



PRODUCT SUMMARY

The HL9464 is an impedance-matched pick-off tee with a flat frequency response from DC to 40 GHz on both the thru and pick-off lines.

It is suitable as a trigger source with minimum perturbation of the thru signal path.

Digital oscilloscope applications include pre-scaler triggering, synchronization, and clock/data recovery.

DEPLOYMENT NOTES

Some of the specifications in this datasheet are only applicable to matched pairs of devices and are labeled accordingly.

S-PARAMETERS

S-parameters are available on our website.

AVAILABLE OPTIONS

The following options and configurations are available for this product:

- M, matched pair
- U, unmatched part(s)

- JJJ, jack (female), all ports
- JPJ, jack (female) thru in and pick-off; plug (male) thru out

HL9464 Broadband Z-matched Pick-off Tee (40 GHz)

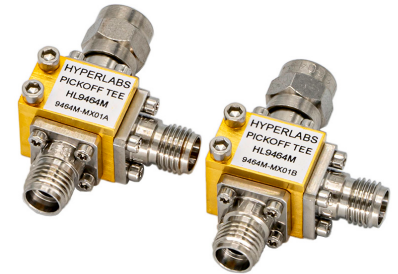
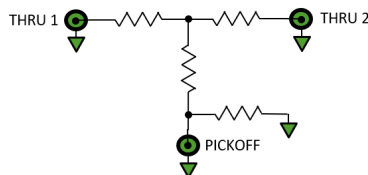
Key Features and Technical Specifications¹

Bandwidth	DC to 40 GHz, thru and pick-off lines
Insertion Loss	3.5 ± 0.5 dB, thru line 10.5 ± 1 dB, pick-off line See Fig. 1
Amplitude Match (opt. -M only)	± 0.1 dB See Figs. 3-4
Phase Match (opt. -M only)	± 2°, f = 10 GHz ± 5°, f = 20 GHz
Return Loss	< 15 dB, f ≤ 30 GHz, thru line < 10 dB, f > 30 GHz, thru line < 20 dB, f ≤ 20 GHz, pick-off line < 15 dB, f > 20 GHz, pick-off line See Fig. 5
Group Delay	≈ 110 ps, thru line (opt. -JJJ) ≈ 90 ps, thru line (opt. -JPJ) ≈ 120 ps, pick-off line (all opts.) See Fig. 2
Connectors	2.92 mm jack, all ports (opt. -JJJ) 2.92 mm jack, Thru 1 and Pick-off; 2.92 mm plug, Thru 2 (opt. -JPJ)
Unit Dimensions	26.41 x 22.86 x 13.59 mm 1.10" x 0.90" x 0.54"
RoHS Compliant	Yes
REACH Compliant	Yes

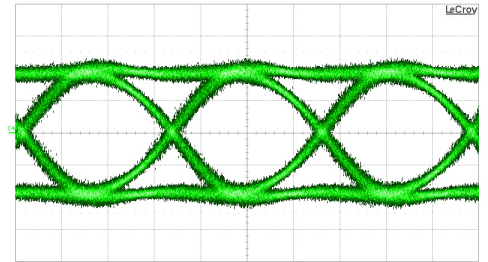
NOTE 1 - The specification in this table are typical. Full specifications are available on Page 2 of this datasheet.

DEVICE PORT ASSIGNMENTS

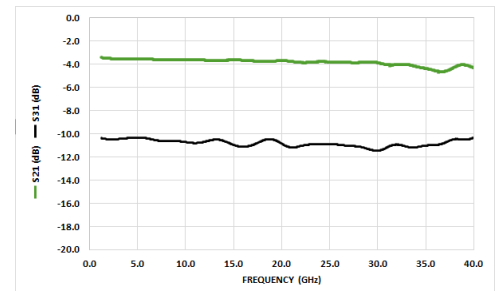
For the purposes of this datasheet, the below port assignments are used.



