modules

D600A-AT
D500PT
D610
6 GHz
D620
6 GHz
D610-PT
6 GHz
D620-PT
6 GHz

Tips/Leads

D500PT-Tip
Dx10-HITEMP (Optional)
Dx10-PT-KIT (Optional)
Dx10-SI
Dx10-QC
Dx10-SP
Dx20-HiTemp (Optional)
Dx20-PT-Kit (Optional)
Dx20-SI
Dx20-QC
Dx20-SP
Dx10-PT-Kit
Dx20-PT-Kit

≤ 4 GHz

WaveLink configurations compatible with oscilloscopes up to and including 4 GHz.



Platform Cable Assembly

ProBus
WL-PBus
WaveLink

Differential Amplifiers Small Tip Modules

D300A-AT
D500PT
D410
4 GHz
D420
4 GHz
D410-PT
4 GHz
D420-PT
4 GHz

Tips/Leads

D500PT-Tip
Dx10-HiTemp (Optional)
Dx10-PT-Kit (Optional)
Dx10-SI
Dx10-SP
Dx20-HiTemp (Optional)
Dx20-PT-Kit (Optional)
Dx20-SI
Dx20-SP
Dx10-PT-Kit
Dx20-PT-Kit

SPECIFICATIONS AND ORDERING INFORMATION

Specifications	D610	D620	D410	D420	D600A-AT	D300A-AT	D500PT
Bandwidth, System DC to -3 dB							
PT Positioner Lead	6 GHz[1]		4 GHz[1]		6 GHz	3 GHz	5 GHz
SI Solder-In Lead	6 GHz[1]		4 GHz[1]			N/A	
QC Interconnect Lead	4 GHz				N/A		
SP Interconnect Lead	3 GHz					N/A	
HiTemp Solder-In Lead	6 GHz		4 GHz		N/A	N/A	N/A
Rise Time (10–90)							
PT Positioner Lead	< 75 ps		< 112 ps		< 75 ps[1]	< 130 ps[1]	< 90 ps[1]
SI Solder-In Lead	< 75 ps		< 112 ps			N/A	
QC Interconnect Lead	< 122.5 ps				N/A		
SP Interconnect Lead	< 150 ps					N/A	
HiTemp Solder-In Lead	< 75 ps		< 112 ps		N/A	N/A	N/A
LF Attenuation Accuracy[1]	2% < 1.25 V_{p-p} 5% 1.25 V_{p-p} to 2.5 V_{p-p}	2% < 2.25 V_{p-p} 5% 2.5 V_{p-p} to 5 V_{p-p}	2% < 1.25 V_{p-p} 5% 1.25 V_{p-p} to 2.5 V_{p-p}	2% < 2.25 V_{p-p} 5% 2.5 V_{p-p} to 5 V_{p-p}	2% 0±1.2 V (with 0 V common mode) 5% ±1.2 V ±2.4 V (with 0 V common mode)		
Zero Offset (within 15 minutes after autozero)	< 2.5 mV[1]	< 5 mV[1]	< 2.5 mV[1]	< 5 mV[1]	< 10 mV[1]		
Offset Gain Accuracy	1% of offset value[1]				N/A		
Input Differential Range	2.5 V_{p-p}	5 V_{p-p}	2.5 V_{p-p}	5 V_{p-p}	4.8 V_{p-p}		
Differential Offset Range	±3 V				0 V		
Common Mode Range (max. peak voltage either input to ground)	±4 V				±2.4 V		
DC Input Resistance	100 kΩ differential 50 kΩ single-ended				4 kΩ differential 2 kΩ single-ended		
AC Loading (differential Zmin)	200 Ω	200 Ω	200 Ω	200 Ω	120 Ω	600 Ω	200 Ω
CMRR	> 30 dB@10 MHz > 26 dB@ 6 GHz		> 30 dB@10 MHz > 26 dB@ 3.5 GHz		> 40 dB@1 MHz > 30 dB@3 GHz > 20 dB@ 6 GHz (D600A-AT only)		> 25 dB@ 1 GHz > 19 dB@ 3 GHz > 16 dB@ 5 GHz
Differential Input Capacitance@1 GHz							
SI Solder-In Lead	210 fF	120 fF	210 fF	120 fF	N/A		
PT Positioner Lead	290 fF	290 fF	290 fF	290 fF	170 fF		
QC Interconnect Lead	550 fF	530 fF	550 fF	530 fF	N/A		
SP Interconnect Lead	980 fF	980 fF	980 fF	980 fF	N/A		
HiTemp Solder-In Lead	210 fF	120 fF	210 fF	120 fF	N/A		
Noise (System referred to probe input)	2.8 mV_{rms}	4.8 mV_{rms}	2.3 mV_{rms}	4.3 mV_{rms}	5.8 mV_{rms}	5.0 mV_{rms}	5.8 mV_{rms}

