

## PRODUCT SUMMARY

The HL934x series are ultra-broadband DC Feeders with a typical insertion loss less than 2.5 dB throughout the specified bandwidth range. A DC Feeder is like a Bias Tee, but without a DC blocking capacitor on the RF input. DC Feeders are bidirectional.

The HL934x allows for the insertion of a DC bias current or voltage onto the RF circuit path with minimal perturbation of the impedance of a 50 ohm transmission line.

These devices can be used for biasing amplifiers, lasers, optical modulators, and other devices.

Applications include 224 Gbps PAM4 communications systems, optical communication systems, high-speed data systems, level shifting, and cascading.

## MODELS & OPTIONS

The following models are available:

**HL9344**, 40 GHz

**HL9345**, 50 GHz

**HL9347**, 67 GHz

The following options are available:

**-M**, matched pair

**-U**, unmatched part(s)

## CONNECTORS

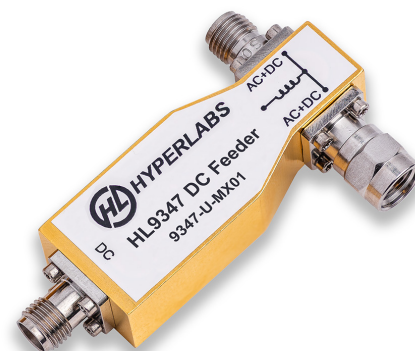
Connectors should be specified according to the configurations listed on Page 2

## HL934x Series DC Feeder (to 67 GHz)

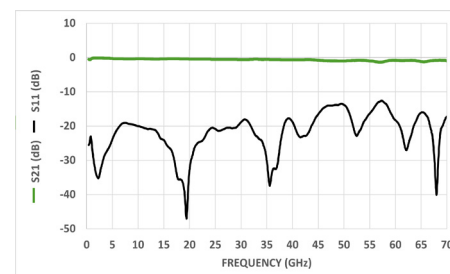
### Features and Technical Specifications<sup>1</sup> (HL9347 shown)

Bandwidth	13 kHz to > 67 GHz
Amplitude Match (opt. -M only)	$\pm 0.2$ dB, $f \leq 67$ GHz See Fig. 5
Phase Match (opt. -M only)	$\pm 4^\circ$ , $f = 40$ GHz
Insertion Loss	< 1.5 dB See Fig. 1
Return Loss	15 dB, $f \leq 45$ GHz 10 dB, $f > 45$ GHz See Fig. 2
Maximum Current	175 mA
Rise Time (10-90%)	3.2 ps
Impedance	50 $\Omega$
Dimensions (W x D x H)	1.95" x 1.30" x 0.53" 49.53 x 33.02 x 13.46 mm
Weight	24 g (0.85 oz.)
Connectors (AC+DC / AC+DC)	1.85 mm Standard configuration is jack/plug with either pins or SMA jack for DC bias. See page 2 for other configurations
Temperature Limits	-40° to +70° C, operating
RoHS Compliant	Yes, assembled with lead-free solder
REACH Compliant	Yes
Warranty	1 year, see website

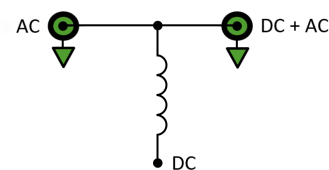
NOTE 1 - Unless otherwise noted, the specifications in this table are typical for Model Number HL9347 using the standard connector configuration (-JP, jack/plug). See page 2 for full specifications.



