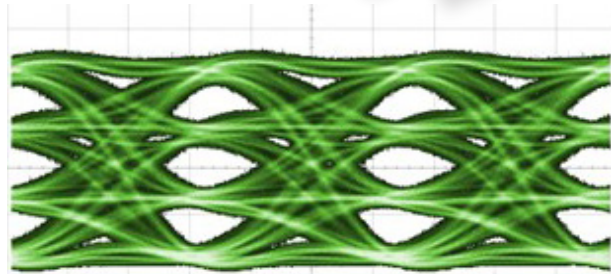
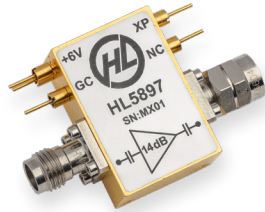




KEEP YOUR EYES WIDE OPEN: DESIGNS FOR HIGH-SPEED DATA

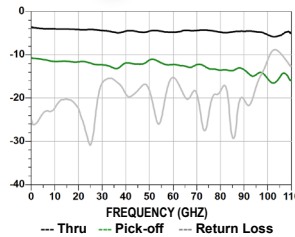
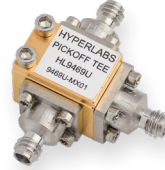
HL5897 Linear Amp (63 GHz)

- Exceptionally flat bandwidth (48 kHz to 63 GHz)
- 14 dB gain
- Optimized as data driver
- 112 Gbps PAM4 signaling
- Small form factor
- Single 6 V power supply



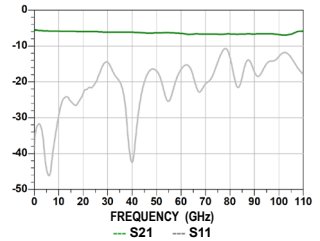
NEW: HL9469 Pick-off Tee

- Ultra-broadband (DC to 110 GHz)
- Suitable for 224 Gbps PAM4
- Available in matched pairs

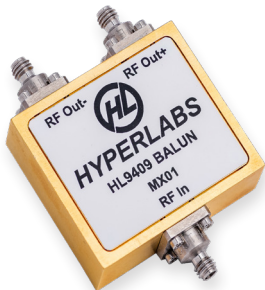


NEW: HL9429 Attenuators

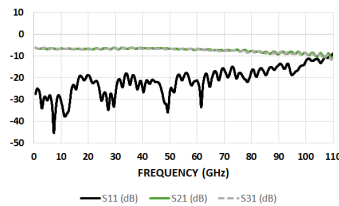
- Ultra-broadband (DC to 110 GHz)
- Exceptional price for performance
- 3, 6, and 10 dB options available



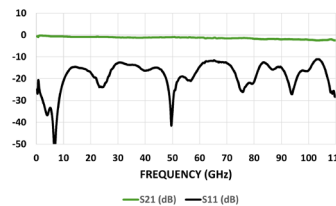
ULTRA-BROADBAND PARTS FOR 112 & 224 GBPS PAM4 APPLICATIONS



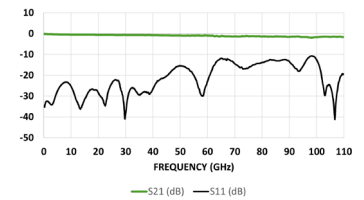
HL9409 BALUN (500 kHz-100 GHz)



HL9449 BIAS TEE (160 kHz-110 GHz)



HL9439 DC BLOCK (160 kHz-110 GHz)



Also Available:

- **HL9479 2-Way Power Divider** from DC to 110 GHz (3 dB)
- **New HL942x Inverters** from 150 kHz up to 100 GHz (3 dB)
- **New HL952x Terminations** up to 110 GHz
- **HL945x Transition Time Converters** up to 50 GHz (7 ps)

Visit our website for baluns, pick-off tees, power dividers, risetime filters, DC blocks, amplifiers, and more!



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We offer some of the broadest band components on the market.

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HL COLORADO

315 W South Boulder Rd.
Suite 206
Louisville, CO 80027

AMPLIFIERS		F-MIN	F-MAX
HL5867	Linear Amplifier; 13 dB gain; 12.5 dBm max. output	35 kHz	30 GHz
HL5877	Limiting Amplifier, 27 dB gain, 1.05 Vp-p max. output	35 kHz	27 GHz
HL5887	Linear Amplifier; 15 dB gain; 15.5 dBm max. output	35 kHz	40 GHz
HL5897	Linear Amplifier; 14 dB gain; 17.3 dBm max. output	70 kHz	63 GHz