[1] Warranted specification.

Ordering Information

Probe Tip Modules

Product Description	Product Code
WaveLink 6 GHz 2.5 V_{p-p} Differential Amplifier Small Tip Module	D610*
WaveLink 4 GHz 2.5 V_{p-p} Differential Amplifier Small Tip Module	D410*
WaveLink 6 GHz 5 V_{p-p} Differential Amplifier Small Tip Module	D620*
WaveLink 4 GHz 5 V_{p-p} Differential Amplifier Small Tip Module	D420*
WaveLink 6 GHz Differential Amplifier Module with Adjustable Tip	D600A-AT*
WaveLink 3 GHz Differential Amplifier Module with Adjustable Tip	D300A-AT*
WaveLink 5 GHz Differential Amplifier Module with Positioner Tip	D500PT*
WaveLink 6 GHz, 2.5 V_{p-p} Differential Positioner Tip	D610-PT*
WaveLink 6 GHz, 5 V_{p-p} Differential Positioner Tip	D620-PT*
WaveLink 4 GHz, 2.5 V_{p-p} Differential Positioner Tip	D410-PT*
WaveLink 4 GHz, 5 V_{p-p} Differential Positioner Tip	D420-PT*

* For a complete probe, order a WL-PLink, or WL-PBus Platform/Cable Assembly with the probe tip module.

Probe Bodies

Product Description	Product Code
WaveLink ProLink Platform/Cable Assembly (4 – 6 GHz)	WL-PLink
WaveLink ProBus Platform/Cable Assembly (4 GHz)	WL-PBus

Probe Leads and Accessories

Product Description	Product Code
Differential Positioner Tip with Accessories (for use with D610 or D410)	Dx10-PT-Kit
Differential Positioner Tip with Accessories (for use with D620 or D420)	Dx20-PT-Kit
WaveLink Temperature Extension Cables for Dx10. Includes (1) Set of Matched 30" High Temperature Cables, (1) Solder-In Lead Set	Dx10-HiTemp
WaveLink Temperature extension cables for Dx20. Includes (1) Set of Matched 30" High Temperature Cables, (1) Solder-In Lead Set	Dx20-HiTemp

Service Options

Product Description	Product Code
NIST Traceable Calibration with Test Data† (one module)	D600A-AT-CCNIST D300A-AT-CCNIST D500PT-CCNIST D610-CCNIST D620-CCNIST D410-CCNIST D420-CCNIST

† CCNIST NIST traceable calibration with test data is an available option for D610, D620, D410, D420, D500PT, D600A-AT, or D300A-AT only when ordered with either a WL-PLink or WL-PBus.

