



HL5867 Broadband Linear Amplifier (30 GHz)

Key Features and Technical Specifications¹

Bandwidth (3 dB)	35 kHz to 30 GHz (opt. -DD)
Small Signal Gain	13 dB See Fig. 1
Deviation from Linear Phase	± 2.5 deg., 50 MHz to 20 GHz (opt. -GD) See Fig. 6
Amplitude Deviation	$\pm 2.5\%$, 0-60° C See Fig. 3
XP Deviation	$\pm 2\%$, 0-60° C See Fig. 4
Return Loss	12 dB, input 12 dB, output See Fig. 2
Max Power Out (-1 dB gain comp.)	12.5 dBm
Dimensions	55.9 x 33.7 x 10.2 mm (opt. -29-JJ) 2.2" x 1.326" x 0.400"
Weight	25 g (0.88 oz)
Temperature Limits	0° to +60° C, operating
RoHS Compliant	Yes, assembled with lead-free solder
REACH Compliant	Yes
Warranty	1 year, see website

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

PRODUCT SUMMARY

The HL5867 is an ultra-broadband, thermally-compensated linear amplifier that demonstrates exceptional gain flatness over a typical bandwidth of 35 kHz to 30 GHz.

This model is available with two options optimized for RF or data applications.

Option -GD offers ultra-linear phase response for use in RF systems where amplification is needed without a significant phase distortion.

The -DD option is optimized as a data driver to amplify signals with a minimum amount of eye distortion. This option is ideal for use as a linear gain block in applications such as fiber optic receiver channels or PAM4 signaling up to 32 Gbps.

DEPLOYMENT NOTES

All specifications contained herein are typical unless otherwise noted.

S-PARAMETERS

S-parameters files are available on our website.

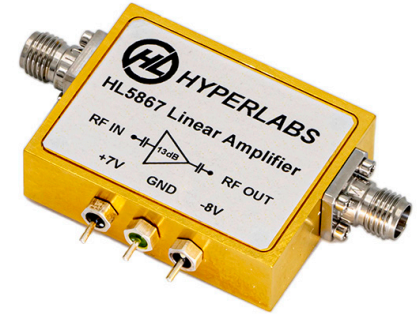
AVAILABLE OPTIONS

The following options and configurations are available for this product:

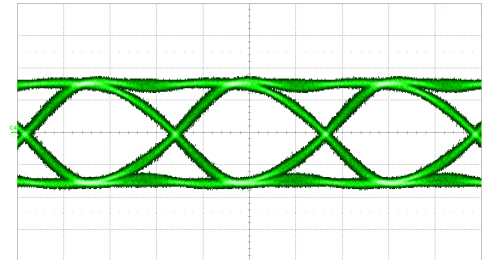
- DD, optimized for data driver applications
- GD, optimized for group delay linearity

- 24, 2.4 mm connectors
- 29, 2.92 mm connectors

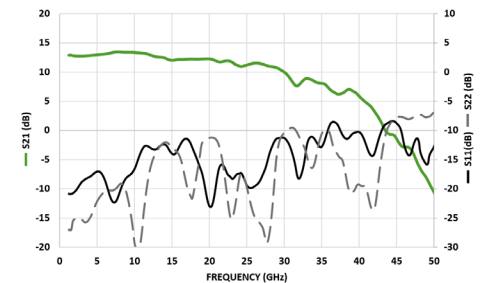
- PP, plug in & out
- PJ, plug in, jack out
- JJ, jack in & out
- JP, jack in, plug out



HL5867, option -29-JJ shown



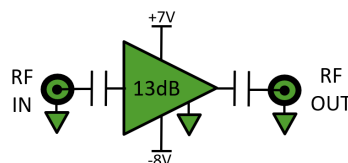
28 Gbps PRBS31 pattern on the RF Out port of HL5867-DD-29-JJ; see also Figs. 7-12