BALUNS - 1 Watt Max Input		F-MIN	F-MAX
HL9302	Match: ± 0.1 dB, $\pm 4^\circ$ (20 GHz); 6 dB I.L.	8 MHz	26.5 GHz
HL9304	Match: ± 0.1 dB, $\pm 4^\circ$ (20 GHz); 6 dB I.L.	8 MHz	40 GHz
HL9305	Match: ± 0.1 dB, $\pm 4^\circ$ (20 GHz); 6 dB I.L.	8 MHz	50 GHz
HL9307	Match: ± 0.25 dB (>50 GHz), $\pm 8^\circ$ (40 GHz); 6 dB I.L.	8 MHz	67 GHz

BALUNS - 1 Watt Max Input		F-MIN	F-MAX
HL9401	Match: ± 0.1 dB (20 GHz), $\pm 6^\circ$ (20 GHz); 6 dB I.L.	100 MHz	20 GHz
HL9402	Match: ± 0.1 dB, $\pm 4^\circ$ (20 GHz); 6 dB I.L.	500 kHz	26.5 GHz
HL9404	Match: ± 0.1 dB, $\pm 4^\circ$ (20 GHz); 6 dB I.L.	500 kHz	40 GHz
HL9405	Match: ± 0.1 dB, $\pm 8^\circ$ (40 GHz); 6 dB I.L.	500 kHz	50 GHz
HL9407	Match: ± 0.25 dB (>50 GHz), $\pm 8^\circ$ (40 GHz); 6 dB I.L.	500 kHz	67 GHz
HL9408	Match: ± 0.5 dB (>50 GHz), $\pm 15^\circ$ (40 GHz); 6.5 dB I.L.	500 kHz	85 GHz
HL9409	Match: ± 0.5 dB (>50 GHz), $\pm 15^\circ$ (80 GHz); 6.5 dB I.L.	500 kHz	100 GHz

INTEGRATED BALUNS - DC Block at all ports / 1W Max Input		F-MIN	F-MAX
HL9502	Match: ± 0.1 dB, $\pm 4^\circ$ (20 GHz); 6 dB I.L.	500 kHz	26.5 GHz
HL9504	Match: ± 0.1 dB, $\pm 4^\circ$ (20 GHz); 6 dB I.L.	500 kHz	40 GHz
HL9505	Match: ± 0.25 dB (>40GHz), $\pm 8^\circ$ (40 GHz); 6 dB I.L.	500 kHz	50 GHz

PULSE INVERTERS		F-MIN	F-MAX
HL9417	2 dB I.L.	150 kHz	67 GHz
HL9419	2 dB I.L.	150 kHz	100 GHz

DC BLOCKS		F-MIN	F-MAX
HL9434	Match: ± 0.1 dB, $\pm 4^\circ$ (20 GHz); <1 dB I.L.; 10, 11, or 30 V	16 kHz	40 GHz
HL9435	Match: ± 0.1 dB, $\pm 4^\circ$ (20 GHz); <1 dB I.L.; 10, 11, or 30 V	16 kHz	50 GHz
HL9437	Match: ± 0.1 dB, $\pm 4^\circ$ (20 GHz); <1 dB I.L.; 10, 11, or 30 V	16 kHz	67 GHz
HL9438	Match: ± 0.1 dB, (<95 GHz), $\pm 4^\circ$ (40 GHz); <1.5 dB I.L. (85 GHz)	160 kHz	95 GHz
HL9439	Match: ± 0.1 dB, (<110 GHz), $\pm 4^\circ$ (40 GHz); <1.5 dB I.L. (85 GHz)	160 kHz	110 GHz
HL8435	Match: ± 0.1 dB, $\pm 4^\circ$ (40 GHz); <1.5 dB I.L.; 10 V, 220 nF	7 kHz	50 GHz
HL8437	Match: ± 0.1 dB, $\pm 4^\circ$ (40 GHz); <1.5 dB I.L.; 10 V, 220 nF	7 kHz	67 GHz
HL8439	Match: ± 0.1 dB, $\pm 4^\circ$; <2 dB I.L.; 10 V, 100 nF	16 kHz	110 GHz
HL8334	Removes DC Bias; Match: ± 0.1 dB, $\pm 4^\circ$ (40 GHz); <0.75 dB I.L.	7 kHz	40 GHz

