HYPERLABS™
Innovation at Hyperspeed since 1992

HL9450 Transition Time Converters (< 1 GHz)

Options and Technical Specifications

Option	Rise Time	Bandwidth (-3 dB fc)
-373	373 ps	938 MHz
-375	375 ps	933 MHz
-417	417 ps	840 MHz
-439	439 ps	797 MHz
-749	749 ps	467 MHz
-900	900 ps	388 MHz
-1000	1.0 ns	350 MHz
-1300	1.3 ns	270 MHz
-2000	2.0 ns	175 MHz
-2990	2.99 ns	177 MHz
-5000	5.0 ns	70 MHz
-9000	9.0 ns	38.0 MHz
-10000	10.0 ns	35 MHz
-20000	20.0 ns	17.5 MHz
-xxx	Custom	Custom

HL9450

Common Specifications	
Insertion Loss	~ 0.1 to 0.14 dB (varies by option) *See full specifications on pg. 2*
Group Delay (100 MHz to fc)	510 ps (opt. -373) See *Fig. 2, full specs* below
Return Loss (DC to 3 fc)	~17 dB (all options) See *Fig. 4* below
Max Input Power	1 W
Impedance	50 Ω
Connectors	SMA, 1x plug, 1x jack
Dimensions	1.80” x 0.60” x 0.40” 45.72 x15.24 x 10.16 mm
Weight	14 g (0.49 oz.)
Temperature Limits	-40° to +40° C, operating
RoHS Compliance	RoHS compliant; made with lead-free solder
Warranty	1 year, see website

PRODUCT SUMMARY

The HL9450 family of Tranistion Time Converters is based on low-pass absorptive rise time filters to provide superior return loss and flat group delay at frequencies below 1 GHz.

Designed using a proprietary absorptive filtering, these filters offer similar frequency response as 4th order Bessel-Thompson filters.

These filters are suitable for OEM use in high-speed telecom and digital networks, as anti-aliasing filters in digital oscilloscopes, and to limit the RF bandwidth to known values.

DEPLOYMENT NOTES

All specifications contained herein are typical unless otherwise noted.

S-parameter files and higher resolution versions of the plots on the following pages are available on our website.

These devices are bidirectional.

CUSTOM FILTERS

In addition to the options listed in this datasheet, HYPERLABS offers customers quick-turn custom filter designs up to 45 GHz.

The full-turn service includes design, manufacturing, and assembly and small quantities are typically available within a few weeks.

Please contact us for more information about these custom designs.

HL9450 Full Specifications

Option	Rise Time	Bandwidth (-3 dB fc)	Insertion Loss (dB)	Return Loss (dB)	Group Delay
-373	373 ps	938 MHz	0.01	16	511 ps
-375	375 ps	933 MHz	0.02	15	508 ps
-417	417 ps	840 MHz	0.03	17	510 ps
-439	439 ps	797 MHz	0.03	18	548 ps
-749	749 ps	467 MHz	0.04	19	918 ps
-900	900 ps	388 MHz	0.05	21	1055 ps
-1000	1.0 ns	350 MHz	0.08	18	1151 ps
-1300	1.3 ns	270 MHz	0.1	18	1260 ps
-2000	2.0 ns	175 MHz	0.12	16	1572 ps
-2990	2.99 ns	177 MHz	0.14	18	2.7 ns
-5000	5.0 ns	70 MHz	0.25	18	5.2 ns
-9000	9.0 ns	38.0 MHz	0.36	14	4.2 ns
-10000	10.0 ns	35 MHz	0.36	14	3.8 ns
-20000	20.0 ns	17.5 MHz	1.25	12	18 ns
-xxx	Custom	Custom			

Parameter	Common Specifications	Comments
Return Loss *See Fig. 4*	15 dB	All options
Max Input Power	1 W (+30 dBm)	
Impedance	50 Ω	Input and Output
Connectors	SMA, 1x plug, 1x jack	
Dimensions (W x D x H)	1.80” x 0.60” x 0.40” 45.72 x15.24 x 10.16 mm	Package including connectors
Weight	14 g (0.49 oz.)	
Operating Temp.	-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	

HL9450 Rise Time and Group Delay

Figure 1 shows the 1 V step response for various HL9450 options. *Figure 2* shows the group delay (ps) over the operating frequency range of these same options.