Typical Insertion Loss and Return Loss of HL5867-DD-29-JJ; see also Figs. 1-2

DEVICE PORT ASSIGNMENTS

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



HL5867 Full Specifications

Parameter	Conditions	Minimum	Typical	Maximum	Comments
Upper 3 dB Frequency	$-30 \text{ dBm} \leq P_{in} \leq -5 \text{ dBm}$	27 GHz (opt. -DD) 20 GHz (opt. -GD)	30 GHz (opt. -DD) 23 GHz (opt. -GD)		3 dB roll-off point, relative relative to small signal gain
Lower 3 dB Frequency			35 kHz		3 dB roll-off point,
Small Signal Gain	Input signal = -30 dBm	12 dB	13 dB	14 dB	Avg. from 35 MHz to 2 GHz
Gain Flatness			$\pm 0.5 \text{ dB}$ (opt. -DD)		50 MHz < f < 15 GHz
Deviation from LLinear Phase			$\pm 2.5 \text{ deg.}$ (opt. -GD) $\pm 7 \text{ deg.}$ (opt. -DD)		50 MHz < f < 20 GHz
Amplitude Deviation			$\pm 2.5\%$, 0-60° C		
XP Deviation			$\pm 2\%$, 0-60° C		
Return Loss, Input			12 dB		50 MHz < f < 30 GHz
Return Loss, Output			12 dB		50 MHz < f < 30 GHz
Group Delay			303 ps		
Input Referred Noise Voltage			105 $\mu\text{V rms}$		20 GHz broadband measurement
Noise Figure			5 dB (opt. -GD)	5.5 dB (opt. -GD)	f = 1 GHz
Max Power Out (1 dB gain compression)			12.5 dBm		
Impedance			50 Ω		
Supply Voltage (+)		+6.5 V_{DC}	+7 V_{DC}	+10 V_{DC}	
Supply Voltage (-)		-8.5 V_{DC}	-8 V_{DC}	-7.5 V_{DC}	
Supply Current (+)			110 mA		
Supply Current (-)			40 mA		
Power Dissipation			1.1 W	2 W	



HL5867 Full Specifications (continued)

Parameter	Conditions	Minimum	Typical	Maximum	Comments
Maximum Allowed Input				15 dBm	Input damage threshold
Input DC Bias Range		-20 V _{DC}		+20 V _{DC}	Input is AC coupled
Output DC Bias Range		-20 V _{DC}		+20 V _{DC}	Output is AC coupled
Operating Temperature		0° C		60° C	Ambient temperature
Storage Temperature		-40° C		125° C	
Polarity	Inverting				
Coupling	AC, input and output				
RF Connectors	2.92 mm jack/female (opt. -29) 2.4 mm jack/female (opt. -24)				
DC Connector	Solder pins				
Dimensions (W x D x H)	55.9 x 33.7 x 10.2 mm (opt. -29-JJ) 2.2" x 1.325" x 0.400"				
Weight	25 g. (0.88 oz.)				
RoHS Compliant	Yes, assembled with lead-free solder				
REACH Compliant	Yes				
Warranty	1 year, repair or replacement; see website for details				



HL5867 Gain

Figure 1 shows the gain of the HL5867 to 50 GHz.

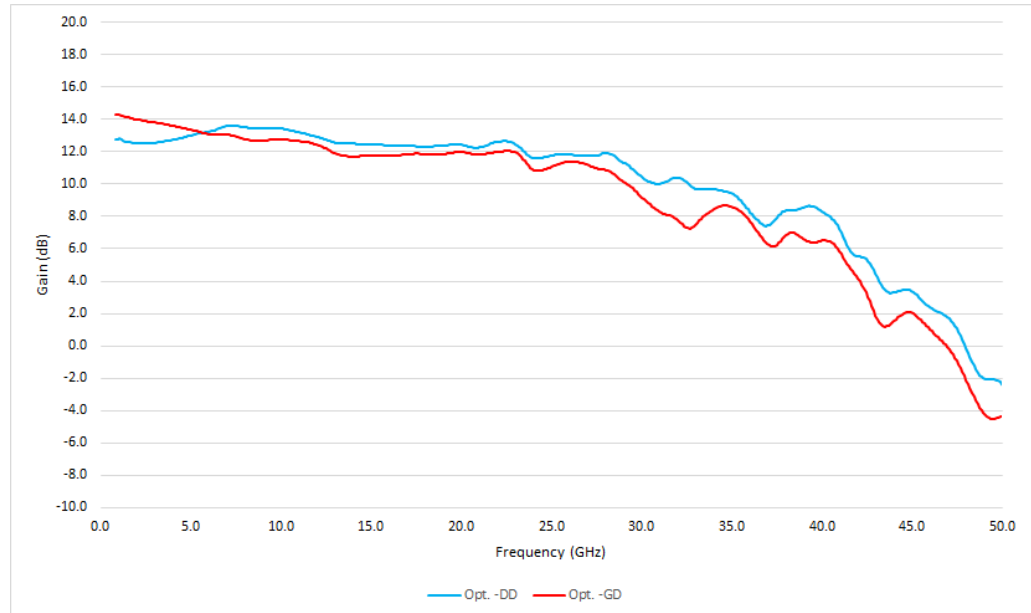


Figure 1: HL5867 Gain (opt. -29-JJ)

HL5867 Return Loss

Figure 2 shows the return loss of the HL5867 to 50 GHz.