HL9347, Option -U-JPS shown



Typical HL9347 Insertion and Return Loss



HL934x Schematic and Port Assignments

## HL934x Full Specifications

Parameter	HL9344	HL9345	HL9347	Comments
Upper Frequency Limit	> 40 GHz	> 50 GHz	> 67 GHz	3 dB roll-off point, relative to nominal insertion loss
Lower Frequency Limit See Fig. 3	13 kHz			Measured with DC port shorted to ground
Maximum Current	175 mA			
Amplitude Match See Fig. 5	$\pm 0.2$ dB, (opt. -M)			Typical, opt. -M
Phase Match	$\pm 4^\circ$ , $f = 40$ GHz (opt. -M)			Typical, opt. -M
Insertion Loss See Fig. 1	0.75 dB $1 \text{ MHz} \leq f \leq 40 \text{ GHz}$	1.0 dB $1 \text{ MHz} \leq f \leq 50 \text{ GHz}$	1.5 dB $1 \text{ MHz} \leq f \leq 67 \text{ GHz}$	Typical
Return Loss See Fig. 2	15 dB, $f \leq 45 \text{ GHz}$ 10 dB, $f > 45 \text{ GHz}$			Typical, within specified operating frequency
Rise Time	8.75 ps	7 ps	5 ps	Typical
Group Delay See Fig. 4	105 ps $\pm$ 10 ps ripple	110 ps $\pm$ 10 ps ripple	110 ps $\pm$ 10 ps ripple	
Impedance	50 $\Omega$			Input and Output
DC Resistance	2 $\Omega$			DC to AC+DC
Connector Type	2.92 mm	2.4 mm	1.85 mm	AC and AC+DC ports
Connector Configurations (specify when ordering)	Port 1 (AC): jack (J) or plug (P) Port 2 (AC+DC): jack (J) or plug (P) Port 3 (DC): SMA jack (S) or capacitive feedthru pins (C) <i>Standard configuration is -JPS or -JPC</i>			E.g. config -JPS: AC jack, AC+DC plug, DC jack Or, config. -JJC: AC jack, AC+DC jack, DC pins
Dimensions (W x D x H)	1.95" x 1.30" x 0.53" 49.53 x 33.02 x 13.46 mm			Package including connectors
Weight	24 g (0.85 oz.)			
Operating Temperature	-40° to +70° C			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 (-JPx, jack/plug). Specifications may vary slightly for other configurations.

## HL9347 Performance Characteristics

Figures 1-5 show the typical performance characteristics of the HL9347 from 10 MHz to 67 GHz, except Fig. 3 which shows low-frequency response to 10 MHz. Other models show similar performance within their specified bandwidth.