HL9464, option -M-JPJ shown



28 Gbps PRBS31 pattern on the RF Out port of HL9464-JJJ; see also Figs. 7-12



Typical Insertion Loss on thru and pick-off lines of HL9464 (opt. -JPJ); see also Fig. 1

HL9464 Full Specifications

Parameter	Minimum	Typical	Maximum	Comments
Bandwidth		DC to 40 GHz, thru and pick-off		3 dB roll-off point, relative to nominal insertion loss
Insertion Loss		3.5 ± 0.5 dB, thru 10.5 ± 1 dB, pick-off		All options
Amplitude Match		± 0.1 dB		Matched pair (opt. -M) only
Phase Match		± 2.5°, f = 10 GHz ± 5°, f = 20 GHz		Matched pair (opt. -M) only
Return Loss, Thru		< 15 dB, f ≤ 30 GHz < 10 dB, f > 30 GHz		
Return Loss, Pick-off		< 20 dB, f ≤ 20 GHz < 15 dB, f > 20 GHz		
Rise Time		9.0 ps, thru and pick-off		
Group Delay		110 ps, thru (opt. -JJJ) 90 ps, thru (opt. -JPJ) 120 ps, pick-off (all options)		
Max Input Power		+30 dBm		
Impedance		50 Ω, all ports		
Connectors		2.92 mm jack/jack/jack (opt. -JJJ) 2.92 mm jack/plug/jack (opt. -JPJ)		Thru 1 / Thru 2 / Pick-off
Dimensions (W x D x H)		26.41 x 22.86 x 13.59 mm 1.10" x 0.90" x 0.54"		Single unit (opt. -U)
Weight		12.5 g 0.44 oz		Single unit (opt. -U)
Operating Temperature	-40° C		+85° C	Case temperature
Storage Temperature	-40° C		125° C	
RoHS Compliant	Yes, assembled with lead-free solder			
REACH Compliant	Yes			
Warranty	1 year, repair or replacement; see website for details			



HL9464 Insertion Loss

Figure 1 shows the typical insertion loss of the HL9464 along the thru and pick-off lines from DC to 40 GHz.

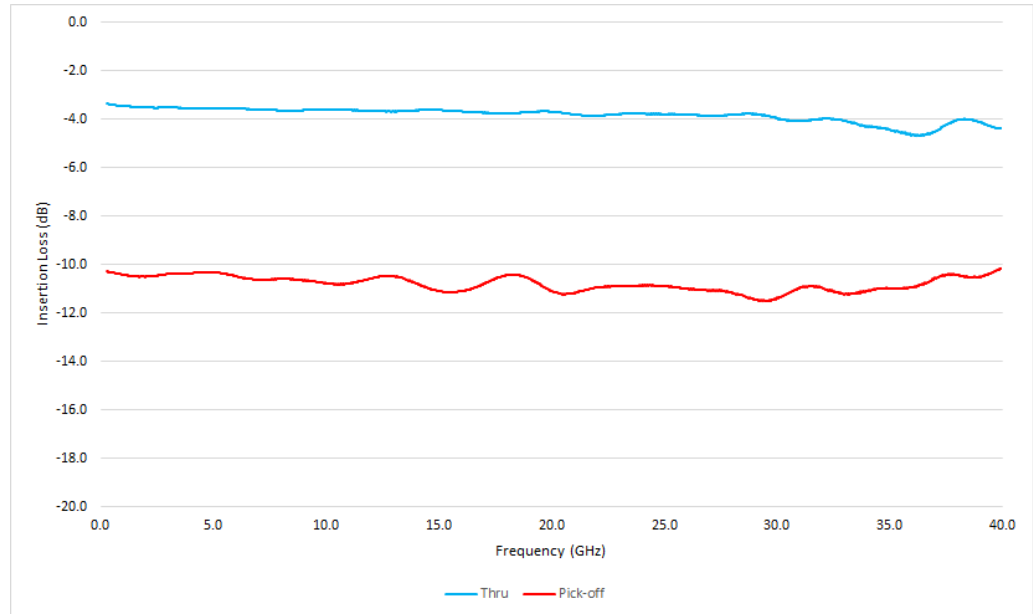


Figure 1: HL9464 Insertion Loss (opt. -JPJ)

HL9464 Group Delay

Figure 2 shows the typical group delay of the HL9464 along the thru and pick-off lines to 40 GHz.