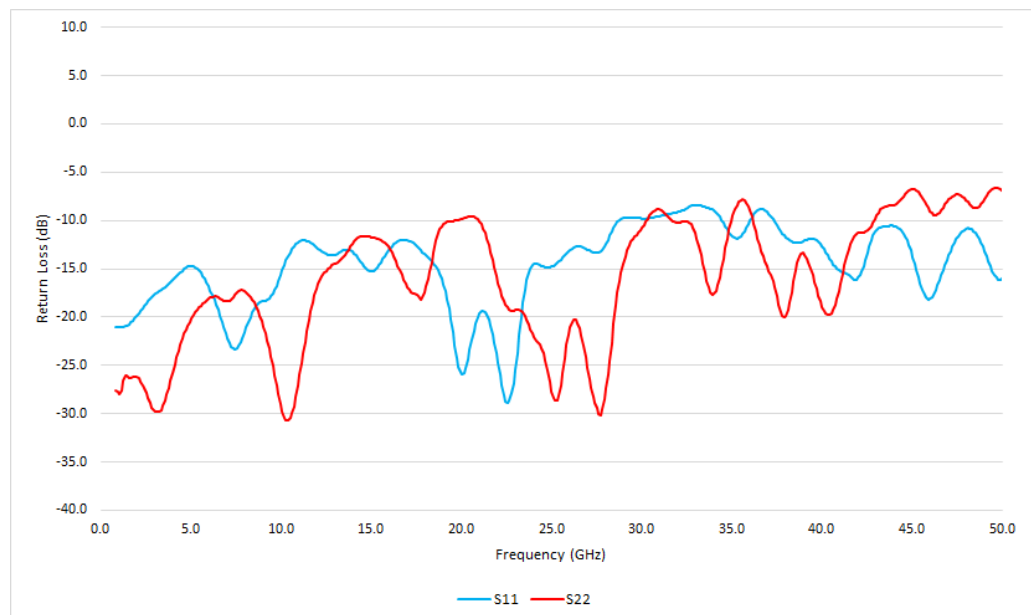


Figure 2: HL5867 Return Loss (opt. -DD-29-JJ)

HL5867 Performance Over Temperature

Figures 3-4 show the amplitude deviation and crossing point (XP) deviation, respectively, over the operating temperature range of 0 to +60 °C.

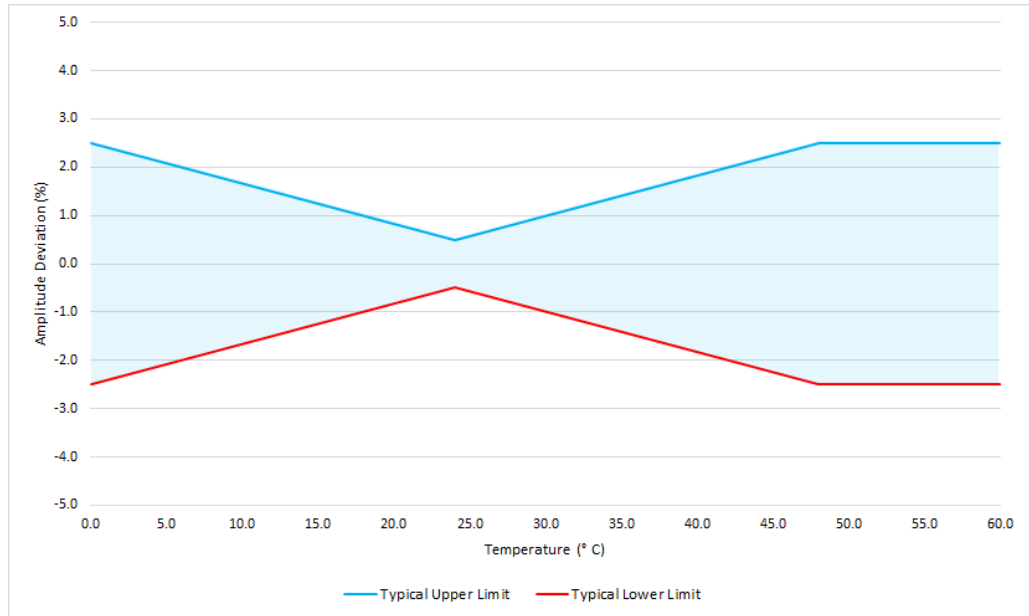


Figure 3: HL5867 Amplitude Deviation (all options)