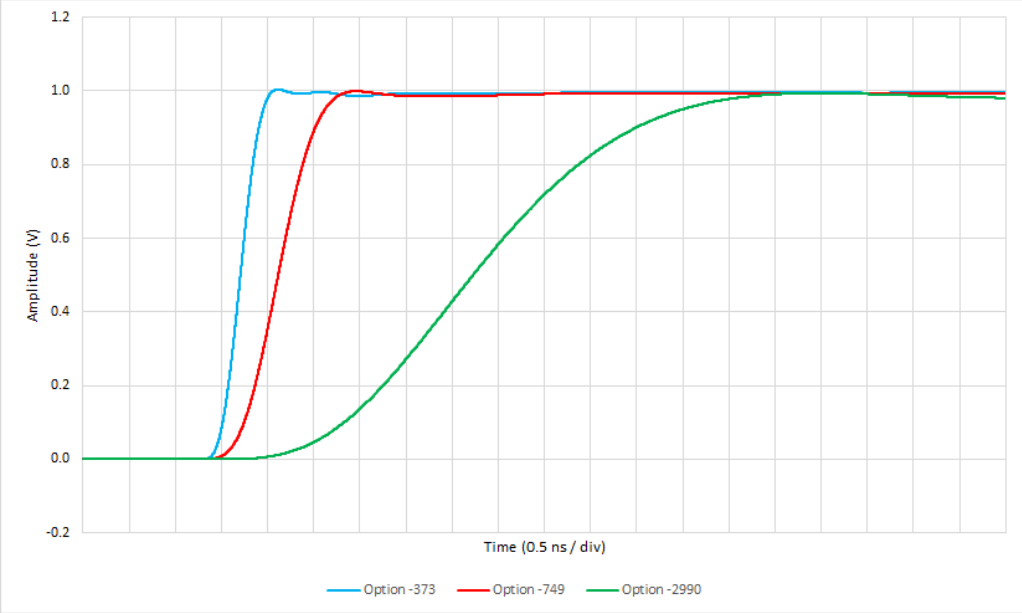

Figure 1: Typical HL9450 step response, various options

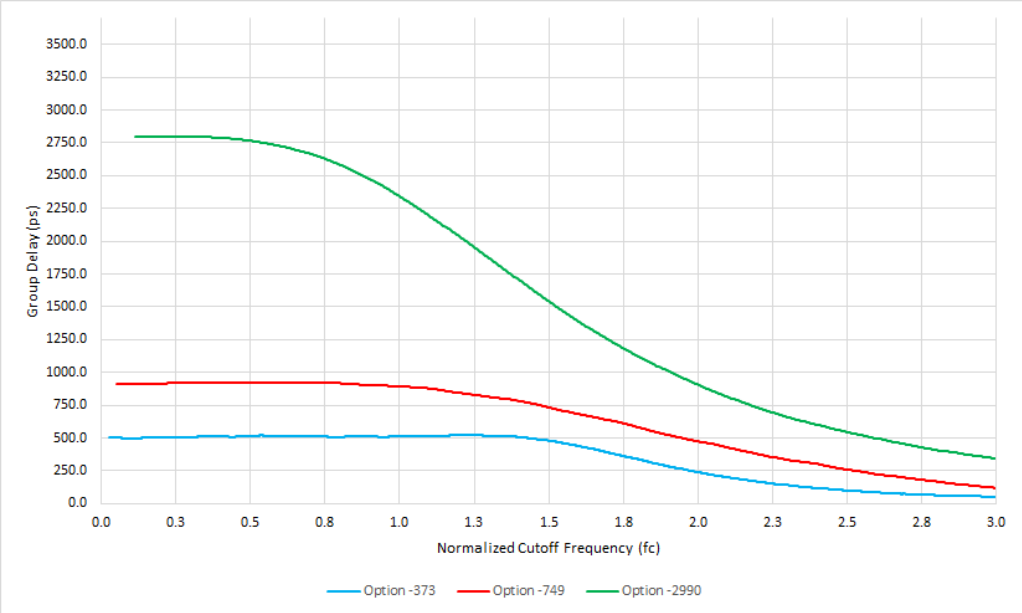

Figure 2: Typical HL9450 group delay, various options

HL9450 Insertion Loss and Return Loss

Figure 3 shows the Insertion Loss and *Figure 4* shows the Return Loss on various HL9450 options over the operating frequency range.