BIAS TEES (SMA port or pins available for DC bias)		F-MIN	F-MAX
HL9444	175 mA IMAX; Match: ± 0.1 dB, $\pm 4^\circ$ (40 GHz); <1.55 dB I.L. (40 GHz)	35 kHz	40 GHz
HL9445	175 mA IMAX; Match: ± 0.1 dB, $\pm 4^\circ$ (40 GHz); <1.55 dB I.L. (50 GHz)	35 kHz	50 GHz
HL9447	175 mA IMAX; Match: ± 0.1 dB, $\pm 4^\circ$ (40 GHz); <1.55 dB I.L. (67 GHz)	35 kHz	67 GHz
HL9448	175 mA IMAX; Match: ± 0.1 dB, $\pm 4^\circ$ (40 GHz); <2.5 dB I.L. (95 GHz)	160 kHz	95 GHz
HL9449	175 mA IMAX; Match: ± 0.1 dB, $\pm 4^\circ$ (40 GHz); <2.5 dB I.L. (110 GHz)	160 kHz	110 GHz
HL9544	400 mA IMAX; Match: ± 0.1 dB, $\pm 4^\circ$ (40 GHz); <1.5 dB I.L. (40 GHz)	50 kHz	40 GHz
HL9545	400 mA IMAX; Match: ± 0.1 dB, $\pm 4^\circ$ (40 GHz); <1.5 dB I.L. (50 GHz)	50 kHz	50 GHz
HL9547	400 mA IMAX; Match: ± 0.1 dB, $\pm 4^\circ$ (40 GHz); <1.5 dB I.L. (67 GHz)	50 kHz	67 GHz
HL9644	1000 mA IMAX; Match: ± 0.1 dB, $\pm 4^\circ$ (40 GHz); <2.3 dB I.L. (40 GHz)	125 kHz	40 GHz
HL9645	1000 mA IMAX; Match: ± 0.1 dB, $\pm 4^\circ$ (40 GHz); <2.3 dB I.L. (50 GHz)	125 kHz	50 GHz
HL9647	1000 mA IMAX; Match: ± 0.1 dB, $\pm 4^\circ$ (40 GHz); <2.3 dB I.L. (67 GHz)	125 kHz	67 GHz
HL8x4x	Above also available as Kelvin Bias Tees (with sense port)		
HL8342	500 mA IMAX; Match: ± 0.1 dB, $\pm 4^\circ$ (20 GHz); <0.5 dB I.L.	5 kHz	28 GHz
HL8442	2000 mA IMAX; Match: ± 0.2 dB, $\pm 4^\circ$ (15 GHz); <0.75 dB I.L.	7.5 kHz	23 GHz

INSTRUMENTATION		F-MIN	F-MAX
HL1101	TDR: Single Ended, 200ps Rise Time, USB Powered (Single Channel)		
HL1302	Cable Skew Tester (2 channel), 1-200 ps Delay/Skew, 0.5 ps Resolution		
HL2202	TDR / Signal Path Analyzer: Differential, 35 ps Risettime, Signal Path Analyzer (Single Channel)		
HL2204	TDR / Signal Path Analyzer: Differential, 35 ps Risettime, Signal Path Analyzer (Dual Channel)		
HL9101	Impulse Generator: Triggerable, 100 ps Rise Time, 100 ps Fall Time, 200 ps Pulse Width, Trigger Rate 10 Hz - 50 MHz		
HL9201	Impulse Generator: Triggerable, 50 ps Rise Time, 50 ps Fall Time, 70 ps Pulse Width, Trigger Rate 10 Hz - 10 MHz		
HL9600	Calibration Standard Substrate. Includes Single-Ended and Differential SOLT Traces. Intended for use with HYPERLABS' Instrument Products		

TRANSITION TIME CONVERTERS / LOW PASS FILTERS		F-MAX
HL9450	Specify Maximum (-3 dB) Frequency and/or Risettime ($T_r > 350$ ps)	< 1 GHz
HL9452	Specify Maximum (-3 dB) Frequency and/or Risettime (350 ps $> T_r > 24$ ps)	1 - 15 GHz
HL9454	Specify Maximum (-3 dB) Frequency and/or Risettime (24 ps $> T_r > 12.5$ ps)	15 - 28 GHz
HL9457	Specify Maximum (-3 dB) Frequency and/or Risettime ($T_r < 12.5$ ps)	> 28 GHz

PICK-OFF TEES (standard)		F-MIN	F-MAX
HL9562	Match: ± 0.1 dB, $\pm 2^\circ$ (10 GHz); I.L.	DC	26.5 GHz
HL9564	Match: ± 0.1 dB, $\pm 2^\circ$ (10 GHz); I.L.	DC	40 GHz
HL9565	Match: ± 0.1 dB, $\pm 2^\circ$ (10 GHz); I.L.	DC	50 GHz

PICK-OFF TEES - Z Matched - 50 Ω all ports		F-MIN	F-MAX
HL9462	Match: ± 0.1 dB, $\pm 5^\circ$ (20 GHz); I.L. 3.5 dB thru, 10.5 dB p.off	DC	26.5 GHz
HL9464	Match: ± 0.1 dB, $\pm 5^\circ$ (20 GHz); I.L. 3.5 dB thru, 10.5 dB p.off	DC	40 GHz
HL9465	Match: ± 0.1 dB, $\pm 5^\circ$ (20 GHz); I.L. 3.5 dB thru, 10.5 dB p.off	DC	50 GHz
HL9467	Match: ± 0.25 dB, $\pm 5^\circ$ (20 GHz); I.L. 4 dB thru, 10 dB p.off	DC	67 GHz
HL5567	100Gb/s PAM4 Encoder. 2:1 Weighted Summing. (ref: HL9467)	DC	67 GHz
HL9469	Match: ± 0.5 dB, $\pm 5^\circ$ (60 GHz); I.L. 4.5 dB thru, 11 dB p.off	DC	110GHz