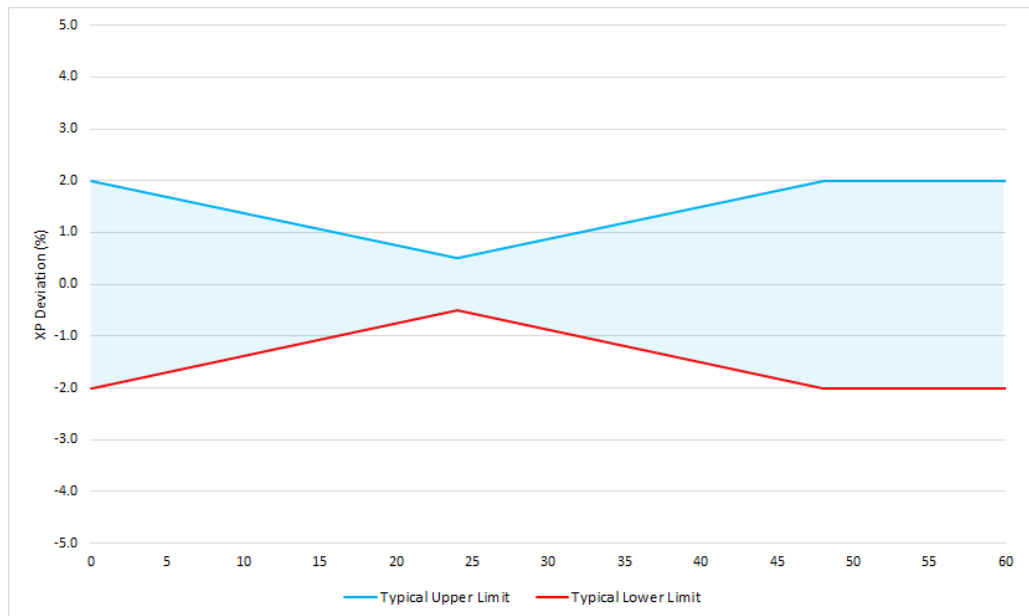


Figure 4: HL5867 Crossing Point Deviation (all options)

HL5867 Group Delay and Linear Phase

Figure 5 shows the group delay of the HL5867 to 30 GHz.

For applications requiring exceptional group delay and phase linearity, devices optimized to these specifications are available as Option -GD. Figure 6 presents this information as deviation from linear phase.

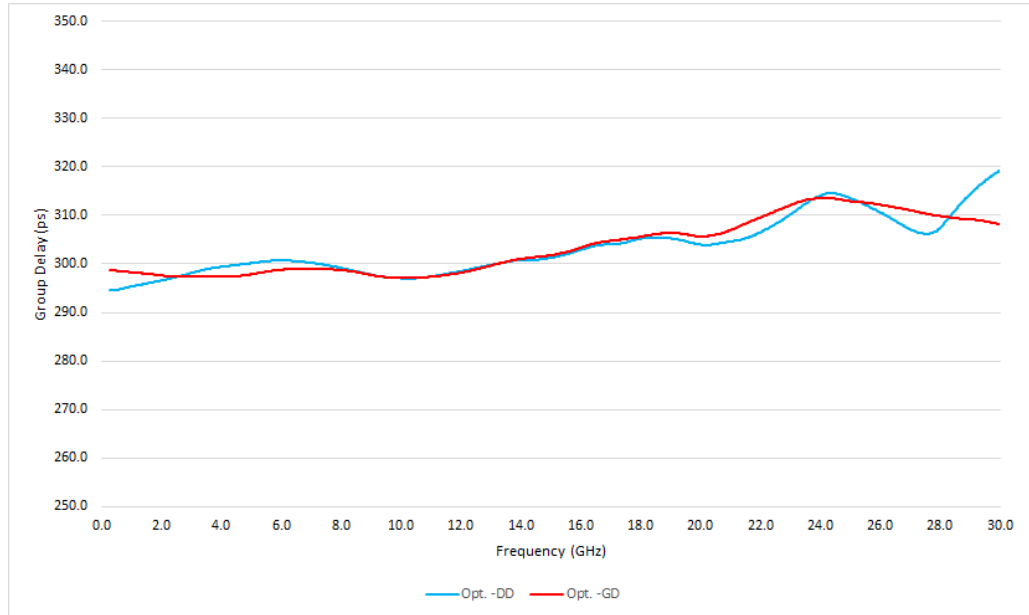


Figure 5: HL5867 Group Delay (opt. -GD-29-JJ)