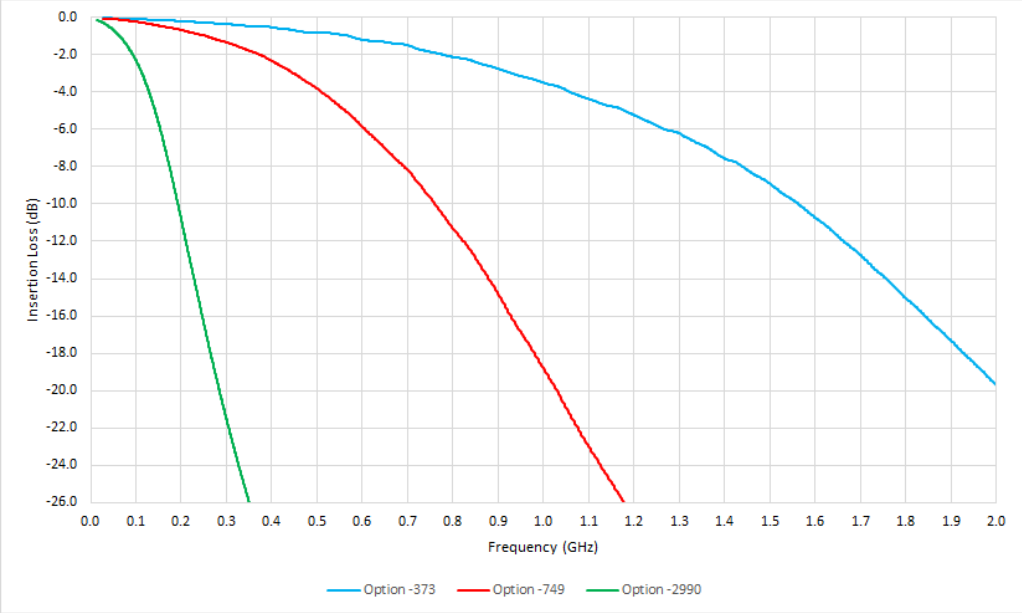

Figure 3: Typical HL9450 insertion loss, various options

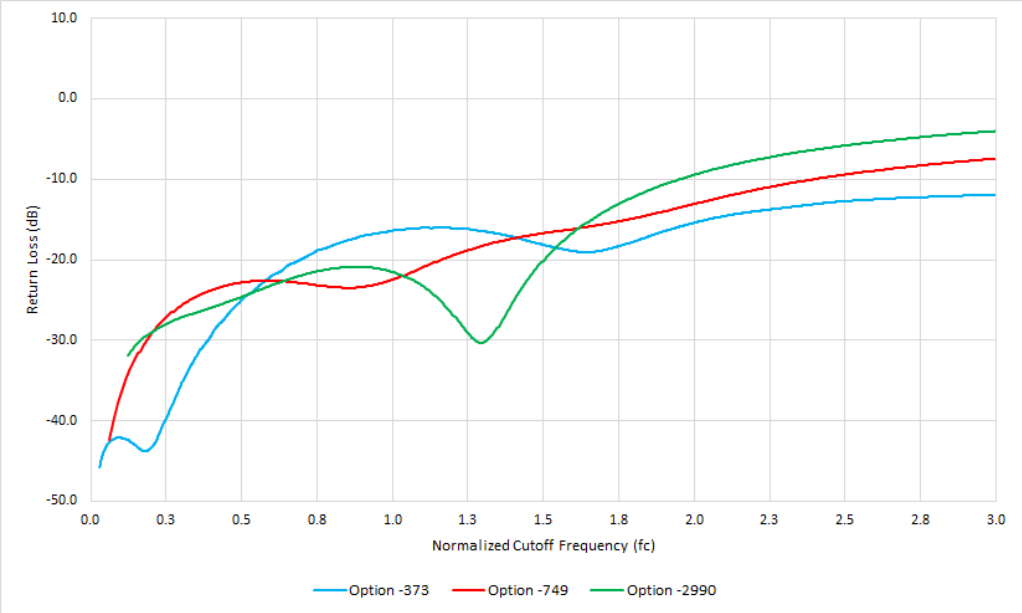

Figure 4: Typical HL9450 return loss, various options

HL9450 Dimensional Drawing