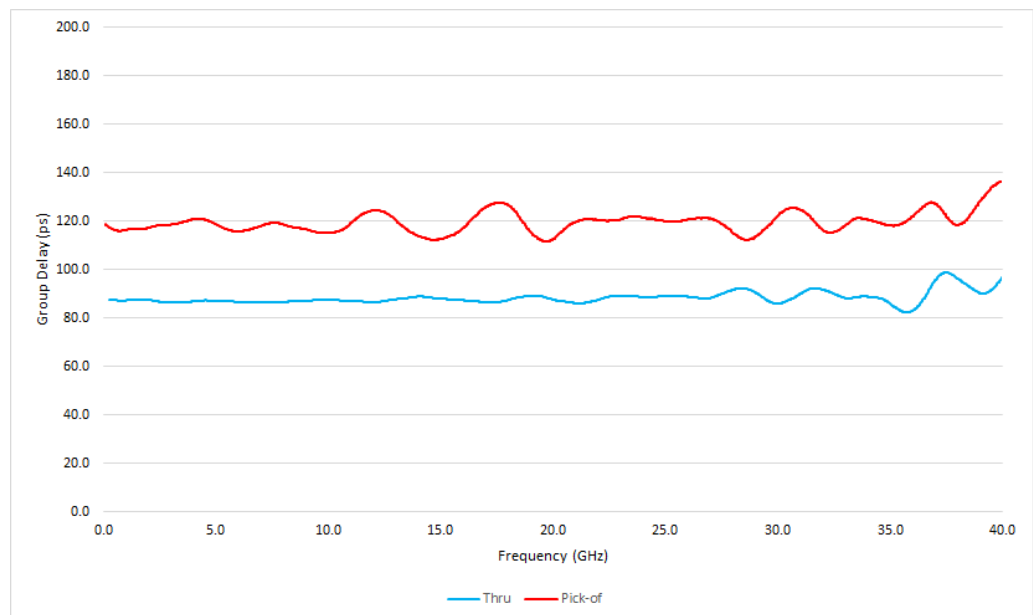


Figure 2: HL9464 Group Delay (opt. -JJJ)



HL9464 Amplitude Match

Figures 3-4 show the amplitude match of two matched HL9464 devices along the thru and pick-off lines, respectively, from DC to 40 GHz.

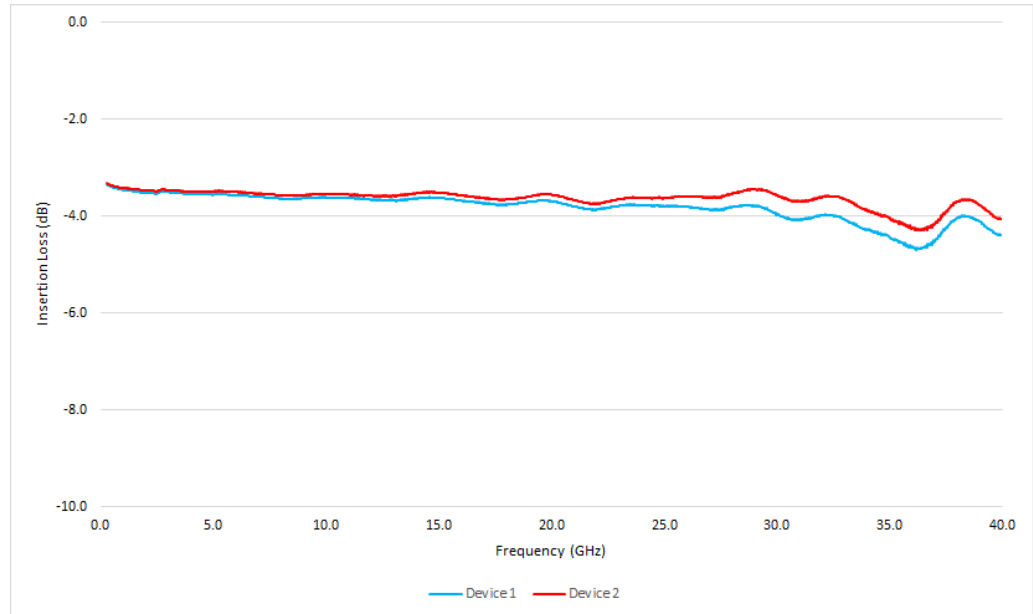


Figure 3: HL9464 Thru Amplitude Match (opt. -M-JPJ)