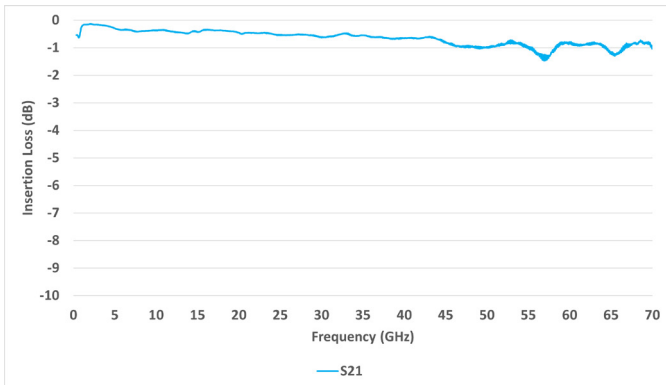


Fig. 1: Typical HL9347 Bandwidth and Insertion Loss

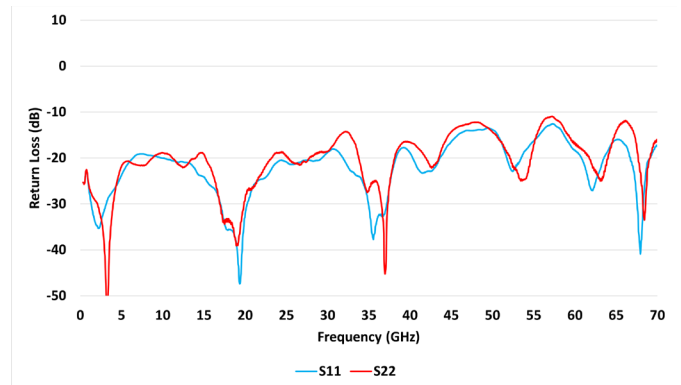


Fig. 2: Typical HL9347 Return Loss

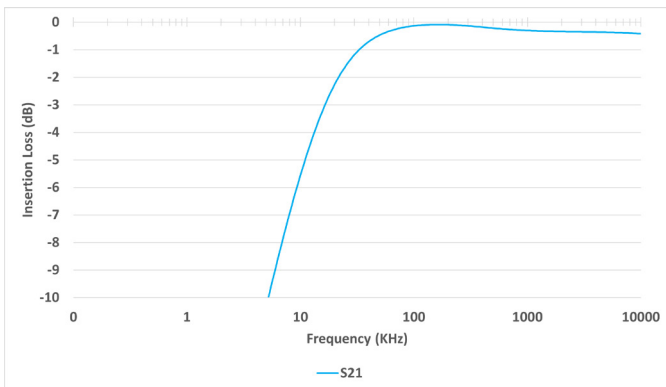


Fig. 3: Typical HL9347 Low Frequency Performance

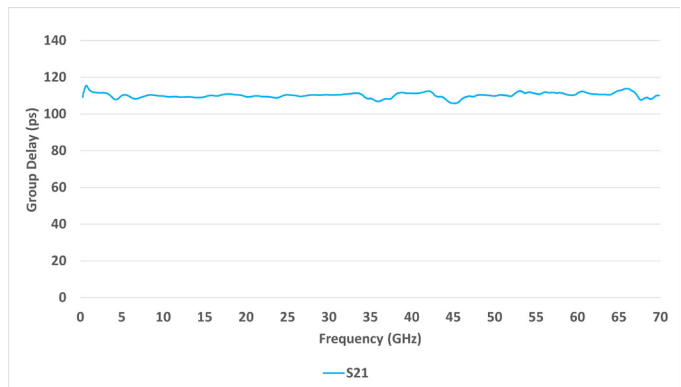


Fig. 4: Typical HL9347 Group Delay

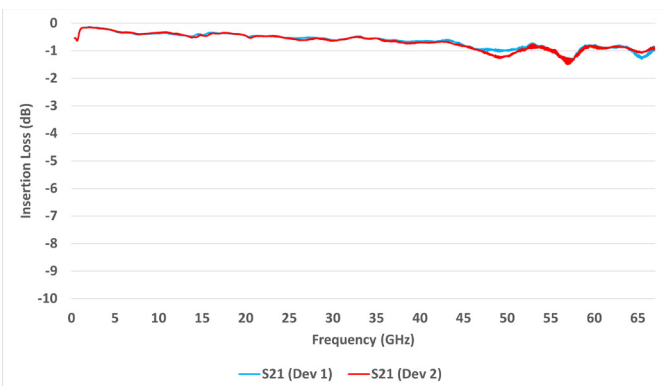


Fig. 5: Typical HL9347 Amplitude Matching (opt. -M)

## HL9347 Dimensional Drawing

Figure 6 shows a mechanical drawing of an HL9347 (opt. -JJS) with an SMA DC port. Unless otherwise noted, all units are in inches. See page 2 for full dimensions.

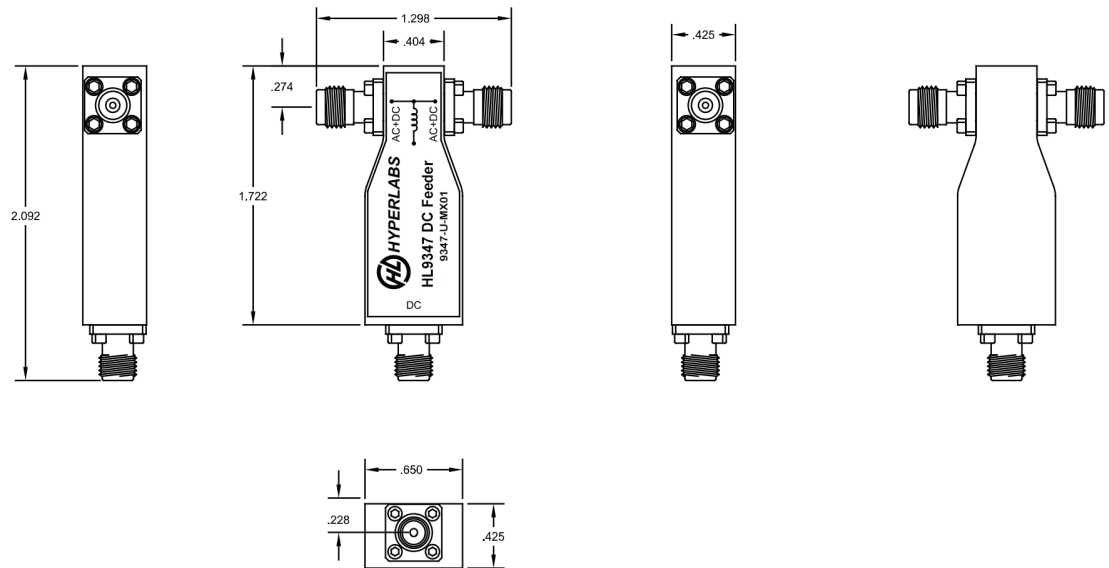


Fig 6: HL9347 with SMA DC Port Mechanical Drawing