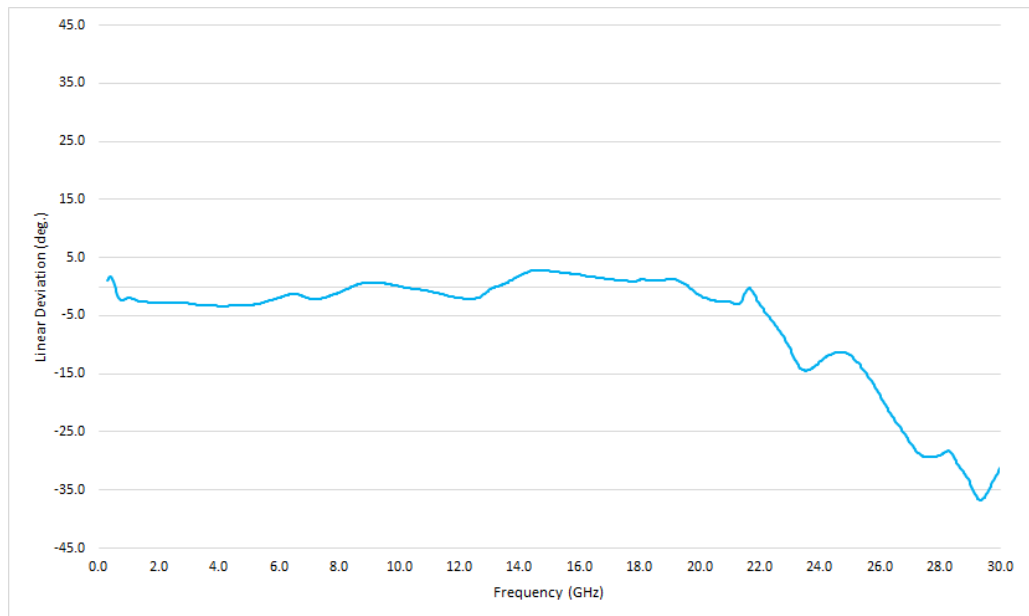


Figure 6: HL5867 Linear Phase Deviation (opt. -GD-29-JJ)



HL5867 Eye Diagrams

Option HL5867-DD is optimized as a data driver and outputs exceptionally clean eyes.

Figure 7 shows an input signal with 250 mV amplitude at 85 mV/div.

Figures 8-12 show output eyes generated from a variety of input patterns. All have an amplitude of 360 mV/div.