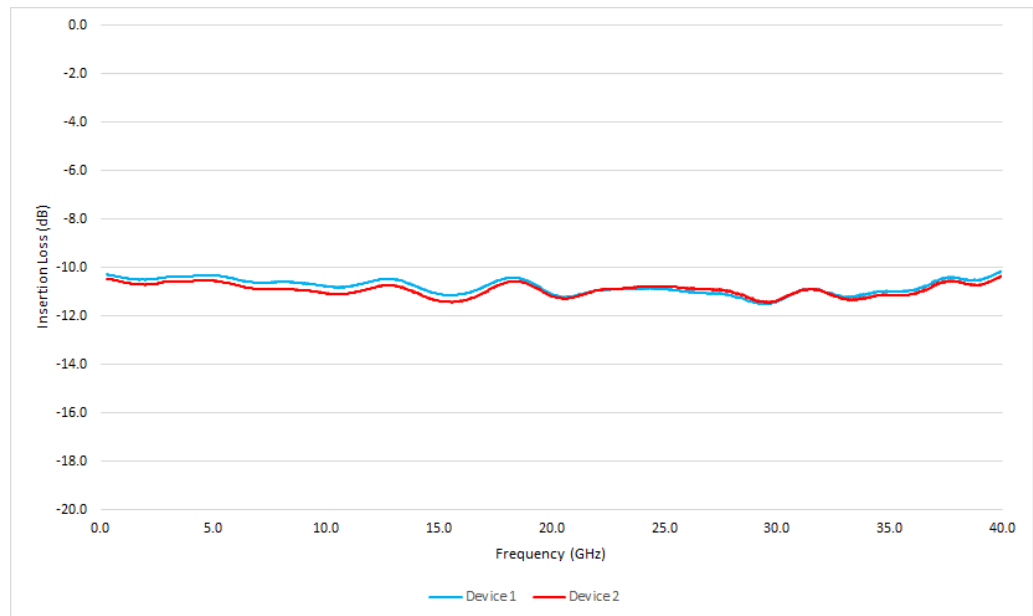


Figure 4: HL9464 Pick-off Amplitude Match (opt. -M-JPJ)



HL9464 Return Loss and VSWR

Figure 5 shows typical return loss on all ports of an HL9464 from DC to 40 GHz. Figure 6 shows the corresponding Voltage Standing Wave Ratio (VSWR).

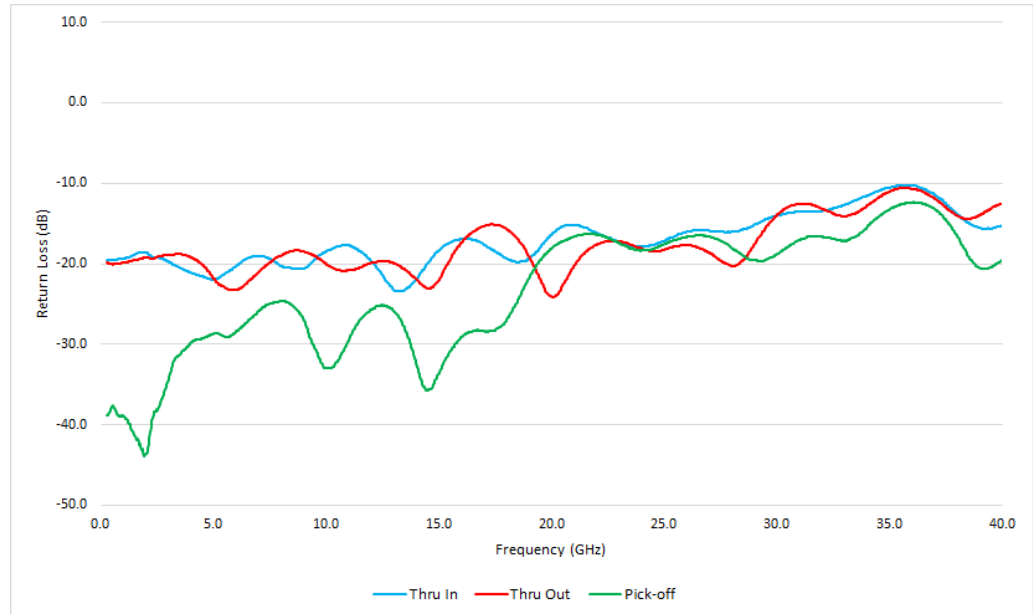


Figure 5: HL9464 Return Loss (opt. -JPJ)