Figure 8 shows a mechanical drawing of an HL9450. Unless otherwise noted, all units are in inches. See page 2 for full dimensions.

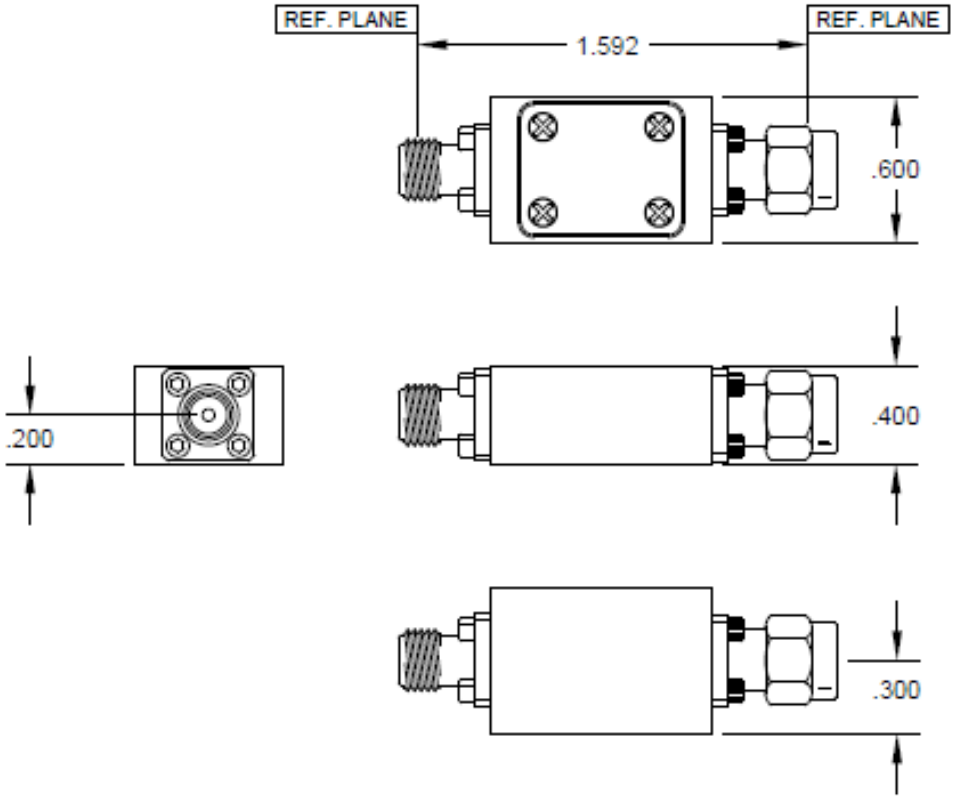

Fig 8: HL9450 Mechanical Drawing