



Mini-Circuits

LOW CURRENT, WIDEBAND

# Monolithic Amplifier

EHC-24L+

50Ω DC to 20 GHz

## THE BIG DEAL

- Very Wideband, DC to 20 GHz
- Low Current, Typ. 19.1 mA
- Excellent Gain Flatness  
Typ.  $\pm 1.1$  dB up to 10 GHz  
Typ.  $\pm 2.7$  dB up to 20 GHz
- Repeatable Performance



Generic photo used for illustration purposes only

CASE STYLE: AF320

### +RoHS Compliant

The +Suffix identifies RoHS Compliance.  
See our website for methodologies and qualifications

## APPLICATIONS

- Instrumentation
- Cable Infrastructure
- 5G

## PRODUCT OVERVIEW

The EHC-24L+ is a low current, wideband gain block that operates up to 20 GHz and is fabricated using a highly reliable HBT process. This Darlington pair amplifier delivers excellent gain flatness and good return loss with low current consumption across a very wide bandwidth. The specified performance is achieved with no external matching components, making this part extremely simple to implement. It has highly repeatable performance from lot to lot and it is enclosed in a 4-lead ceramic package.

## KEY FEATURES

Feature	Advantages
Very Wideband: DC to 20 GHz	General purpose wideband amplifier is suitable for various applications.
Low Current, 19.1 mA Typ.	Low current consumption is ideal for use in amplifier chains where power consumption needs to be minimized.
Excellent Gain Flatness $\pm 1.1$ dB up to 10 GHz Typ. $\pm 2.7$ dB up to 20 GHz Typ.	As a desirable characteristic of a wideband amplifier, excellent gain flatness allows amplification of a signal with minimal impact to cascaded performance.
No External Matching Components Required	EHC-24L+ provides good input and output return loss up to 20 GHz without the need for any external matching components.





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## ELECTRICAL SPECIFICATIONS AT +25°C, $V_s = +5$ V UNLESS NOTED OTHERWISE

Parameter	Condition (GHz)	$V_s = +5$ V <sup>1</sup>			Units
		Min.	Typ.	Max.	
Frequency Range <sup>2</sup>		0.01		20	GHz
Gain	0.01	11.9	15.5	14.7	dB
	5		14.1		
	8		13.4		
	12		12.8		
	15		12.5		
	20		10.2		
Input Return Loss	0.01		18		dB
	5		14		
	8		15		
	12		10		
	15		15		
	20		11		
Output Return Loss	0.01		15		dB
	5		14		
	8		16		
	12		11		
	15		16		
	20		11		
Reverse Isolation	10		21		dB
Output Power @ 1 dB Compression	0.01		+7.0		dBm
	5		+5.5		
	8		+6.8		
	12		+4.4		
	15		+2.6		
	20		-0.6		
Output IP <sub>3</sub> <sup>3</sup>	0.01		+19.2		dBm
	5		+17.0		
	8		+16.6		
	12		+12.8		
	15		+11.3		
	20		+9.6		
Noise Figure	0.01		5.2		dB
	5		5.2		
	8		5.1		
	12		5.3		
	15		5.2		
	20		5.7		
DC Supply ( $V_s$ )		+4.75	+5	+5.25	V
Device Operating Current			19.1	24	mA
Device Current Variation vs. Temperature <sup>4</sup>			60		μA/°C
Device Current Variation vs. Voltage <sup>5</sup>			0.0188		mA/mV
Thermal Resistance, Junction-to-Ground Lead at +85°C Stage Temp.			349		°C/W

1. Measured on Mini-Circuits Characterization test board TB-EHC-24L+. See Characterization Test Circuit (Fig. 1).

2. Low frequency cut-off determined by external coupling capacitors & RF choke.

3. Tested at  $P_{OUT} = -5$  dBm/ton.

4. (Current at +85°C - Current -45°C) / 130.

5. (Current at +5.25 V - Current at +4.75 V) / 1000.





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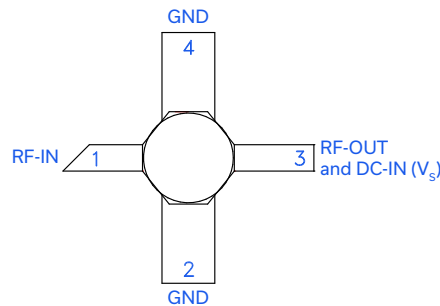
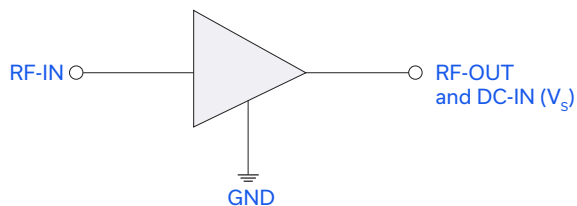
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**ABSOLUTE MAXIMUM RATINGS<sup>6</sup>**

Parameter	Ratings
Operating Temperature (Ground Lead)	-40°C to +85°C
Storage Temperature	-55°C to +100°C
Junction Temperature	+150°C
Power Dissipation	0.2 W
Input Power (CW)	+22 dBm (5 minutes max.) +8 dBm (continuous)
V <sub>S</sub> Supply Voltage (Pin 3)	+6 V

6. Permanent damage may occur if any of these limits are exceeded. Electrical maximum ratings are not intended for continuous normal operation.