POWER DIVIDERS (2:1)		F-MIN	F-MAX
HL9472	Match: ± 0.5 dB, $\pm 4^\circ$ (20 GHz); 6.0 dB I.L.AC; 6 dB I.L.DC	DC	26.5 GHz
HL9474	Match: ± 0.5 dB, $\pm 8^\circ$ (40 GHz); 6.0 dB I.L.AC; 6 dB I.L.DC	DC	40 GHz
HL9475	Match: ± 0.5 dB, $\pm 8^\circ$ (40 GHz); 6.0 dB I.L.AC; 6 dB I.L.DC	DC	50 GHz
HL9477	Match: ± 0.5 dB, $\pm 8^\circ$ (40 GHz); 6.0 dB I.L.AC; 6 dB I.L.DC	DC	67 GHz
HL9479	Match: ± 0.5 dB, $\pm 10^\circ$ (80 GHz); 6.0 dB I.L.AC; 7 dB I.L.DC	DC	110 GHz

POWER DIVIDERS (4:1)		F-MIN	F-MAX
HL9572	Match: ± 0.5 dB, $\pm 4^\circ$ (20 GHz); 12 dB I.L.AC; 6 dB I.L.DC	DC	26.5 GHz
HL9574	Match: ± 0.5 dB, $\pm 8^\circ$ (40 GHz); 12 dB I.L.AC; 6 dB I.L.DC	DC	40 GHz
HL9575	Match: ± 0.5 dB, $\pm 8^\circ$ (40 GHz); 12 dB I.L.AC; 6 dB I.L.DC	DC	50 GHz
HL9577	Match: ± 0.5 dB, $\pm 8^\circ$ (40 GHz); 12 dB I.L.AC; 6 dB I.L.DC	DC	67 GHz

POWER SPLITTERS (2:1)		F-MIN	F-MAX
HL9482	Match: ± 0.1 dB, $\pm 4^\circ$ (20 GHz); 6.0 dB I.L.AC; 6 dB I.L.DC	DC	26.5 GHz
HL9484	Match: ± 0.1 dB, $\pm 8^\circ$ (40 GHz); 6.0 dB I.L.AC; 6 dB I.L.DC	DC	40 GHz
HL9485	Match: ± 0.1 dB, $\pm 8^\circ$ (40 GHz); 6.0 dB I.L.AC; 6 dB I.L.DC	DC	50 GHz
HL9487	Match: ± 0.1 dB, $\pm 8^\circ$ (40 GHz); 6.0 dB I.L.AC; 6 dB I.L.DC	DC	67 GHz
HL9489	Match: ± 0.1 dB, $\pm 4^\circ$ (70 GHz); 7.0 dB I.L.AC; 6 dB I.L.DC	DC	100 GHz

ATTENUATORS (opt. -3, -6, or -10)		F-MIN	F-MAX
HL9427	Match: ± 0.2 dB, $\pm 2^\circ$ (10 GHz); I.L. 3, 6, or 10 dB	DC	70 GHz
HL9429	Match: ± 0.5 dB, $\pm 2^\circ$ (10 GHz); I.L. 3, 6, or 10 dB	DC	110 GHz

TERMINATIONS (50 Ω)		F-MIN	F-MAX
HL9524	2.92 mm connector	DC	40 GHz
HL9525	2.40 mm connector	DC	50 GHz
HL9527	1.85 mm connector	DC	70 GHz
HL9529	1.0 mm connector	DC	110 GHz

SURFACE MOUNT COMPONENTS		F-MIN	F-MAX
HL7071	SMD Power Divider: Match: ± 0.3 dB, $\pm 6^\circ$ (20 GHz)	DC	30 GHz
HL9491	SMD Balun: Match: ± 0.4 dB (20 GHz), $\pm 5^\circ$ (10 GHz); 7 dB I.L.	1 MHz	20 GHz
HL9492	SMD Balun: Match: ± 0.4 dB (20 GHz), $\pm 5^\circ$ (10 GHz); 8 dB I.L.	3 MHz	30 GHz
	Bias Tees and Pick-off Tees also available in SMD	various	30 GHz

NOTE: Some specifications may vary depending on the selected option(s). Please visit www.hyperlabs.com for datasheets and full specifications.