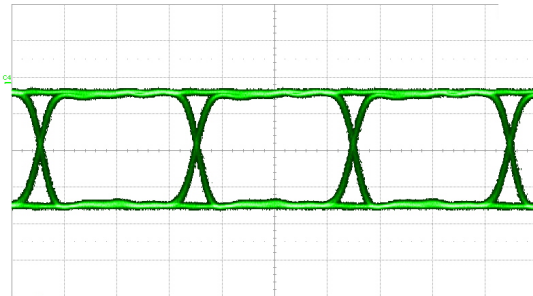


Figure 7: 12.5 Gbps PRBS31 pattern on RF In

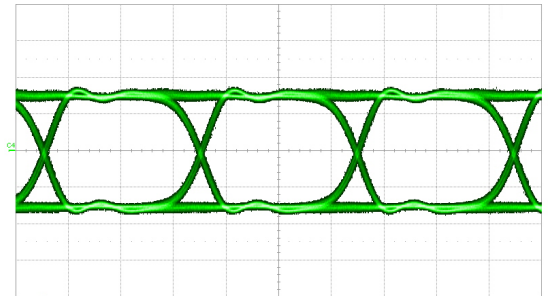


Figure 8: 12.5 Gbps PRBS31 pattern on RF Out

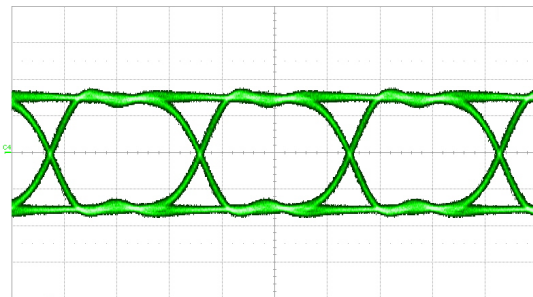


Figure 9: 16 Gbps PRBS31 pattern on RF Out

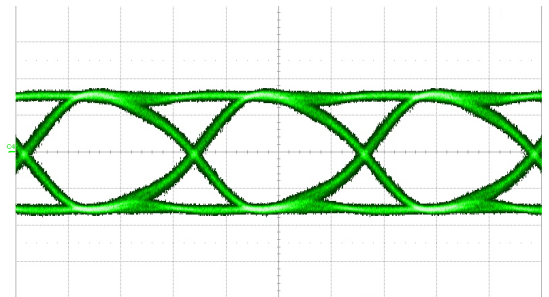


Figure 10: 25 Gbps PRBS31 pattern on RF Out

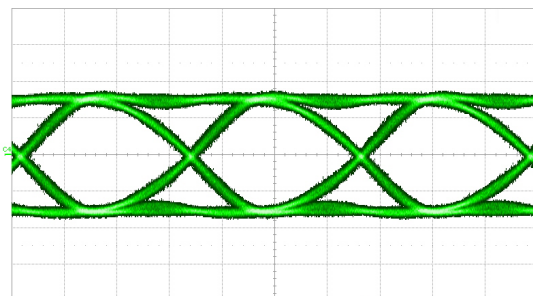


Figure 11: 28 Gbps PRBS31 pattern on RF Out

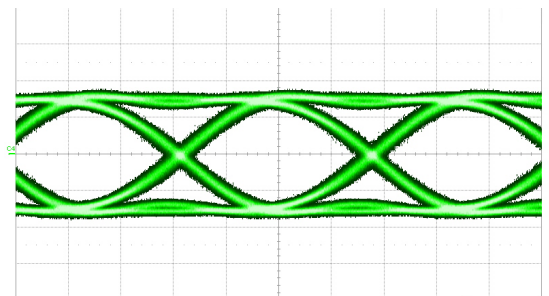


Figure 12: 32 Gbps PRBS31 pattern on RF Out

HL5867 Dimensional Drawing

Figure 13 shows a mechanical drawing of an HL5867, option -29-JJ. Unless otherwise noted, all units are in inches.

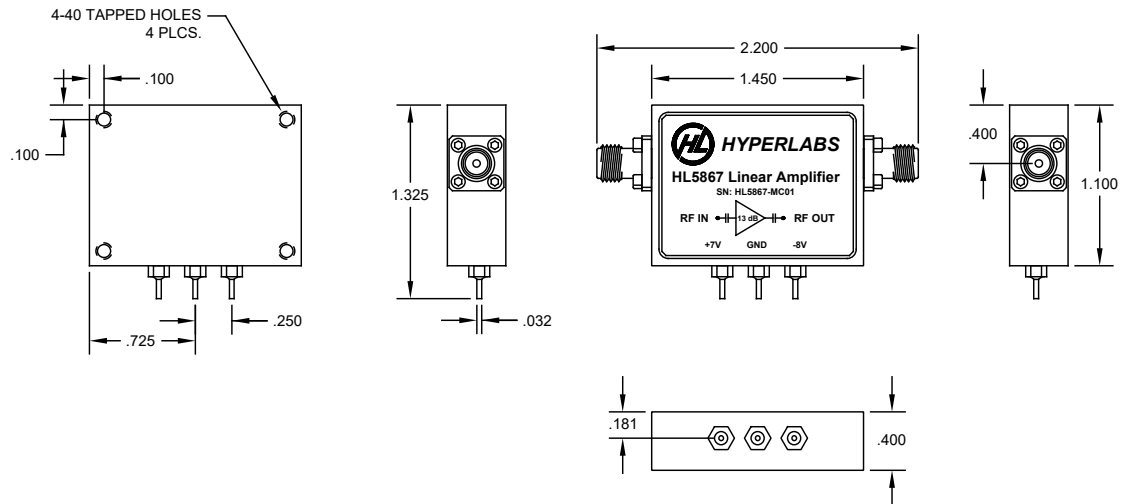


Figure 13: HL5867 mechanical drawing (opt. -29-JJ), inches