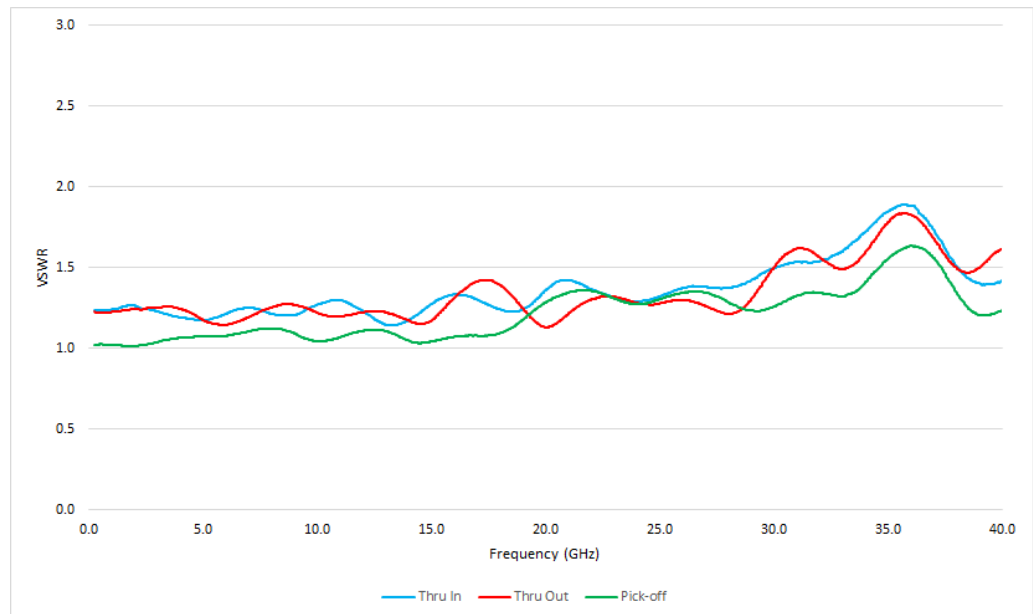


Figure 6: HL9464 VSWR (opt. -JPJ)



HL9464 Eye Diagrams

The eye diagrams in *Figures 7-9* show a PRBS31 pattern at 28 Gbps. The input signal has a 1.53 V amplitude and is shown at 450 mV/div. The thru and pick-off outputs are shown at 275 mV/div.

Figures 10-12 were generated by a PRBS31 pattern at 12.5 Gbps. The input signal has amplitude of 1.49 V and is shown at 450 mV/div. The thru and pick-off outputs are shown at 275 mV/div.