**SIMPLIFIED SCHEMATIC & PAD DESCRIPTION**

Function	Pad Number	Description
RF-IN	1	RF input
RF-OUT & DC-IN (V <sub>S</sub> )	3	RF output and DC input
GND	2,4	Ground



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## CHARACTERIZATION TEST CIRCUIT

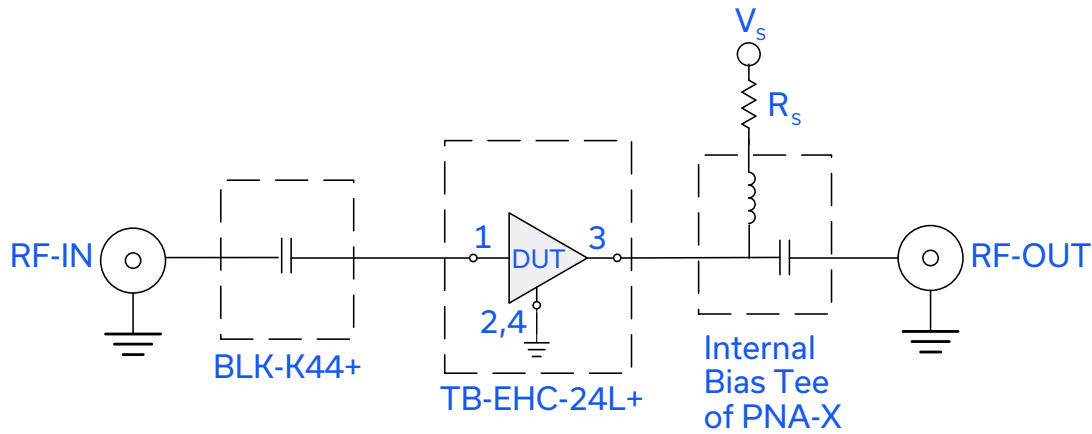


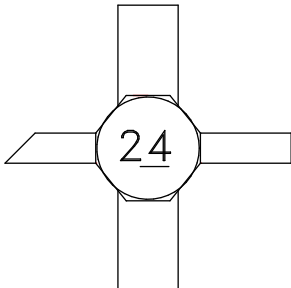
Fig 1. Characterization Circuit

Note: This block diagram is used for characterization. (DUT soldered on Mini-Circuits Characterization test board TB-EHC-24L+) Gain, Return Loss, Output Power at 1 dB Compression (P1 dB), Output IP3 (OIP3) and Noise Figure measured using Agilent's N5242A PNA- X microwave network analyzer.  $R_s = 49.9\Omega$ ,  $V_s = +5\text{ V}$

Conditions:

1. Gain and Return Loss:  $P_{IN} = -25\text{ dBm}$
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -5 dBm/tone at output.

## PRODUCT MARKING





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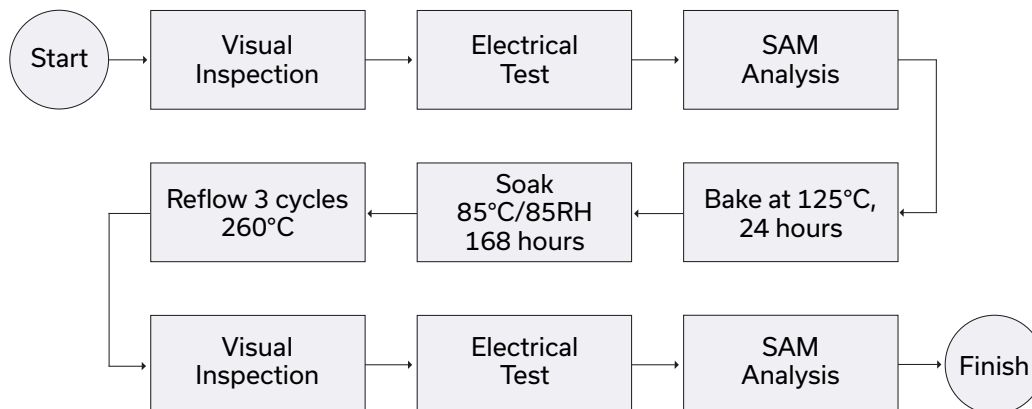
ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. TO ACCESS [CLICK HERE](#)

Performance Data	Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file)
Case Style	AF320 Ceramic Package
Tape & Reel Standard Quantities Available on Reel	F26 7" Reels 1K devices
Suggested Layout for PCB Design	PL-597
Evaluation Board	TB-EHC-24L+
Environmental Ratings	ENV08T1

## ESD RATING

Human Body Model (HBM): Class 1A (Pass 250 V) in accordance with ANSI/ESD STM 5.1 - 2001

## MSL TEST FLOW CHART



### NOTES

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)