WAVELINK STANDARD ACCESSORIES CHART

Standard Accessories	WL-PLink WL-PBus	D610/D620 D410/D420	D610/D620-PT D410/D420-PT	Dx10-HiTemp Dx20-HiTemp	D600A-AT D300A-AT	D500PT	Replacement Part
Solder-In Lead Set	—	1 each	—	—	—	—	Dx10-SI (D610/D410) Dx20-SI (D620/D420)
Damping Resistors for Solder-In Lead	—	10 each	—	—	—	—	PKxx0-SI (qty 20)
Quick Connect Lead Set	—	1 each	—	—	—	—	Dx10-QC (D610) Dx20-QC (D620)
Damping Resistors for QC Tip	—	20 each	—	—	—	—	PKxx0-QC
Square Pin Interconnect Lead Set	—	1 each	—	—	—	—	Dx10-SP (D610/D410) Dx20-SP (D620/D420)
Positioner Tip with Accessories (kit includes items below with **)	—	—	1 kit	—	—	—	Dx10-PT-Kit (D610/D410) Dx20-PT-Kit (D620/D420)
**Positioner Tip	—	—	1 each	—	—	—	Dx10-PT (D610/D410) Dx20-PT (D620/D420)
**Replacement Pogo Tips for PT Tip	—	—	4 each	—	—	—	Dxx0-PT-Tips
**XYZ Positioner	—	—	1 each	—	—	—	Dxx0-PT-XYZ-Positioner
**Adhesive Tape for XYZ Positioner	—	—	15 each	—	—	—	Dxx0PT-Tape
**Browser Wand for PT Tip	—	—	1 each	—	—	—	Dxx0PT-Wand
**Interlock Pieces for PT Tip	—	—	3 each	—	—	—	Dxx0PT-Interlock
**Swivel for PT Tip	—	—	1 each	—	—	—	Dxx0PT-Swivel
Replacement HiTemp Solder-In Lead	—	—	—	1 each	—	—	Dx10-HiTemp (D610/D410) Dx20-HiTemp (D620/D420)
Replacement HiTemp Cable	—	—	—	1 paired cable each	—	—	Dxx0-Cable-HiTemp
Tip Assembly for D500PT	—	—	—	—	—	1 each	D500PT-Tip
Probe Tips for D500PT	—	—	—	—	—	4 each	PK500PT-1
Freehand Probe Holder	—	—	—	—	—	1 each	PACC-MS001
Tip Repair Tool	—	—	—	—	—	1 each	
Module Mounting Clamp for EZ-Probe	—	—	—	—	—	1 each	
Tip Retaining Clip for SI and QC Leads	—	1 each	—	—	—	—	PK600ST-3
Protective Storage Case	—	—	—	—	—	1 each	
Ground Lead	—	1 each	1 each	—	1 each	1 each	PACC-LD005
Ground Clip	—	1 each	1 each	—	1 each	1 each	PK006-4
Instruction Manual	—	1 each	1 each	—	1 each	1 each	WL-OM-E
Quick Start Guide	—	1 each	1 each	—	1 each	1 each	
Calibration Certificate	—	1 each	1 each	—	1 each	1 each	See Service Options
Soft Accessory Case	1 each	—	—	—	—	—	SAC-01
Probe Characterization Fixture	1 each	—	—	—	—	—	PCF200
Probe Body Mounting Clip	1 each	1 each	1 each	1 each	1 each	—	PK600ST-4 includes 4 adhesive backed probe body clamps
Probe Cable Clamp	2 each	—	—	—	—	—	—
Small Probe Accessory Case	1 each	—	—	—	—	—	—

**Included with Dx10/Dx20-PT-Kit

Recommended Accessories						
Cascade Microtech EZ-Probe Positioner	—	—	yes	yes	yes	EZ Probe

Customer Service – LeCroy probes are designed, built, and tested to ensure high reliability. In the unlikely event you experience difficulties, our probes are warranted for one year. This warranty includes: • No charge for return shipping • Long term 7-year support • Upgrade to latest software at no charge

LeCroy 1-800-5-LeCroy
www.lecroy.com

Local sales offices are located throughout the world.
Visit our website to find the most convenient location.

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WaveLinkLowSpeed-DS-25Feb11
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