

HL930x Series Baluns (8 MHz to 67 GHz)

Features and Technical Specifications¹ (HL9307 shown)

Bandwidth	8 MHz to 67 GHz		
Amplitude Match	± 0.1 dB, f ≤ 50 GHz ± 0.25 dB, f > 50 GHz See <i>Fig. 1</i>		
Phase Match	± 4°, f = 20 GHz ± 8°, f = 40 GHz See <i>Fig. 8</i>		
Insertion Loss	6 dB, single-ended reference See <i>Figs. 1, 3-4</i>		
Return Loss	> 15 dB, unbalanced port, f \leq 40 GHz > 10 dB, unbalanced port, f > 40 GHz > 10 dB, balanced ports, f \leq 50 GHz > 7.5 dB, balanced ports, f > 50 GHz See <i>Figs. 2, 5</i>		
CMRR	> 25 dB See <i>Fig. 6</i>		
Group Delay	≈ 270 ps See <i>Fig.</i> 7		
Max Input Power	1 W (+30 dBm)		
Connectors	Standard configuration is 1.85 mm, 3x jack/female 1.85 mm plug connectors available at extra cost		
Temperature Limits	-40° to +100° C, operating		
RoHS Compliant	Yes, assembled with lead-free solder		
REACH Compliant	Yes		
Warranty	1 vear. see website		

NOTE 1 - Unless otherwise noted, the specifications in this table are typical for Model Number HL9307 using the standard connector configuration (3 x jack). Full specifications for this and related models are available on Page 2 of this datasheet.



HL9307, standard configuration shown



Typical HL9307 Single-ended Insertion Loss



The following connector options are available: -JJJ, jack/jack/jack

available:

Extra cost options:

-JPP, jack/plug/plug -PJJ, plug/jack/jack

The HL930x series are ultra-broadband 180° signal

splitters and combiners

that offer excellent amplitude and phase match

The HL930x series is a

lower-cost alternative to the HL940x when the lowest low-frequency cutoff is

They are suitable for use in high-speed analog-

DEPLOYMENT NOTES When the device is used

using differential signals

with unmatched source

impedance, attenuators

If the DC voltage of the

balanced or unbalanced

blocks are required. The balanced ports (2 and 3) are DC shorted.

MODELS & OPTIONS

HL9302. 26.5 GHz

HL9304, 40 GHz HL9305, 50 GHz

HL9307, 67 GHz

The following models are

ports is non-zero, DC

to improve isolation.

(3-6 dB) may be required

as a signal combiner

to-digital conversion, frequency response testing for differential devices, and many other applications.

to 67 GHz.

not required.

over a bandwidth of 8 MHz

-PPP, plug/plug/plug



HL930x Full Specifications

Parameter	HL9302	HL9304	HL9305	HL9307	Comments		
Upper Frequency Limit	26.5 GHz	40 GHz	50 GHz	67 GHz	3 dB roll-off point, relative to nominal insertion loss		
Lower Frequency Limit	8 MHz	8 MHz	8 MHz	8 MHz	3 dB roll-off point		
Amplitude Match See Fig. 1	± 0.1 dB	± 0.1 dB	± 0.1 dB	± 0.1 dB, f ≤ 50 GHz ± 0.25 dB, f > 50 GHz			
Phase Match See Fig. 8	± 4°, f = 20 GHz	± 4°, f = 20 GHz	± 4°, f = 20 GHz ± 8°, f = 40 GHz	± 4°, f = 20 GHz ± 8°, f = 40 GHz			
Insertion Loss See Figs. 1, 3-4		Single-ended refer- ence					
Return Loss <i>See Figs. 2, 5</i>	> 15 dB, unbal. port > 10 dB, bal. ports	 > 15 dB, f ≤ 30 GHz, unbal. port > 12.5 dB, f > 30 GHz, unbal. port, > 10 dB, bal. ports 	 > 20 dB, f ≤ 30 GHz, unbal. port > 15 dB, f > 30 GHz, unbal. port > 10 dB, bal. ports 	 > 15 dB, f ≤ 40 GHz, unbal. port > 10 dB, f > 40 GHz, unbal. port > 10 dB, f ≤ 50 GHz, bal. ports > 7.5 dB, f > 50 GHz, bal. ports 	unbal. = unbalanced bal. = balanced		
Rise Time	13 ps	9 ps	7 ps	5 ps			
CMRR See Fig. 6	> 30 dB, f ≤ 20 GHz	> 30 dB, f ≤ 20 GHz > 25 dB, f > 20 GHz	> 30 dB, f ≤ 25 GHz > 25 dB, f > 25 GHz	> 30 dB, f ≤ 25 GHz > 25 dB, f > 25 GHz	Typical		
Group Delay See Fig. 7	≈ 290 ps	≈ 280 ps	≈ 270 ps	≈ 270 ps			
Max Input Power							
Impedance		Input and Outputs					
Connectors (Standard Config)	SMA, 3x jack/female	2.92 mm, 3x jack/ female	2.4 mm, 3x jack/ female	1.85 mm, 3x jack/ female	Plug/male connectors available at extra cost		
Dimensions (W x D x H)	2.25" x 1.50" x 0.55" 57.2 x 38.1 x 14 mm	2.25" x 1.50" x 0.55" 57.2 x 38.1 x 14 mm	2.35" x 1.50" x 0.55" 59.7 x 38.1 x 14 mm	2.39" x 1.50" x 0.55" 60.8 x 38.1 x 14 mm	Package including connectors		
Weight							
Operating Temp.		Case temperature					
RoHS Compliant	Yes, assembled with lead-free solder						
REACH Compliant	Yes						
Warranty	1 year, repair or replacement; see website for details						

Note: All specifications are based on test results using the standard connector configuration (3 x jack). Specifications may vary slightly for other configurations.



HL9307 Plot Diagrams

Figures 1-6 show the typical S-parameter characteristics for both single-ended and mixed-mode (differential) measurements. Other models show similar performance within their respective specified bandwidths.



Figure 1: HL9307 Single-ended Insertion Loss



Figure 2: HL9307 Single-ended Return Loss







Figure 4: HL9307 Low Frequency Single-ended Insertion Loss

Figure 5: HL9307 Mixed-mode Return Loss



Figure 3: HL9307 Differential Mode Insertion Loss

Figure 6: HL9307 Common Mode Rejection Ratio



HL9307 Plot Diagrams (continued)

Figures 7 and 8 show the Group Delay and Phase Mismatch of the HL9307. Other models show similar performance within their respective specified bandwidths.



HL930x Dimensional Drawing

Figure 9 shows a mechanical drawing of an HL9307. Unless otherwise noted, all units are in inches. Other models vary in width based on connectors.



Fig. 9: HL9307 Mechanical Drawing