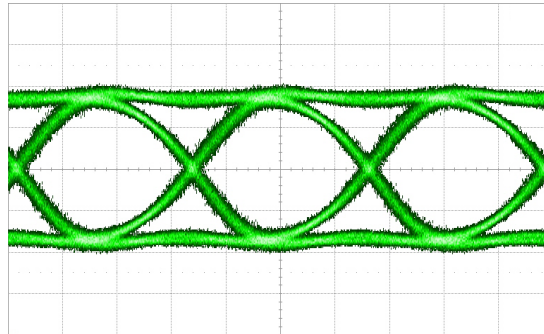


Figure 7: 28 Gbps PRBS31 pattern on RF In

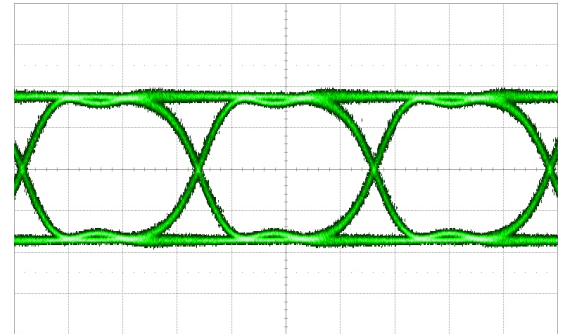


Figure 10: 12.5 Gbps PRBS31 pattern on RF In

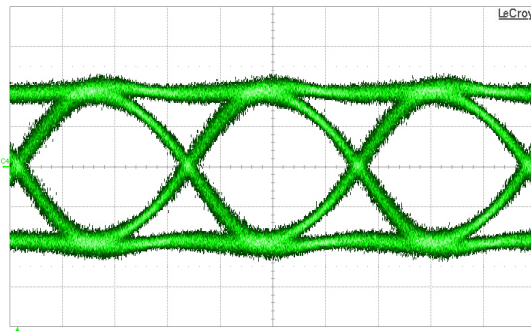


Figure 8: 28 Gbps PRBS31 pattern on Thru Out

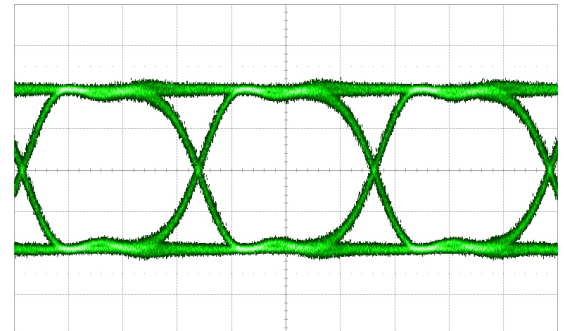


Figure 11: 12.5 Gbps PRBS31 pattern on Thru Out

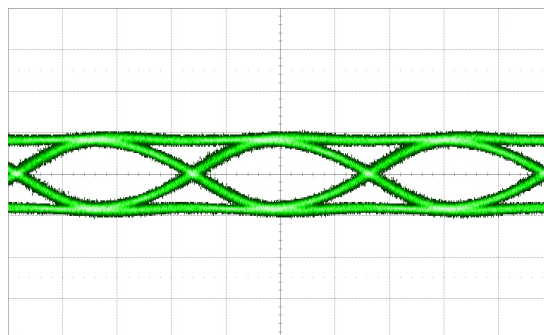


Figure 9: 28 Gbps PRBS31 pattern on Pick-off Out

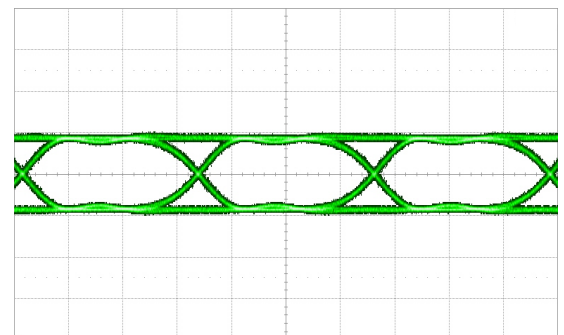


Figure 12: 12.5 Gbps PRBS31 pattern on Pick-off Out



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HL9464 Dimensional Drawing

Figure 10 shows a mechanical drawing of an HL9464, option -JPJ. Unless otherwise noted, all units are in inches.

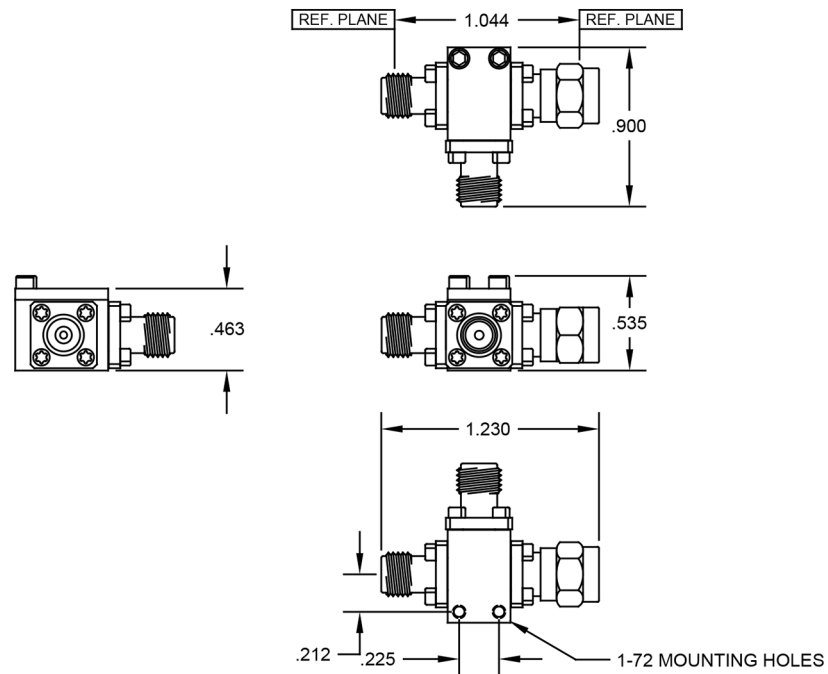


Figure 10: HL9464 mechanical drawing (opt. -JPJ)